STRATEGIC COLLABORATION AND E-GOVERNANCE PERFORMANCE:
A STUDY OF SELECT PROJECTS IN INDIA

THESIS

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CANDIDATE'S DECLARATION

I, Jitendra Kumar Pandey, hereby certify that the thesis titled "**Strategic Collaboration and E-Governance Performance: A Study of Select Projects in India"**, submitted in fulfilment of the requirements for the award of the degree of Doctor of Philosophy (PhD), is an authentic record of my research work carried out under the guidance of Dr. Pradeep Kumar Suri. Any material borrowed or referred to in the study is duly acknowledged.

The matter presented in this thesis has not been submitted in part or fully to any other University or Institute for the award of any degree.

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CERTIFICATE

This is to certify that the thesis entitled **"Strategic Collaboration and E-Governance Performance: A Study of Select Projects in India"**, being submitted by Mr. Jitendra Kumar Pandey to the Delhi Technological University for the award of the degree of Doctor of Philosophy (PhD), is a record of bonafide research work carried out by him. He has worked under my guidance and supervision and fulfilled the requirements for the submission of the thesis, which has attained the standard required for a PhD degree at the University. The results presented in this thesis have not been submitted elsewhere for the award of any degree or diploma.

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ABSTRACT

Instances of usual practices of strategic collaboration are more prevalent in corporate sector as compared to public sector. It is attributable to the inherent objectives of these organizations. Corporate organizations collaborate to achieve their corporate values which are generally economy-oriented whereas, a government organization has different objectives to achieve, i.e., public values which are non-economic (social value). The need for organizations to collaborate arises due to several reasons. However, scarcity of resources and self-insufficiency are usually the key reasons. Organizations tend to collaborate with other organizations to have access to vital resources to achieve their objectives and goals. Emergent requirements also often impel organizations to collaborate to have access to divergent and precious resources for making their processes more efficient. E-governance is one of such emergent areas that requires access to multi-disciplinary resources for offering flawless citizen-centric services to the masses. These resources could be in the form of people, processes, government policies, etc. E-governance aims at delivering quality and useful services to the citizens in a better and improved way at their doorsteps with little or no extra efforts applied by them. Government organizations are required to strategically collaborate within and across, not only to have access to the vital resources but also, for improving e-governance performance. Studies have found that there has not been much success attained by e-governance projects in the context of developing countries. The partial success is attributed to various reasons, such as lack of access to the appropriate technology, lack of funds, lack of skilled manpower, and above all, the lack of a culture of strategic collaboration and alliance within and across government organizations. It is also learnt that government organizations generally work in silos and have different decision making, monitoring, and control mechanisms. The silo nature of working style also leads to the impediment to the path of creating a strategic collaborative environment and further affects collaborative e-governance performance.

Though a fair amount of research has been conducted on e-governance in the Indian context. These researches are primarily focused on the adoption of e-governance, delivery of e-governance services, e-governance performance

assessment, etc. So far, hardly any research has been conducted on analyzing strategic collaboration for improving e-governance performance. The gaps identified based on a review of literature have helped in formulating the research objectives.

The research work is based on literature review, functional experience, and survey conducted on select e-governance projects of central and state government organizations of India. These organizations have actively implemented respective e-governance projects under the National eGovernance Plan (NeGP). The study is conducted with a focus on strategic collaboration in the context of four identified citizen-centric e-governance projects. Projects are considered for selection both from state government and central government to cover a wider perspective. Two projects are taken up from the central autonomous body and each one from the state and the central government. Before conducting the main study, a pilot study on "Lease-hold-to Free-hold Conversion of Properties" of the Delhi Development Authority (a central autonomous body under the Ministry of Housing and Urban Affairs, Government of India) is conducted. Other projects selected for the study are "Booking of DDA's Park and Open Spaces", "Driving License Project", and "Passport Sewa Project". These citizen-centric projects are selected due to their wider acceptability, being in operation for more than five years and reported corrupt practices in service delivery in the conventional system.

The research is divided into three parts. In the first part, an extensive literature review on e-governance and strategic collaboration is conducted. To gather more insights for the research work, the literature has been reviewed in the areas of i) E-governance/E-government: definitions, scopes, frameworks, importance and challenges and performance parameters, ii) Strategic collaborations, Alliances, Joint-ventures, Joined-up government: definitions, scopes, importance and challenges, iii) Strategic collaboration and e-governance, and iv) Collaborative e-governance performance. A literature review on related areas of information technology and strategic management is also conducted. Literature review helped in identifying the research variables selected for the study in terms of macro and micro perspectives. Further, a conceptual research framework constituting 'Collaborative e-governance performance' variables is developed.

The second part is about the research methodology adopted and survey conducted for the study. The study uses a mixed-method approach, i.e., qualitative and quantitative. The qualitative methodology for the study consists of an opinion survey of 10 domain experts. Responses from these experts helped in assessing the factors of 'Collaborative e-governance performance'. The total Interpretive Structural Modeling (TISM) technique has been adopted to assess the conceptual research framework. For the quantitative study, a survey with a sample size of 300 has been targeted. In all, 250 responses were received. Out of these, 210 responses were found valid for analysis. Partial Least Squares-Structural Equation Modeling (PLS-SEM) has been adopted to analyze the result of the survey. Smart PLS version 3.0, has been used to analyze the survey data.

The third part is about detailed outcomes of research from both qualitative and quantitative perspectives. It is found that gaps in strategic collaboration are prevailing within and across organisations in the context of e-governance projects. Drawing lessons from the corporate sector, it has been learnt that e-governance can be effectively implemented by building strategic collaboration among related government organizations. The cross-case synthesis of learning from quantitative and qualitative analyses has facilitated the development of a generalized strategic framework for 'Collaborative e-governance performance'. The study concludes by highlighting the research contributions, recommendations, implications, limitations and future research scope.

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List of Abbreviations

AVE	Average Variance Extracted
CEEG	Cost-Effectiveness by Collaborative E-Governance
CEGP	Collaborative E-GovernancePerformance
CFA	Confirmatory Factor Analysis
CR	Composite Reliability
CSC	Common Service Centre
DDA	Delhi Development Authority
DIP	Digital India Programme
DV	Discriminant Validity
EFA	Exploratory Factor Analysis
GOI	Government of India
GPR	Government Process Reengineering
HTMT	Heterotrait-Monotrait Method
ICT	Information and Communication Technology
ISM	Interpretive Structural Modeling
LAP	Learning-Actions-Performance
MMP	Mission Mode Project
NeGP	National e-Governance Plan
PLS	Partial Least Squares
PPP	Public Private Partnership
SAP	Situation-Actor-Process
SEM	Structural Equation Modeling
SMART	Simple Moral Accountable Responsive and Transparent
SPSS	Statistical Package for Social Sciences
SSIM	Self-Structural Interaction Matrix
SWAN	State Wide Area Network
TDEG	Trust-Development by Collaborative E-Governance
TISM	Total Interpretive Structural Modeling
VCEG	Value-Creation by Collaborative E-Governance
VIF	Variance Inflated Factor

Chapter 1

Introduction to the Study

1.1 General Background

Strategic collaboration is increasingly gaining importance due to the associated benefits for the organizations to achieve their objectives. Strategic collaboration within and across government organisations is popularly known as collaborative government, joined-up government, we-government, etc. Government organizations generally operate in silos and have independent processes and control structures, different decision-making environments (Luna-Reyes et al., 2008; Austin, 2010; McDermott, 2010; Suri, 2014) and are usually not inclined to collaborate (Dawes et al., 2009). Instances of intra- and inter- organizational collaboration are, therefore, usually not visible in the context of government organizations (Suri and Sushil, 2006). These organizations tend to develop capabilities in their value chain within their respective frameworks (Scholl and Klischewski, 2007). On the other hand, citizens expect their problems to be addressed seamlessly without being subjected to the long channels through which a traditional government department generally operates (Goldsmith and Eggers, 2004; Gong and Janssen, 2012; O'Leary and Vij, 2012). Government organizations are, therefore, required to build cross-organizational strategic collaboration (Ansell and Gash, 2008; Dawes et al., 2009; Navickas and Mykolaityte, 2010; Kumar et al., 2016) to achieve improved delivery of public service and enhanced performance (Rowley, 2011; Srivastava, 2011; Gupta and Suri, 2018) through strategic planning, implementation, and evaluation (Suri and Sushil, 2012; Suri, 2014; Gupta and Suri, 2017).

Nowadays, government organisations across the world are extending their services to the citizens through extensive use of Information and Communication Technology (ICT). This is usually referred to as e-governance in India and e-government in developed countries (Harris, 2007). In this study, the terms e-government and e-governance are interchangeably used. E-governance can offer several benefits to the government organisation as well as the society. Hence, it is widely being practiced. E-governance is contributing to increasing the competence level of government organizations by enhancing their efficiency, accountability, and

transparency. E-governance has gained importance due to its capability to achieve socially desirable objectives such as citizen participation in the government decision-making process and helping citizens availing government services in a cost-effective manner (Lofstedt, 2012).

Due to prevalent trends in collaborative governance, joined-up government, and public (social) value creation (Golubeva, 2007; Karunasena et al., 2011; O'Leary and Vij, 2012; Gupta and Suri, 2017) strategic collaboration has taken the centre stage and it can be related to e-governance for the reasons that it brings transparency, encourages citizen participation (Yildiz, 2007; Suri and Sushil, 2011; Tripathi et al., 2012; UN, 2016, Deng and Karunasena, 2018), improves service delivery, helps in efforts and cost reduction (Weerakkody et al., 2011; Cordella and Bonina, 2012; Osman et al., 2014; Lonn et al., 2016; Gupta and Suri, 2017), integrate data and link resources (Chun et al., 2012; Suri, 2016), simplifies government procedures and enhances the execution of processes (Suri, 2014). Effective collaboration within and across government organizations help in solving multiplicity of problems related to the usage of resources and processes, interoperability of technology, compliance of legal and regulatory framework and other such problems faced by governments across the world (Pardo et al., 2010; 2012; O'Leary and Vij, 2012; Kumar at el., 2016). Strategic collaboration helps to achieve e-governance objectives and making lives easier for the citizenry (McGuire, 2006; Lofstedt, 2012).

1.1.2 Collaborative E-Governance

Strategic collaboration and e-governance jointly can be termed collaborative e-governance. Collaborative e-governance can be understood to be guided by the three significant factors, namely public-value creation (Moore, 1995; Kelly et al., 2002; Golubeva, 2007; Austin, 2010; Chun et al., 2012; Gupta and Suri, 2017), cost-effectiveness (Kearns, 2004; Chun et al., 2012; Osman et al., 2014; Suri and Sushil, 2017) and trust-development (Virili and Sorrentino, 2009; Cordella and Bonina, 2012; Chun et al., 2012; Suri and Sushil, 2017).

Scope of Collaborative E-Governance

The scope of collaborative e-governance is vast. However, this study to achieve its objectives considers collaborative aspects of e-governance in terms of public-value creation, cost-effectiveness and building trust.

The public-value based collaborative e-governance helps organisations in creating improved public value by combining their distinct resources and capabilities for better planning, decision making and control (Bonia and Cordella, 2009; Andersen et al., 2010; Molina and McKowen, 2012, Flak et al., 2015; Lonn et al., 2016; Gupta and Suri, 2017), enhance service delivery by ensuring information availability in simpler and easily understandable form, providing accessibility for deprived and disabled persons (Bhattacharya et al., 2012; Osman et al., 2014; Lonn et al., 2016; Gupta and Suri, 2017) and achieve e-governance domain specific goals like ensuring safety and security (Chun et al., 2012), responsiveness for queries and complaints (Papadomichelaki and Mentzas, 2012; Satapathy, 2014; Gupta and Suri, 2017), bringing transparency into the system by providing information tracking, display and disclosure of full information (Almarabeh and Ali, 2010; Suri, 2014), citizens participation for their valuable suggestions for policy and decisions making (Axelsson et al., 2010; Reddick, 2011; Chun et al., 2012; Picazo et al., 2015; Gupta and Suri, 2017) and facilitating hassle free interactions within and across the government and citizens (Mofleh and Wanous, 2009; Andersen et al., 2010; Karunasena and Deng, 2012; Suri, 2016).

Collaborative e-governance helps in achieving effectiveness of resource utilization and considerable cost reductions in availing e-governance services. Effective resource utilization helps in saving stationery, storage space, minimizing occupancies, etc. It also helps in saving cost in terms of time and efforts put to obtain the services (Chun et al., 2012; Osman et al., 2014; Gupta and Suri, 2017) such as lesser time spent standing in the queue and reduced pen and paperwork (Karunasena and Deng, 2012; Suri, 2014). Cost-effectiveness also signifies cost reduction in searching of documents for requested data and cost reduction in disposing of old records (Suri and Sushil, 2011; Papadomichelaki and Mentzas, 2012; Suri, 2014; Suri and Sushil, 2017), savings of money paid to middlemen for availing services (Belwal and Zoubi, 2008; Osman et al., 2014; Gupta and Suri, 2017) and bringing efficiency

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through simplification of procedures and faster execution of processes (Andersen et al., 2010; Chun et al., 2012; Suri, 2014; 2016; Gupta and Suri, 2017).

Trust development for the adoption of e-governance services has been assessed by many scholars (Carter and Belanger, 2005; Gefen et al., 2005; Pavlou and Fygenson, 2006). Trust becomes an essential issue, particularly where interactions between the citizens and the government is conducted through virtual mode such as in e-governance (Weerakkody et al., 2013). Trust development is an expectancy on which the promise of an individual or group can rely (Rotter, 1967). It is learnt from literature review that trust development has two parts. The first part is the trust in the government bodies that provide services and the second part, is the trust in the technological tools that will be used to deliver e-governance services to the citizens.

Trust development through technology-oriented collaborative e-governance refers to outputs and outcomes for project efficiency, better quality services, and improved citizen participation (Bryson et al., 2014; Picazo et al., 2015). Technological tools play an immense role in shaping collaboration in public sector (Luna-Reyes, 2016). Technology-driven collaborative e-governance helps the organization in better system design for data integration, citizens participation, and linking of various resources (Chun et al., 2012). Such collaborative e-governance also helps in developing trust among the beneficiaries by providing the latest and relevant information (Harrison et al., 2011; Bhattacharya et al., 2012; Weerakkody et al., 2013; Osman et al., 2014; Gupta and Suri, 2017), protection against loss of security and breach of privacy (Kalsi and Kiran, 2013; Satapathy, 2014) and ease of use to the e-governance system. Reliable systems that do not often fail and do not generate technical errors while submitting application forms by citizens are always desirable (Bhattacharya et al., 2012; Osman et al., 2014). Customized e-governance services based on feedback and grievances redressal mechanism (Reddick, 2011) is also an effective mechanism for trust development in the context of collaborative e-governance. Government organizations, should, therefore, encourage appropriate technology adoption and use of technological tools and platforms, for meeting citizens expectations from e-governance ranging from ease of use of services to reliability of systems.

1.2   Motivation for the Research

A review of the literature shows that a significant amount of research has been conducted by the researchers exploring e-governance service delivery, e-governance adoption and e-governance performance measures. These researchers have explored e-governance programs and proposed frameworks for evaluating citizen-centric e-governance services. However, there is a lack of research, analyzing e-governance performance based on a collaborative government approach. Hence, it becomes imperative to investigate the context of collaborative e-governance services in India.

1.3   Research Questions

This research study attempts to answer the following questions in the context of e-governance in India.

1. What is the basic concept of strategic collaboration and its relevance to e-governance?
2. What are the key factors of collaborative e-governance performance in general and specific to the context of India?
3. What is the citizen perception about the collaborative e-governance performance in India?

1.4   Research Objectives

To address the above questions, the study is conducted with the following objectives:

- To understand the concept of strategic collaboration and its relevance to the e-governance domain through literature support.
- To clarify and analyze the interrelationship among the constituents of the strategic collaboration for e-governance performance in India.
- To suggest an empirically validated research framework for evaluating the strategic collaboration for e-governance performance in India.

1.5   Significance of the Research

The research is expected to help researchers and practitioners in the field of collaborative e-governance. The outcome of the study is expected to help planners and implementers while designing new e-governance projects and taking corrective measures for strengthening ongoing projects. The research framework proposed in the study is likely to achieve enhanced collaborative e-governance performance. The recommendations from the study in the direction of improving e-governance performance through collaboration are expected to set a standard for e-governance services.

1.6   Scope of the Study

The research is based on a pilot study and the main study of select collaborative e-governance citizen-oriented projects of India. For the pilot study, the context of "Lease-hold to Free-hold Conversion of Properties", of Delhi Development Authority (DDA) (a central autonomous body, under the Ministry of Housing and Urban Affairs, Government of India) has been taken. For the main study, three additional projects, viz. "Online Booking of Open spaces, Parks and Community Halls", of DDA, the "Driving License" project of the government of National Capital Territory (NCT) of Delhi and the "Passport Sewa" project, a Mission Mode Project (MMP) under NeGP, have been included. These projects are selected due to their wide acceptability and being operational for more than five years. The following scope for the study has been construed:

- Four e-governance projects have been selected to conduct the study. Out of selected projects, three projects pertain to the central government of India and one to the state government of Delhi. These collaborative projects are selected based on the criteria that these are in operation for at least five years and are citizen-centric. Reported corruption in the conventional functioning of these projects is also a criterion for the selection of projects for study.

- A mix of qualitative and quantitative methods have been adopted to conduct the study. The survey for the qualitative study has been conducted by seeking responses from domain experts comprising academicians, planners, and

implementers. For the quantitative study, response data has been obtained by surveying the beneficiaries who have availed of e-governance services from any of the selected projects.

1.7 Overview of Research Methodology

The study involves the conceptualization of the research framework that emerged from a literature review on research issues and a pilot study of the e-governance project. The research is conducted by using empirical surveys and case study approaches. The theoretical framework is assessed in a staged manner for its development, validation, and interpretation. Following are the three stages of the research:

Stage I- Conceptual Research Framework and Hypotheses Formulation

Factors affecting the 'strategic collaboration and e-governance performance' have been identified through an extensive literature review, pilot study, and inputs from domain experts. Accordingly, a conceptual research framework has been developed based on the factors affecting collaborative e-governance performance. Further, the hypotheses have been developed to explore the possible relationships among the research variables identified for the study.

Stage II- TISM Analysis

The Total Interpretive Structural Modeling (TISM) has been used to study and verify the interrelationships of the factors of 'strategic collaboration and e-governance performance' of the proposed conceptual framework. The TISM model adopted for the study is based on the inputs received from the 10 domain experts through a questionnaire. A five-point Likert-type scale has been used to measure the extent of agreement/disagreement for the related link in the model.

Stage III- Empirical Study for Hypotheses Testing

The empirical survey was conducted using a structured questionnaire. The responses were obtained from the respondents who have used the service offered by any of the selected e-governance projects taken for the study. The proposed framework was validated using Partial Least Squares-Structural Equation Modeling (PLS-SEM).

This is followed by a synthesis of the findings of qualitative and quantitative analysis. The recommendations originating from the synthesis and its implications are brought out. Finally, the significant contributions and the limitations of the research are also listed leading to the possible direction for future research. A brief description of the research methodologies and techniques adopted to conduct the study are presented in Table 1.1.

Table 1.1: Description of Research Methodologies and Techniques Used

Phase	Objective	Methodology	Technique
Pilot Study	• To present a conceptual research framework for 'strategic collaboration and e-governance performance' for "Lease-hold to Free-hold Conversion of DDA's Properties"	• Survey of beneficiaries and interview of Planners and Implementers conducted	• Univariate Analysis
Main Study	• To propose a conceptual research framework for 'strategic collaboration and e-governance performance in India' • To test and validate the conceptual research framework	• Citizen-centric e-governance projects, viz. "DDA's online booking of parks, open spaces, Driving License and Passport Sewa " • A questionnaire-based survey of target beneficiaries	• Total Interpretive Structural Modeling (TISM) • Partial Least Squares-Structural Equation Modeling (PLS-SEM)

1.8 Research Steps

Broadly, the steps used for conducting this study are presented in Figure 1.1. Detailed research steps are explained in Chapter 4, Figure 4.3.

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│            Research Gap Identification           │
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│  Problem Definition, Research Objectives,        │
│             Hypotheses Formulation               │
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│          Conceptual Research Framework           │
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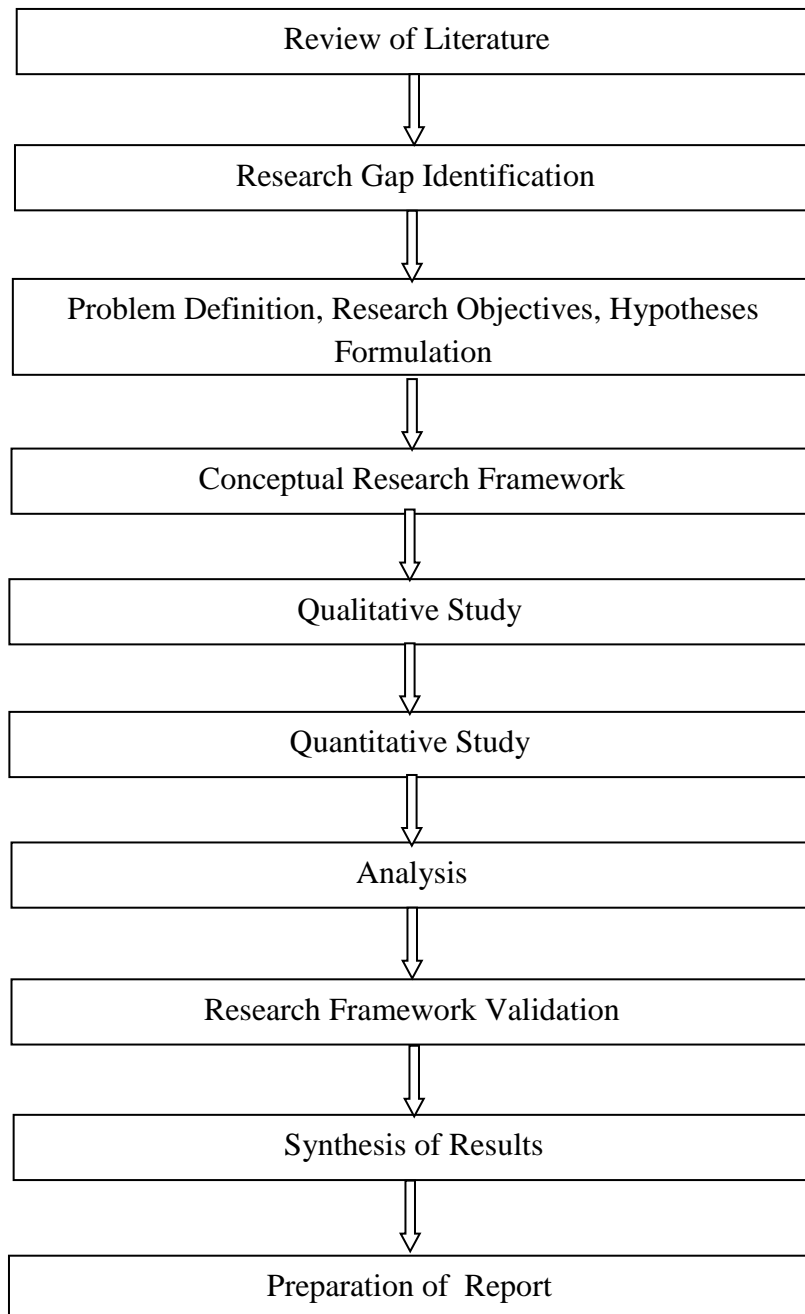
Figure: 1.1 Research Steps

1.9   Overview of Projects Taken for the Study

Keeping in view of the study context, such e-governance projects have been selected where citizens are required to visit the government office to fully avail the service. Citizens are required to collaborate with the government agencies to provide their input, feedback and suggestions to get their job accomplished. As such, to conduct the study four government projects have been included, one is of the central government of India and another one is of the state government of Delhi and two of a central autonomous body.

While selecting the project for the study, adequate considerations have been given to keep in view the objectives of the research. Therefore, only those projects have been included where citizen engagement is mandatory to avail of the services. Other criteria for considering the selection of projects are a collaborative approach, citizen-centricity with the Government to Citizen (G2C) model, projects that have been implemented successfully and in operation for the last five years or more, and projects that have issues of reported corruption in the government organisations for conventional service delivery. For developing deeper insights, apart from state-level projects and autonomous organisations projects, one national-level mission mode project (MMP) under the initiative of e-Kranti, has also been included in the study. A brief description of the project selected for the study is presented in Chapter 4.

1.10 Organization of the Thesis

This thesis is organised into eight chapters. A brief overview is as follows:

Chapter one is dedicated to the introduction of the thesis. It sheds light on the research background, need and scope of the study, the research questions, and the objectives of the study. It outlines the overview of research methodology used in three stages, viz. conceptual research framework and hypotheses formulation, TISM analysis based on expert interviews and empirical study for hypotheses testing and validation. It also depicts the sequence of research and throws light on e-governance projects included in the study.

Chapter two presents a review of literature in the study context. Focus has been kept on strategic collaboration, e-governance performance-related frameworks and the challenges involved. This has helped in identifying research gaps and provided support for developing the conceptual research framework.

Chapter three sheds light on the pilot project taken for the study before taking up the main study. The findings of the pilot study indicate that e-governance users want their concerns to be addressed, while e-governance projects implementer struggle with issues related to inter- and intra- organisational collaboration. Further, the role of collaboration competency in the context of a public organisation is explored and key learnings are highlighted.

Chapter four summarizes the research methodologies used for conducting the study. This study is based on a mix of qualitative and quantitative methods. A brief description of the qualitative research method used, i.e., TISM and the quantitative research method used, i.e., PLS-SEM are presented in this chapter. Formulation of hypotheses for macro and micro variables in terms of null and alternate hypotheses is also presented in this chapter. A conceptual research framework for validation is proposed as part of this chapter.

Chapter five summarizes the analysis of the data. A questionnaire was developed to seek the opinion of the identified domain experts. TISM method is used to study and model the interrelationship among the constituents of 'strategic collaboration and e-governance performance'. The suitability of the model is established based on data obtained from experts using a five-point Likert-type scale for the agreement of statements given in the questionnaire ranging from 1 (nil extent) to 5 (very large extent) to measure the level of relationship for every link in the model.

Chapter six summarizes the validation of the conceptual research framework presented in chapter four using a quantitative research method. Partial Least Squares-Structural Equation Modeling (PLS-SEM) is used for validating the measurement and structural models. Research hypotheses proposed in chapter four are tested and validated.

Chapter seven summarizes the key learnings from the research. The triangulation approach in which at least two research techniques are used to establish validation of the research framework is presented in this chapter.

Chapter eight is about the major findings from the research and contributions, key recommendations, and implications for the practitioners, beneficiaries and researchers. It also outlines research limitations and suggestions for future research.

1.11 Concluding Remarks

E-governance, due to its capability of extending government services to the citizens, is widely practised all over the world. The use of e-governance took place first in developing countries and subsequently in developing countries including India. It did well in the developing countries as compared to developing countries. Its underperformance in the Indian context has been examined by several scholars from different perspectives. Apart from the several reasons, integration of processes across various databases and strategic collaborations amongst the various stakeholders emerged as the most critical limiting factors. A silo nature functioning of government organisations acts as an impediment to the realization of a collaborative approach to e-governance.

Assessment of the outcomes of various e-governance projects under NeGP has also shown that the government could not deliver its services effectively due to the lack of a collaborative approach. A concerted effort by the government is required to be put in place to adopt the collaborative approach for e-governance projects. To address the problem, the research background has been described. The need and scope of the study, the research questions, objectives, and an overview of the research methodology used are presented. The study is designed to analyze the aspects of 'strategic collaboration and e-governance performance'. The next chapter presents a review of the literature on the relevant areas related to the study.

Chapter 2
Literature Review

2.1   Introduction

There is a need to augment the capability of government organisations for meeting the growing expectations of the citizen in this Internet era. Information and Communication Technology (ICT) tools through which e-governance services are offered help the government organisations to transform within to match the growing expectations of the citizen. E-governance with the amalgamation of technological tools and building strategic collaboration among various stakeholders can enhance organisational work efficiency and effectiveness. Despite understating the capabilities of e-governance that it can offer for improving organisational efficiencies and engaging with the citizens, it has so far, remained partially successful, when it comes to the context of developing countries. The low success rate on one hand and its potential to offer greater opportunities on the other - both for the government and citizens - are required to be analyzed diligently. The area of strategic collaboration is widely being practised in the corporate sector. There is a need to conduct a study to understand the collaborative aspect of e-governance performance for the public sector. A review of related literature on the two broad subject areas, i.e., strategic collaboration and e-governance has been conducted. The literature review is conducted with a focus on strategic collaboration and the related aspects in the study context such as strategic alliance, joined-up government, collaborative government, and collaborative competency with its definitions, scopes, frameworks, benefits and challenges. Similarly, the relevant literature on e-governance including, its origin, definitions, scopes, maturity models, performance indicators, implementation issues and challenges to the context of developing countries have been reviewed.

2.2   E-Governance: An Overview

E-governance has become a synonym for government transformation using Information and Communication Technologies (ICTs) (Basu, 2004). It enhances the government work efficiency and effectiveness by ensuring improved transparency and accountability, quality of delivered services, democratic participation and better relationship between the citizens and the government (Chen et al., 2006; Yildiz, 2007;

Bertot and Jaeger, 2008; Suri and Sushil, 2011; Tripathi et al., 2012). Substantial reduction in time, efforts, and material resources help government organisations in improving their operational efficiency (Schwester, 2009; Reddick and Turner, 2012). There is a need to augment the capability of a government organization for meeting the growing expectations of the citizen in the Internet age. With the fast-changing technologies, this requires building strategic collaboration among various stakeholders with a focus on adding value to government-citizen relationships (Johnston and Hansen, 2011).

For harnessing the potential of e-governance, the thrust has predominantly been on technical aspects and there has been lesser focus given on the actual requirements and expectations of beneficiaries (Reddick, 2005a; Bertot and Jaeger, 2008; Ebbers et al., 2008; Pieterson and Ebbers, 2008). To assess expectations through e-governance and to understand its "value" and "impact" that shall influence the factors of acceptance by the citizens, a standardized method needs to be used (Rowley, 2011). However, there is not any universally accepted maxim that can characterize its performance assessment (Yildiz, 2007; Verdegem and Verleye, 2009; Gupta, 2010). Furthermore, it encompasses such a broad spectrum that it is difficult to find one method that fits all. However, in all assessments of e-governance, the core ideology emphasized is "SMART" governance, i.e., 'Simple, Moral, Accountable, Responsive and Transparent' (Heeks, 2003; Harris, 2004).

E-governance is considered one of the most innovative and significant developments in the context of government information sharing and service delivery over the last several decades (Verdegem and Verleye, 2009). E-governance offers an opportunity for governments to re-organize and integrate processes within and across related organisations for creating better value for the citizens at large (Suri and Sushil, 2006; Yildiz, 2007; Williams et al., 2009; Rowley, 2011; Chun et al., 2012). Despite e-governance promises to promote democracy, reduce corruption, improve efficiency and increase citizen participation (Whitmore, 2012), stakeholders' perceptions of e-governance performance may still vary (Gupta et al., 2017; Suri and Sushil, 2017). As such government simultaneously faces two parallel challenges, i.e., meeting the changing requirements as per the needs and expectations of citizens on one hand and

managing the resource constraint in e-government projects on the other (Bertot and Jaeger, 2008; Kumar, 2016; Gupta et al., 2020).

Due to growing demands as per emerging needs and expectations of the citizens for timely and reliable e-governance services, government organizations feel pressurized to deliver improved, innovative, more accessible, and responsive services (Angelopoulos et al., 2010; Nkwe, 2012; Kumar, 2016). In the delivery of government services, ICTs play a dominant role and thus, it has become "a central component of e-governance in a very short period" (Bertot et al., 2012). ICT is used not only as a channel for information dissemination to the public but also in strategic collaboration and citizen engagement (Benkler, 2006). It too further provides a platform of opportunities for the citizens to transact with the government and to participate in government decisions (Johnston and Hansen, 2011). The interactive channels of ICTs have the potential to let involved actors "rethink traditional boundaries between individuals, the public, communities, and levels of government" to "dramatically alter how the public and government interact, develop solutions, and deliver services" (Jaeger and Munson, 2010).

Though the importance of digitally empowered societies remained on the global agenda for the past several years, a focused approach for building a sound information society in India remained lacking till the National e-governance Plan (NeGP) was launched in May 2006. This plan was formulated to implement e-governance in India at three levels, i.e., national, state and local levels to create a citizen-centric and business-centric environment (Gupta, 2010). However, it could not perform and deliver desired outcomes concretely due to certain limitations such as lack of comprehensive need analysis, lack of integration and collaborations amongst government applications and databases, lack of thrust on Government Process Re-engineering (GPR) and interoperability across projects, inability to keep pace with new technology trends, etc. (http://www.digitalindia.gov.in/content/about-programme). Suri and Sushil (2006) further investigated the limited success of e-governance initiatives in the Indian context and found strategic collaborations within and across government agencies as one of the key challenges to be overcome for effective e-governance.

To address challenges and problems faced during the implementation of NeGP, NeGP 2.0 or e-Kranti under the 'Digital India Programme' (DIP) was launched in 2014. It is focused on reform-driven e-governance with a broad vision as e-governance for transforming governance. Effective collaborative arrangements among government organisations are set as a prerequisite to realizing this vision.

2.2.1 E-Governance Definition and Scope

The term 'E-government' was first coined in the United States in the early 90s (Tat-Kei Ho, 2002; Heeks and Bailur, 2007). By and large, e-government refers to three major activities- enhancing efficiency and effectiveness of government performance, bettering transparency by the information disclosed to the public and citizen participation in the decision-making process in a public organisation (Bellamy and Taylor, 1994; Li, 2003).

There are numerous definitions of e-governance that have been conceived by researchers, experts and global agencies. However, none of the definitions is universally accepted for e-governance (Halchin, 2004). West (2004) defines e-government as the delivery of government information and services through the Internet or other digital means. According to Schuppan (2009), e-governance is a way of strengthening the public sector's performance for accomplishing the social and economic developments of a country. The government get significant benefits by implementing e-governance by offering benefits to the citizens for delivery of quality public service, convenience and accessibility to government services, a better quality of life, bridging the digital divide, reduction of communication and information costs, and active participation of citizens in government (Aldrich et al., 2002; Jaeger and Thompson, 2003). Hence, e-governance can be viewed from the perspective of improving administrative efficiency and curbing corruption (Bhatnagar, 2004).

The scope of e-governance is primarily laid on service interactions and activities involved. The scope of e-governance is focused on three main target groups, government, citizens and business. These target groups can be categorized as internal and external. Internal groups imply the Government to Government (G2G) interface and external target groups imply the Government to Citizen (G2C) and Government to Business (G2B) interfaces. The external strategic objectives of

government focus on citizens and business and other interest groups whereas the internal strategic objectives focus on internal managerial needs within an organisation. Though the objectives of these groups are different but in a holistic sense, their objectives seem to be centralized, i.e., making e-governance progression successful by engaging the citizen for the adoption of services. The most common group interactions in e-governance are presented below in Table 2.1.

Table 2.1: Interactions and Activities in E-Governance

Common Groups	E-democracy	E-government
Internal		
G2G: Government to Government		**X**
External		
G2C: Government to Citizen	**X**	**X**
G2B: Government to Business (and others)		**X**

(Source: Backus, M. 2001)

E-governance services' interaction with different actors like G2G, G2C and G2B along with their key characteristics is presented below in Table 2.2.

Table 2.2: E-Governance Services Interactions with Dominating Characteristics

Parties of Communication	Content	Characteristics	Termed as	Example
G2G	Government information and services	Communication, Coordination, Standardization of information and services	E-administration	To establish and use a common data warehouse in a government organization
G2C		Communication, Transparency, Accountability, Effectiveness, Efficiency, Standardization of information and services, Productivity	E-governance	Presence of organizational websites, e-mail communication between citizens and government officials
G2B		Communication, Collaboration, Commerce	E-governance, E-commerce, E-collaboration	Posting government bids on the web, e-procurement, e-partnership, etc.

(Source: Yildiz, 2007)

2.2.2 Stages of Development of E-Governance

The development of e-governance passes through various stages of its journey before it reaches its maturity level. There are many e-governance maturity models which are propounded by scholars. The most prominent among those is given by Layen and Lee in the year 2001 and is presented below in Figure 2.1. Though this model was proposed about 2 decades back, its significance and relevance remain valid even today. This model contains four stages, namely, Catalogue, Transaction, Vertical Integration and Horizontal Integration. The model is developed based on technological and organizational complexity. The first stage, i.e., the Catalogue is considered the simplest one as it only provides basic information through the e-governance to citizens such as a list of offered services, process and procedure explanation, address and contact details and downloadable forms, if any. The horizontal integration phase is considered the most complex phase in it as integration is to take place across different organisational functions through the computer systems. It is intended to provide one-stop solutions for citizens' problems in a real-time environment.
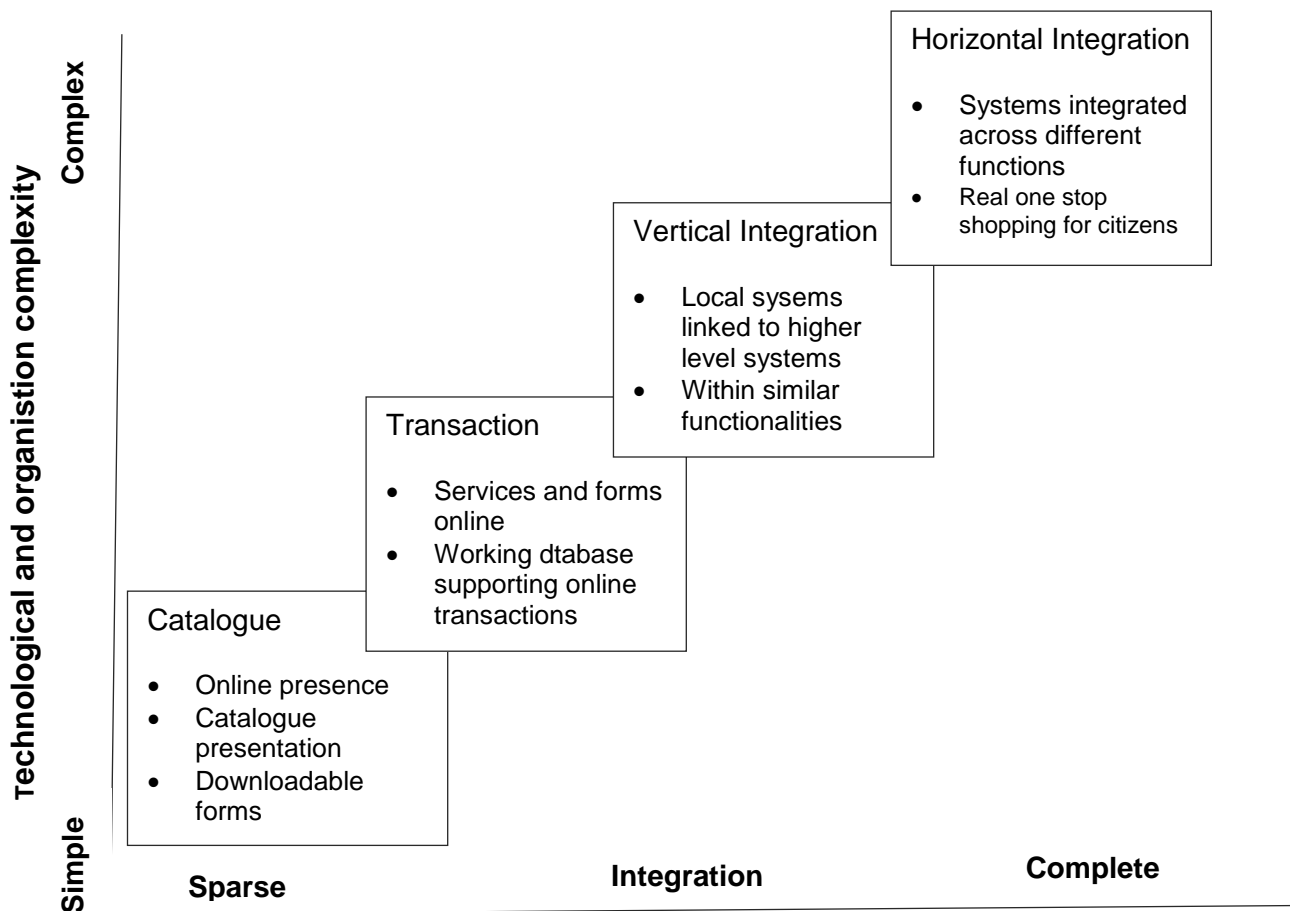
Figure 2.1: Four-stage Model of E-Governance Growth
(Source: Layne and Lee, 2001)

Another prominent growth model for e-governance, based on the parameters such as the digitalization of government processes spread across the period, is presented by the world bank in the year 2003. This model also has the four-stage as Publishing, Interactivity, Transactions and Delivery of services to the citizen. It can be seen that the least time is elapsed in making information available on the website and its corresponding digitalization process for the government also remains flattened. The complete digitalization of the government is to be pronounced once the adoption of e-governance services by the citizen takes place. The sketched growth model propounded by the world bank is presented below in Figure 2.2.
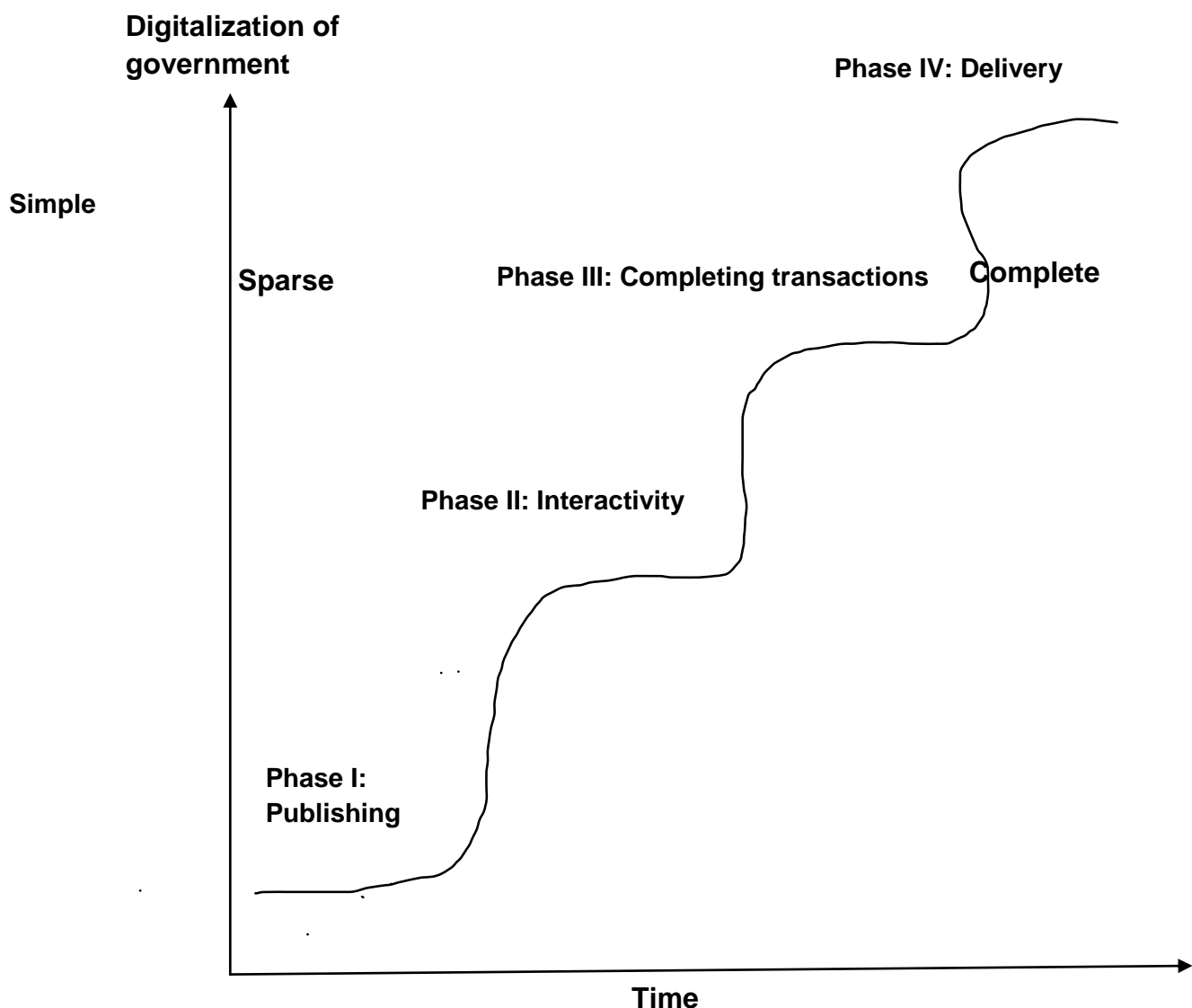
Figure 2.2: World Bank Growth Model (2003)

Several other e-governance growth models have been proposed by scholars. A brief list is presented in Table 2.3 below.

Table 2.3: E-Governance Growth Models in Stages

E-governance Models	Stage 1	Stage 2	Stage 3	Stage 4
Gartner (2000)	Web presence	Interaction	Transaction	Transformation
Layne and Lee (2001)	Catalogue	Transactional	Vertical	Horizontal
Chandler and Emanuel (2002)	Information	Interaction	Transaction	Integration
World Bank (2003)	Publishing	Interactivity	Transaction	Delivery
West (2004)	Bill-board	Partial-service delivery	Portal or one stop shop portal	Interactive democracy
United Nations (2012)	Emerging information	Enhanced information service	Transactional service	Connected services
Alhomod et al. (2012)	Presence on the web	Interaction between the citizen and the government	Complete transactions over the web	Integration of services

2.3 E-Governance in India

E-governance in the context of India can be traced back to 1985-86 when the erstwhile Planning Commission's (now, Niti Ayog) National Informatics Centre (NIC) networked districts, states and central government for information and data sharing through NICNET (Suri and Sushil, 2017). Another breakthrough toward e-governance occurred when in 1998 a national task force on IT was constituted (http://it-taskforce.nic.in/bgr11.htm). Initiatives like the IT Act-2000, the RTI Act-2005 and the setting up of the Administrative Reforms Commission (ARC) in 2005 are said to be the steps in the right direction for the e-governance rollout (Suri and Sushil, 2006). However, the major and dedicated thrust at the national level was given by launching the National e-governance Plan (NeGP), in May 2006 with the key focus on bringing government services at the doorstep to the common man at affordable costs with adequate efficiency, transparency and reliability. This version of NeGP is termed NeGP 1.0. Primarily, NeGP 1.0 comprised 27 Mission Mode Projects (MMPs) and 8 components to be executed at three levels of government functionary such as central,

state and local. As of now, there are 44 MMPs exist out of which 15 are central MMPs, 17 are state-level MMPs and 12 are integrated MMPs (https://negd.gov.in/mission-mode-projects).

At the state level, State Wide Area Networks (SWANs) was approved by the government in March 2005. The objective is to connect all states, and Union Territories (UTs) to the block level through the headquarters of the district and subdivision with high bandwidth. Currently, SWANs are operational in 34 states/UTs which are being used to provide close user connectivity to different government offices in the states of India (DIT, 2015).

The Common Services Centre (CSC) scheme by the government of India was launched in September 2006 to establish one lakh ICT-enabled front-end services centres across India in a way that there is a minimum of one CSC for every six villages so that all six lakh villages of the country are covered under this initiative. Based on the review of the CSC scheme government, in 2015 launches its second version of CSC 2.0 to increase penetration at the Gram Panchayats (GPs) level. As part of the CSC 2.0 scheme, it has been proposed to set up a minimum of one CSC in all about 2.5 lakh GPs across the country.

The NeGP 1.0 is now subsumed into NeGP 2.0 or e-Kranti under the 'Digital India Programmer (DIP)' initiatives. E-Kranti is centred around the critical need for e-governance, to promote mobile e-governance and good governance with a broad vision as "Transforming E-governance for Transforming Governance". The focus is on "citizen-centricity, identification of services and service levels, centralized planning and decentralized implementation and Public-Private Partnership (PPP)" (Meity, 2012). There are three vision areas of DIP as digital infrastructure, governance and services on demand and digital empowerment to the citizen. Figure 2.3 shows the vision areas of the Digital India Programme whereas each vision area with its objectives is shown in Table 2.4.
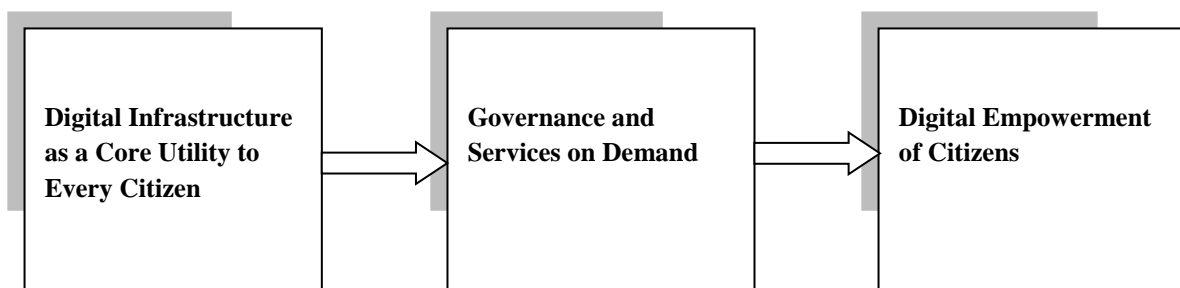
Figure 2.3: Vision Areas of Digital India Programme (DIP)

(Adapted from https://www.digitalindia.gov.in)

Some of the citizen-centric e-governance projects with a major impact on the lives of people at large, for their successful planning and implementation in recent years, are BHOOMI- computerized management of land records in the state of Karnataka, CARD- properties registration in Andhra Pradesh, e-SEVA- a one-stop centre for multiple citizen-centric services in Andhra Pradesh, FRIENDS- a one-stop place for paying taxes and utility bills in Kerala, GYANDOOT- delivery of agriculture and other such services in rural areas in Madhya Pradesh, LOKVANI- grievances addressal management system in Uttar Pradesh, e-Passport, mFMS- Mobile-based Fertilizers Monitoring System, eNAM- Electronic National Agriculture Market, etc. Evaluation of these implemented e-governance projects shows that strategic collaboration in and across government organizations is to play a significant role in the delivery of quality digital services.

Table 2.4: Vision Areas Under Digital India Programme

Digital Infrastructure as a Core Utility	Governance and Services on Demand	Digital Empowerment
Ensuring availability of high-speed Internet as a core utility for delivery of services to citizens	Seamlessly integrated services across departments of jurisdictions	Universal digital literacy
Providing online unique digital identity authenticable to every citizen	Availability of services in real-time from online and mobile platforms	Universally accessible digital resources
Providing mobile phone and bank accounts enabling citizen participation in digital and financial space	All citizen entitlements to be portable and available on the cloud	Digital resources/services in Indian languages

Ensuring easy access to a Common Service Centre	Digitally transformed services for improving the ease of doing business	Collaborative digital platforms for participative governance
Shareable private space on a public cloud	Making financial transactions electronic and cashless	Citizens need not submit government documents/certificates physically
Safe and secure cyber-space	Leveraging Geospatial Information Systems (GIS) for Decision and development	

(Source: https://www.digitalindia.gov.in/content/vision-and-vision-areas)

2.4 Strategic Collaboration - An Overview

E-governance integrated service delivery can start from the organizational level and can further extend to the national level (Klievink and Janssen, 2009). Many government organizations are trying for offering their online products and services as a single-window system. In the Indian context, such examples include MCA21 by the Ministry of Corporate Affairs, pensioner's portal by the Department of Pensioners and Welfare, collection of Income Tax (IT) by the Ministry of Finance/Central Board of Direct Taxes, etc. Organizational stakeholders involved in such e-governance projects are required to effectively coordinate among themselves. As such, there is a need for horizontal and vertical integration across the organizations involved (Layne and Lee, 2001; Heeks, 2003; Heeks and Bailur, 2007). To achieve such integration, government departments are required to deal with the issue of many disparate systems as they conventionally tend to operate in silos (Scholl and Klischewski, 2007). Strategic collaboration helps government organizations to come out from the problem of silo attitude and also in addressing gaps in planning and implementation for better performance of e-governance solutions by ensuring coherence and cohesiveness among government officials (Cooper et al., 2006).

Effective collaboration in and across government agencies helps to solve numerous complex problems faced by governments all over the world (Pardo et al., 2012). Government organisations have a different decision-making environment which can be featured as hierarchical, top-down and command and control driven (McDermott, 2010). Instances of inter- and intra- organizational collaboration are, therefore, uncommon in government organisations (Suri, 2012). Organisations

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traditionally, develop capabilities in their limited value chains, whereas, there is a need to build strategic alliances through collaboration to develop or enhance core competencies (Navickas and Mykolaityte, 2010; Kumar and Banerjee, 2012). Despite its significance for the effective utilisation of resources and competencies, collaboration is rarely practised in government organisations (Suri and Sushil, 2006; Likhi, 2010; Suri, 2016). Three principal stakeholders, i.e., government, citizens and business need to be taken into consideration for strategic collaboration (Backus, 2001).

2.4.1 Defining Strategic Collaboration

There is no uniform consensus on the exact connotation of collaboration (Ansell and Gash, 2008) as there are several definitions cited for it. Gray (1989, p.5), defines collaboration as "a process through which parties who see different aspects of a problem can constructively explore their differences and search for solutions that go beyond their limited vision of what is possible." In another definition of collaboration Gray (1989, p.11), defines it as "a process of joint decision making among key stakeholders of a problem domain about the future of that domain". According to Chun et al., (2012) it is "a process or a set of activities in which two or more agents work together to achieve shared goals". A few authors have stated that strategic collaboration is an emergent process of combined decision-making for solving the existing differences, recognizing interdependencies among organizations and taking ownership of decisions made (Dawes et al., 2009; Suri, 2014; Bindra et al., 2019). However, the significance of strategic collaboration in e-governance is much wider than these definitions. It is referred to as one of the mechanisms for achieving citizens' effective engagement with government officials and other interested stakeholders through electronic means (Yildiz, 2007; Rowley, 2011; Tripathi et al., 2012). Collaborative governance helps to operate in multi-organizational arrangements to achieve e-governance objectives (McGuire, 2006) for enhanced transparency, accountability and performance efficiency of the involved organizations through increased knowledge sharing (Bertot et al., 2012; Chun et al., 2012). The synergetic relationship achieved through strategic collaboration among government organizations helps to tackle various citizen-centric problems (Lofstedt, 2012).

Literature review reveals that an organisation enter into strategic collaboration when it is difficult for them to be self-reliant. They enter into the collaboration for strategizing their potential capabilities for comprehensive competition by having the access to essential resources (Austin, 2010; Tsou, 2012; Kumar et al., 2016; Batra et al., 2019). Organisations can create synergy for achieving outcomes in a unified manner in a cross-organisational setup through the act of collaborations, partnerships, alliances, joint ventures, etc. (Fedorowicz et al., 2009; Cordella and Bonina, 2012; Savoldelli et al., 2014; Lune-Reyes et al., 2016; Liu et al., 2017; Bamel et al., 2019). However, the significance and scope of strategic collaboration are much wider than these interpretations.

2.4.2 Scope of Strategic Collaboration

Due to the significance of strategic collaboration for creating synergy in achieving organisational outcomes in a unified manner, it can broadly be classified as inter-organizational collaboration and cross-sectoral collaboration. Inter-organizational collaboration for the delivery of citizen-centric services can be referred to as collaboration between two or more organisations. Whereas, the cross-sector collaboration can have different societal sectors, including the public and private sectors, non-governmental organizations, and citizens (Agranoff, 2007; McGuire et al., 2010; Agranoff and Radin, 2015). For the development of technology-based products such as e-governance, collaboration can be viewed to signify broadly three areas, viz. absorptive capacity, coordination capability, and integrative capability. Absorptive capacity signifies the organization's ability to value, assimilate, and apply new information or knowledge received from external sources, such as public or private organisations, beneficiaries, collaborating partners, etc. (Cohen and Levinthal, 1990; Malhotra et al., 2005; Cai et al., 2014). Coordination capability signifies the organization's ability to arrange and deploy tasks, resources and activities in the functional capabilities (Pavlou and El Sawy, 2011) such as, managerial, technological, and customer (Danneels, 2002; Klievink and Janssen, 2009; Cai et al., 2014). Integrative capability is an organization's ability to integrate new knowledge into functional capabilities by the way of contribution, representation, and interrelation of individual inputs in a collective manner (Pavlou and El Sawy, 2006; 2011; Adeniran and Johnston, 2016).

Absorptive Capacity

The root of absorptive capacity is based on the evolutionary theory of the organisation or firm (Nelson and Winter, 1982) and it is mainly discussed in the context of dynamic capabilities or organizational capabilities (Zollo and Winter, 2002; Winter, 2003; Adeniran and Johnston, 2016; Helfat et al., 2007; Teece, 2007). Dynamic capability is "the ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments" (Teece et al., 1997, p. 517). It can be visualized as one of the best suitable means for dealing with changing environments such as e-governance (Zahra et al., 2006; Teece, 2007). Absorbed knowledge by the organization is applied in different ways such as, to strengthen their knowledge base (Van den Bosch et al., 1999), forecast technological trends (Cohen and Levinthal, 1990), reconfigure existing capabilities (Pavlou and El Sawy, 2006), and to generate innovative products and services. A review of the research literature reveals that absorptive capacity influences organizational performance both directly (Lichtenthaler, 2009) and indirectly (Lane et al., 2006). Although, absorptive capacity has long been used as a collaboration competency for knowledge information management (Tsou, 2012), new product development (Pavlou and El Sawy, 2006), and in some information systems projects (Roberts et al., 2012) yet its use in the context of e-governance projects is rare and, therefore, a comprehensive analysis needs to be done.

Coordination Capability

Coordination capability signifies the organization's capability to arrange and assign the jobs, resources and activities for its newly identified functional capabilities (Pavlou and El Sawy, 2011) such as, managerial, technological, and operational (Danneels, 2002; Klievink and Janssen, 2009). A functional capability is the ability to exercise routine activities (Pavlou and El Sawy, 2011) for day to day working of an organisation. For example, functional capabilities for e-governance would be the ability to provide the services in an efficient, transparent, reliable and interactive manner to the beneficiaries. Functional capabilities require identifying new ways of allocating resources to the identified jobs (Eisenhardt and Brown, 1999; Helfat and Peteraf, 2003) and thus, creating harmony among jobs and resources (Eisenhardt and Galunic, 2000). Coordination capability can facilitate inter- and intra- organisational collaboration for new product development, such as an e-governance solution, through resource identification, accumulation and channelization (Collis, 1994) by leveraging

the organization intelligence across the departments or within divisions of an organization (Vorhies and Harker, 2000). It can help in achieving the targeted outcomes of an e-governance initiative through the re-alignment of actors and processes (Suri and Sushil, 2006; 2012). Thus, the appropriate allocation of resources to identified jobs in a balanced way is the key to effective coordination capability (Crowston, 1997; Pavlou and El Sawy, 2006) for e-governance.

Integrative Capability

Integrative capability focuses on creating a collective environment for the understanding of jobs and their activities (Crowston and Kammerer, 1998) and enhances competitive advantage (Adeniran and Johnston, 2016). Although the integrative capability is positively associated with the coordination capability (Galunic and Eisenhardt, 2001), these two are divergent from the viewpoint of theoretical and empirical aspects (Kogut and Zander, 1996). Integrative capability is the ability of an organisation to induce new knowledge into its functional capabilities and can be used for e-governance to realign the functioning by three basic practices, i.e., by the way of (a) contribution for collecting and combining personal input within the organization (Okhuysen and Eisenhardt, 2002), (b) representation for visualizing the fitment of the persons, their activities and fitment of organisational activities together (Crowston and Kammerer, 1998) and (c) interrelate for integrating the individual inputs (Grant, 1996) to sharpen the functional capabilities by performing group activities (Helfat and Peteraf, 2003; Pavlou and El Sawy, 2011).

2.4.3 Frameworks for Assessing Collaborative E-Governance

Various frameworks have been suggested by scholars to assess collaborative e-governance for inter-organisational and cross-sectoral collaborations. Table 2.5 presents some of the key frameworks used for assessing collaboration-based e-governance.

Table 2.5: Summary of Frameworks for Collaborative E-Governance Assessment

S.No.	Author/Reference	Brief Description	Issues Addressed
1	Fu et al. (2006)	A collaborative model for service provision by multiple public-sector agencies	• Integrated collaborative website among government agencies to enhance customer satisfaction with the service quality of government agencies into a model of one-stop shopping. • Five key factors for collaborative e-governance: - "Appropriate regulations for the implementation process; Designing a viable collaborative-service system; Establishing a closely connected virtual organization; Ensuring the participation of senior managers; Obtaining the cooperation of the facilitators from various agencies".
2	Luna-Reyes et al. (2007)	The collaborative digital government in Mexico "Some lessons from federal web-based inter-organizational information integration initiatives"	• The integration of information across organizational boundaries is necessary. The required level of inter-organizational collaboration and trust is required to be supported by existing institutional arrangements, organizational structures, and managerial processes. • How certain institutional arrangements and organizational structures can enable or hinder cross-agency collaboration and consequently, inter-organizational information integration.
3	Pardo et al. (2010)	Collaborative Governance and	• The importance of collaborative governance, information technologies, and

		Cross-Boundary Information Sharing "Envisioning a Networked and IT-Enabled Public Administration"	the internationalization of complex social problems for public administration.
4	Chun et al. (2012)	Rational choice theory and Institutional factors for state-level interagency collaboration	• Key factors that predict and facilitate the collaboration in e-government can provide a feasible model, however, empirical studies are needed.
		Enterprise architectures help in minimizing failure in collaborative projects development	• The collaborations can be transient or long-term partnership-based. • The appropriate models and approaches to reduce risks and sustain collaborative e-government projects.
5	Liu et al. (2012)	IT-enabled logistics procedure redesign for high-value pharmaceutical shipments "The application of the e3-control methodology"	• Cross-boundary processes can be challenging in collaborative e-government. • The process redesign approach can facilitate collaboration.
6	PytlikZilllig et al. (2012)	Public input methods impacting confidence in government	• Promoting citizens' trust and confidence in government by collaborative e-governance. • Citizen engagement through different interaction channels results in confidence and trust with the government.
7	Candiello et al. (2013)	Quality and impact monitoring for local e-government services	• Measuring the satisfaction and quality of service of online services and engagements in collaborative e-governance.
8	Ramanathan and Gunasekaran (2014)	Supply chain collaboration "Impact of success in long-term partnerships"	• The factors of collaboration, collaborative planning, execution and decision-making impact the success of supply chains and lead to future collaborations.

			• Organizations that are interested in supply chain collaborations can consider engaging in long-term collaboration depending on the success of current collaborations.
9	Pilemalm et al. (2016)	Emerging forms of Inter-organizational and Cross-sector collaborations in e-government initiatives-implications for participative development of information systems	• Inter-organizational collaborations and cross-sector collaborations within the e-governance context for emergency response systems (ERSs) that are involved in carrying out rescue operations.
10	Adam et al. (2017)	Industry involvement conceptual framework for collaboration of National Dual Training Systems (NDTS) in Malaysia.	• Three key factors of collaboration are:- "Organisational governance: (Leadership, Commitment, Trust, Coordination); Organisational motivation: (Intrinsic, Extrinsic); and Organisational behaviour: (Attitude towards behaviour, Subjective norm, Perceived behavioural control)".
11	Pereira et al. (2020)	The Role of Collaboration in Innovation and Value Creation in the Aviation Industry	• Key factors for collaborations are:- "Strategic decision making; Networking and partner choice; Cultural context, Values, behaviour and compatibilities; Collaboration configuration; Issues and risks shared; Skills, capacities and experience; Infrastructure and resources available; Engagement activities; Knowledge transfer, absorption and appropriation; Communication flows; External environment and demand; and Expectations and outcomes".

12	Nath et al. (2021)	A framework to measure collaboration in a construction project.	- Psychological factors (Generosity, Being Appreciative, Transparency). - Project level enablers (Good Communication, Process Design, Engagement of Stakeholders, Adoption of Information Technology, Real-Time Information Sharing and Reliability of Work)

2.5   Concept of Strategic Collaboration in E-Governance

Government organizations generally operate in silos and are characterized by independent processes and control structures (Luna-Reyes et al., 2007; 2008; Suri, 2014), different decision-making environments (Austin, 2010; McDermott, 2010) and unwillingness to collaborate (Dawes et al., 2009). Therefore, instances of within and across organizational collaboration are usually not visible in the context of government organizations (Suri and Sushil, 2006; 2012). These organizations tend to develop capabilities in their value chain within their frameworks (Scholl and Klischewski, 2007). On the other hand, citizens expect their problems to be resolved seamlessly without struggling with the long channels through which the traditional government generally operates (Goldsmith and Eggers, 2004; O'Leary and Vij, 2012; Gong and Janssen, 2012). Government organizations are, therefore, required to build cross-organizational strategic collaboration (Suri and Sushil, 2006; Ansell and Gash, 2008; Dawes et al., 2009; Likhi, 2010; Kumar et al., 2016) to achieve improved delivery of public service and enhanced performance (Srivastava, 2011; Gupta and Suri, 2018) through strategic planning and implementation (Suri, 2014; Gupta and Suri, 2017).

Due to, prevalent trends in collaborative governance, joined-up government, and public (social) value creation (Golubeva, 2007; O'Leary and Vij, 2012), strategic collaboration has taken a centre stage and it is relevant to e-governance for the reasons that it brings transparency, encourages citizen participation (Yildiz, 2007; Linders and Wilson, 2011; Tripathi et al., 2012; UN, 2016), improve service delivery (Weerakkody et al., 2011; Cordella and Bonina, 2012; Osman et al., 2014; Lonn et al., 2016; Gupta and Suri, 2017), helps in substantial efforts and cost savings (Suri, 2014;

Gupta and Suri, 2017), integrate data and link resources (Chun et al., 2012; Suri, 2016), simplify government procedures and enhance the execution of processes (Suri, 2014). Effective collaboration within and across government organizations help in solving a multiplicity of problems related to the usage of resources and processes, interoperability of technology, compliance with the legal and regulatory framework and other such problems faced by governments across the world (Luna-Reyes et al., 2008; Pardo et al., 2010; O'Leary and Vij, 2012; Kumar at el., 2016). Collaborative e-governance helps to achieve organisational objectives and also serves better for citizens' benefits (McGuire, 2006; Lofstedt, 2012). Despite several benefits of strategic collaboration, the associated challenges are many in the context of government organisation.

2.6   Challenges to Collaborative Governance

Government organisations face several challenges in forming strategic collaboration. These involve a difference in organizational culture in terms of language, egos, chauvinism, attitude, etc. lack of common understanding of basic principles of collaboration objectives and strategies such as dissimilar objectives, inability to share the risk, lack of trust (Pham and Tanner, 2014), lack of financial sources (Dada, 2006), unwanted influences in the decision-making process (Mcgure, 2006), focus on department level performances instead of common goals, i.e., the difference in operating procedures (Dawes et al., 2009), lack of interoperability among systems (Tripathi et al., 2012), lack of champions/actors who can inculcate collaborative environments (Chun et al., 2012), etc. To resolve such challenges, it is required to take initiatives for shifting to collaborative governance for achieving more openness and transparency in government functioning. Without such a shift, the successful implementation of collaborative governance appears impractical (Bertot et al., 2012). Government agencies need to introduce mechanisms to change the mindset of their employees and equip them with the required competencies so that they can genuinely put efforts into forming cross-organizational collaborative arrangements (McDermott, 2010).

The literature review reflects that most e-governance initiatives fail in the context of developing countries primarily due to the non-preparedness of ICT

infrastructures or e-readiness. Another, challenge that is foreseen is design-reality gaps, i.e., non-adoption of the prevailing best practices in e-governance   (Heeks, 2001). Developing countries have several other challenges to e-governance such as lack of required technological infrastructure (Cordella and Iannacci, 2010; Srivastava and Teo, 2010), lack of a supportive institutional environment, etc. lack of content in the local language, digital divide, etc (Spencer and Gomez, 2004; Cordella and Iannacci, 2010; Luna-Reyes et al., 2011).

2.7   E-Governance Performance

E-governance performance has been assessed on a wide range of evaluation criteria. Initially, the criterion for e-commerce was used to evaluate a website's performance (Merwe and Bekker, 2003) by including characteristics such as user interface design, navigational ease, quality content, reliability and technology. Kaylor et al., (2001) observed that the assessment of e-governance performance is primarily based on the analysis of its content or measure of its usage, which is not a suitable metric. Other factors as per user perceptions such as security and privacy, trustworthiness, response time, easy navigation, data download time, delivery of promised services, availability of current and relevant information, and full functionality must be included (Voss, 2000). Yildiz (2007) has identified key features for assessing e-government performance in terms of "communication", "transparency", "accountability", "effectiveness", "efficiency", "standardization of information and services", and "productivity".

Several studies revealed that there is a dearth of metrics for the appropriate assessment of e-government services performance (Steyaert, 2004). Hung et al. (2006) suggested nine performance indicators as "perceived usefulness", "perceived ease of use", "trust', "compatibility", "external influence", "interpersonal influence", "self-efficacy", and "facilitating condition". These performance indicators for e-governance can be prioritized based on organisational requirement. Verdegem and Verleye (2009) identified fifteen e-government performance indicators such as, "reduction of administrative burden, reliability, usability, cost-effective, ease of use, security, content readability, privacy/personal information protection, courtesy, content quality, transparency, responsiveness, accessibility, flexibility, and personal contact".

Bertot and Jaeger (2006) conclude that e-governance performance indicators can broadly be related to the "functionality, accessibility and usability" of e-governance services.

Several other e-governance performance indicators are suggested by the authors in the wake of the new perspective of e-governance such as citizen participation and strategic collaboration. E-governance services offered to the citizens, therefore, should have transparency and accountability (Carter and Bélanger, 2005; Ciborra and Navarra, 2005; Bertot et al., 2012; Gupta et al., 2016a), efficiencies, such as time and efforts savings (Dhillon at el., 2008, Gupta et al., 2018), procedures simplification, better office management, and cordial attitudes of staffs (Monga, 2008; Gupta et al., 2017; Gupta et al., 2018), cost reduction, and quality of information and services (Suri and Sushil, 2011; Gupta et al., 2018). The public's trust in e-governance services is another key performance indicator having factors such as perceived satisfaction, level of trust, lawfulness and loyalty (PytlikZillig et al., 2012). Candiello et al., (2009; 2012) evaluated e-governance performance indicators for perceived quality in terms of service satisfaction and its impact, effectiveness and efficiency. Several other scholars identify reliability (Collier and Bienstock, 2006; Kim et al., 2006; Shareef et al., 2011; Gupta et al.,2017) as the key performance indicator as it helps improve e-governance performance internally and externally. Suri (2014), while examining flexibility of processes and e-governance performance, identified key performance indicators as "Efficiency", "Transparency", "Interactivity" and "Decision Support".

Singh et al., (2020) identified five key indicators for measuring e-governance performance as "beneficiaries, technology usage, policy-formulation, institutional and economic parameters". Beneficiaries look for "Ease of use", "Usefulness", "User awareness", "Satisfaction", and "Adoption and social benefits and influence". Technology usage focuses on "Accessibility", "Infrastructure", "Reliability" and "Website maturity". Policy formulation should focus on "Laws and policies", "Privacy and security", "Transparency and user trust" and "Effectiveness and empowerment". Economic parameters should focus on "Affordability and cost of service" and "Funding sustainability". Institutional parameters should cover "Availability and performance", "Management support", "Quality (system, service and information) and operational efficiency".

2.7.1 E-Governance Performance Assessment Frameworks

Several scholars have brought out frameworks to assess e-governance performance in different aspects. Table 2.6 summarizes some of the e-governance performance assessment frameworks.

Table 2.6: E-Governance Performance Assessment Frameworks

S.No.	Author/Reference	Brief Description	Issues Addressed
1	Kaylor et al. (2001)	The essence of e-governance is "The enhanced value for stakeholders through transformation"	• Assessment of e-governance performance must contain:- "Security and privacy, Trustworthiness, Response time, Easy navigation, Data download time, Delivery of promised services, Availability of current and complete information, and Full functionality".
2	Merwe and Bekker (2003)	A framework and methodology for evaluating e-commerce websites	• E-governance performance includes characteristics such as "User interface design, Navigational ease, Quality contents, Reliability and Technology".
3	Hung et al. (2006)	Determinants of user acceptance of the e-government services "The case of online tax filing and payment system"	• Performance indicators for e-governance can be prioritized based on organizational requirements. • There are nine performance indicators:- "Perceived usefulness, Perceived ease of use, Trust, Compatibility, External influence, Interpersonal influence, Self-efficacy, and Facilitating condition".
4	Yildiz (2007)	E-government research "Reviewing the literature, limitations, and ways forward"	• Key features for assessing e-governance performance include "Communication, Transparency, Accountability, Effectiveness, Efficiency, Standardization of information and services, and Productivity".
5	Verdegem and Verleye (2009)	User-centred e-government in practice "A comprehensive model for measuring user satisfaction"	• Key e-governance performance indicators are:- "Reduction of administrative burden, Reliability, Usability, Cost-effective, Ease of use, Security, Content readability, Privacy/personal information protection, Courtesy, Content quality,

			Transparency, Responsiveness, Accessibility, Flexibility, and Personal contact".
6	PytlikZillig et al. (2012)	Public input methods impacting confidence in the government	• Key performance indicators in terms of public trust have factors such as "Perceived satisfaction, Level of trust, Lawfulness and Loyalty".
7	Suri, P.K. (2014)	The flexibility of processes and e-governance performance	E-governance performance includes: • "Efficiency" (fast execution of the core process, simplification of government procedures, reduced paperwork and decreased communication cost), • "Transparency" (service is easily accessible and delivered fairly), • "Interactivity" (within and across actors and beneficiaries) and • "Decision-support" (improved planning and decision making and better monitoring and control).
8	Suri P.K., Sushil (2017)	Measuring E-Governance Performance. In: Strategic Planning and Implementation of E-Governance.	The constituting micro-variables, viz. "Efficiency", "Transparency", "Interactivity" and "Decision-support" are mapped with literature. The construct is populated based on three independent surveys of key actor types in the e-governance context, viz. planners, implementers and beneficiaries.
9	Singh et al. (2020)	Service innovation implementation "A systematic review and research agenda"	• Five key indicators for measuring the e-governance performance are:- "Beneficiaries, Technology-usage, Policy-formulation, Institutional and Economic parameters".

2.8   Learning from the Literature Review

The literature review conducted for the study reveals the following research gaps.

- Strategic collaboration in terms of inter-organisational and cross-sectoral collaborations is widely practised in the corporate sector.

- The collaborative e-governance models have been proposed by scholars based on the parameters such as public value, technology, cost/economic and

beneficiaries (Chun et al., 2012) but empirical surveys to validate the framework have not been taken so far.

- Many e-governance performance evaluation frameworks have been proposed and validated by past studies but collaborative aspects of e-governance have not been included in these.

- Hardly any study could be found in the literature which has analyzed 'strategic collaboration and e-governance performance'.

While some attempts have been made by a few researchers to study the strategic alliance, strategic collaboration and collaboration competency in developing countries context, but hardly any comprehensive framework exists, particularly, from the Indian perspective. Hence, it is imperative to develop a validated research framework that addresses the existing gaps and facilitates the assessment of e-governance performance from the viewpoint of collaborative e-governance.

2.9   Concluding Remarks

An attempt through a review of the literature to develop an understanding of strategic collaboration, e-governance and collaborative e-governance performance has been made here. Frameworks for assessing 'strategic collaboration and e-governance performance' propounded by various scholars are also presented and analyzed. Identified research gaps have been presented as learnings from the appropriate literature review that helped conceptualize the theoretical research framework and identification of variables. The research gaps suggest that the collaborative e-governance models have been proposed by scholars based on the parameters such as public value, technology, cost/economic and beneficiaries but empirical surveys to validate it have not been taken so far. It is, therefore, became imperative to develop a conceptual framework and to analyze the 'Collaborative e-governance performance'. The next chapter outlines a strategic analysis of 'strategic collaboration and e-governance performance' through a pilot study to gain further insights for developing the study design.

Chapter 3

Strategic Collaboration and E-Governance Performance in India: A Pilot Study of Lease-hold to Free-hold Conversion of DDA's Properties[1]

3.1   Introduction

E-governance is primarily assessed from the technical point of view in terms of better interface design, information availability, reliability, security and privacy, ease of use, etc. Analysis in terms of non-technical aspects such as preparation of information, flow and disclosure of information, and collaboration in and across an organisation remained less focused. These non-technical aspects become complex and critical and, therefore, require appropriate attention to be given.

'Lease-hold to Free-hold' conversion of properties of Delhi Development Authority is a typical e-governance project that is complex due to the intricacies involved in its successful implementation. Various stakeholders are required to be aligned to deliver services to the citizens. Such intricacies have impelled the researcher to conduct an in-depth study of this project to have a better insight into 'strategic collaboration and e-governance performance' as a pilot study before attempting to conduct the main study.

3.2   Methodology

The methodology used for this pilot project involved the identification of conceptual research variables from the literature review conducted and their mapping with the case study project. The survey process comprised questionnaire development and data collection from the respondents. Univariate analysis has been performed to analyze and summarize the findings. This is further elaborated in the subsequent sections as follows.

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1. Part of this chapter has been published as
Pandey, J. K., and Suri, P. K. 2020. Collaboration competency and e-governance performance. *International Journal of Electronic Governance,* 12(3), 246-275.

3.2.1 Conceptual Research Variables

Conceptualized research variables comprised two macro variables and seven micro variables for the pilot project. While the first, macro variable 'Strategic Collaboration' is conceived to be having three micro variables namely, 'Absorptive capacity', 'Coordination capability' and 'Integrative capability. The second macro variable 'E-governance Performance' has four micro variables namely, 'Efficiency', 'Transparency', 'Reliability' and 'Interactivity'. A brief description of these variables is given below.

Collaboration Variables

Absorptive capacity: It is an organisation's ability to identify, assimilate, transform, and apply new information or knowledge from the environment for enhancing organizational capabilities (Cohen and Levinthal, 1990; Zollo and Winter, 2002; Malhotra et al., 2005; Ettlie and Pavlou, 2006; Roberts et al., 2012; Adeniran and Johnston, 2016; Verma et al., 2017).

Coordination capability: It is an organization's ability to build a knowledge-intensive interface (Grant,1996) arrange and deploy tasks (Helfat and Peteraf, 2003), resources and synergies among activities within and across organisations (Eisenhardt and Galunic, 2000; Ettlie and Pavlou, 2006; Jansen et al., 2005; Pavlou and El Sawy, 2011).

Integrative capability: It is an organization's ability to embed new knowledge in the environment by the way of contribution (Okhuysen and Eisenhardt, 2002), representation (Crowston and Kammerer, 1998), and interrelation (Grant, 1996) of individual diverse input in a collective manner (Adeniran and Johnston 2016; Pavlou and El Sawy, 2011) to impact competitive advantage.

Performance Variables

Efficiency: It deals with the operational efficiency in terms of reduced time, efforts, material resources (Reddick and Turner, 2012; Suri, 2014; Gupta et al.,2016a; Gupta et al., 2018) and cost-saving (DeitY, 2008; Schwester, 2009; Suri, 2014; Singh et al., 2017; Gupta et al., 2018) for both government and non-government entities.

Transparency: It deals with the openness of government functioning and accountability and includes the availability of online records and government decisions (McDermott, 2010; Suri, 2014; Kumar, 2016; Gupta et al., 2018), public input and feedback systems (Chun et al., 2012, Kumar, 2016; Gupta et al., 2018), and choice of alternate services (Goldsmith and Eggers, 2004).

Reliability: It deals with the extent to which e-governance services are consistent, secured, trustworthy and generate quality information (Kumar, 2016; Gupta and Suri, 2017; Priya et al., 2018) and includes, trust (PytlikZillig et al., 2012, Gupta et al., 2017), security and privacy (Bhattacharya, et al., 2012, Gupta et al., 2017; Singh et al., 2020), information quality and speed of services (Yildiz, 2007; Suri and Sushil, 2011; Gupta et al., 2017).

Interactivity: It deals with enhancement in interactions due to e-governance services (Suri, 2014) and includes a navigational aspect of service to find the content user is looking for (Merwe and Bekker, 2003; Gupta et al., 2017; Gupta et al., 2018), content coherency, recency, relevancy and comprehensiveness (Verdegem and Verleye, 2009; Shareef et al., 2011; Gupta et al., 2017).

3.3   A Brief Description of Pilot Project

Delhi Development Authority constructs the residential flats of different categories - Janta, Economic Housing Scheme (EHS), Low Income Group (LIG), Middle Income Group (MIG), High Income Group (HIG) and Self-Financing Scheme (SFS). These flats and flats of the Asian games village complex constructed before 1992 were allotted to the beneficiaries on a lease-hold basis by executing a Conveyance Deed (CD). Under directions by the government, DDA has to convert a leasehold property allotted to the citizen as free-hold within a time frame of 45 days.

The manual processing of freehold conversion of properties is cumbersome and time-consuming as multiple forms and supporting documents are required to be filled in and submitted. These conversion processes mandatorily require the services of outside agencies such as banks and registrar offices apart from DDA's offices. Many times, beneficiaries become victims of touts for lack of knowledge about the processes

involved. Such instances tarnish the image of the organisation. DDA has, therefore, adopted the e-governance approach and developed an interactive and responsive website. The website has attractive features such as easy navigation, user registration, calculation of property conversion fee, tips for filling up the online forms and application status tracking. The website provides links to internal and external departments involved in the conversion process such as Land, Housing, Finance, Legal, Systems, Banks, Sub-registrar offices, etc. DDA has also set up Nagrik Suvidha Kendras (NSKs) (Citizen Facilitation Centres) to facilitate the conversion process at four easily approachable locations at zonal offices. The salient features of the scheme are given in Table 3.1 below.

Table 3.1: E-Governance Project Selection for Pilot Study

Project name: Lease-hold to Free-hold Conversion of Properties by DDA	
Objective	To transform the manual method of lease-hold to the free-hold conversion of properties into a web-based, dynamic process for providing services at the doorsteps of the citizen in an efficient, transparent, reliable and interactive manner
Focus	Single Window, Efficient, Transparent, Reliable, Interactive (user-friendly) and Time-bound (45 days) service to the citizens
Coverage	All India and Indians residing outside India
Responsible Organisation	Delhi Development Authority (DDA) - A central autonomous body, Ministry of Housing and Urban Affairs (MoHUA), Government of India (GoI)
Beneficiaries	The allottees/purchasers of residential flats comprising of different categories as per income levels -Janta, Economic Housing Scheme (EHS), Low Income Group (LIG), Middle Income Group (MIG), High Income Group (HIG)and Self-Financing Scheme (SFS) and flats of Asian games village complex
Status as on 31.12.2021	An interactive website, with an audiovisual display explaining the processes of conversion of properties, is functional since 2012. Application received for freehold conversion: 67,735 Conversion certificates issued: 43,853 The application is scrutinized and with the different departments for processing: 19,660 Application returned due to incomplete documentation: 4,222

3.4   Questionnaire Development and Data Collection

Relevant questionnaires for mapping 'Strategic Collaboration' and 'E-governance Performance' are prepared based on the identified micro variables and circulated to six senior executives and domain experts of the organization who helped in removing redundancy and ambiguity in the questionnaires. For pre-testing, the questionnaires were distributed among 10 respondents. Questions not clear to respondents were removed. After fine-tuning, the contents of the questionnaires in terms of their language, coherency, and understandability, the questionnaire on 'Strategic Collaboration' was circulated to the respondents comprising of DDA's staff of different departments, sub-registrar offices and banks for seeking their response. The questionnaire comprising the 'E-governance Performance' assessment was circulated to the beneficiaries of DDA's conversion scheme. The final questionnaires used in the pilot study are given in Appendix H. The mapping of identified and conceptualized macro and micro variables with questionnaire items is given in Table 3.2 below.

Table 3.2: Mapping of Conceptualized Variables with Questionnaire Construct

Macro Variables	Micro Variables	Corresponding Questionnaire Items
Strategic Collaboration	Absorptive capacity (Acap)	Acap1,Acap2,Acap3,Acap4
	Coordination capability (Ccap)	Ccap1,Ccap2,Ccap3,Ccap4
	Integrative capability (Icap)	Icap1,Icap2,Icap3,Icap4
E-governance Performance	Efficiency (Eff)	Eff1,Eff2,Eff3,Eff4
	Transparency (Trp)	Trp1,Trp2,Trp3,Trp4
	Reliability (Rel)	Rel1,Rel2,Rel3,Rel4
	Interactivity (Int)	Int1,Int2,Int3,Int4

3.4.1   Reliability and Validity Analysis

The Likert-type scale of 1 to 5 is normalized into five adjoining intervals as 0–0.2, 0.2–0.4, 0.4–0.6, 0.6–0.8 and 0.8–1.0 representing nil, small, medium, large and very large extent respectively. A total of 40 responses for measuring 'Strategic Collaboration' and 'E-governance Performance' were received from government officials and

beneficiaries. Cronbach's alpha value (Kerlinger, 1983), was used to measure the internal consistency of constructs. The Cronbach's alpha for constituents of 'Strategic Collaboration', i.e., 'Absorptive capacity', 'Collaboration capability' and 'Integrative capability' was found to be 0.96, 0.97 and 0.97 respectively. These values for 'E-Governance Performance' constituents, i.e., 'Efficiency', 'Transparency', 'Reliability' and 'Interactivity' were found to be 0.97, 0.97, 0.97 and 0.97 respectively. The Alpha values are found to be greater than 0.7 and are, therefore, considered acceptable as per recommended threshold values for such studies (Hair et al., 2006).

3.5 Analysis and Discussion

To explore the survey outcomes, univariate analysis has been conducted for the conceived macro and micro variables. Table 3.3 presents the calculated values for mean, standard error (mean), range, maximum and minimum for macro and micro variables of 'Strategic Collaboration' and 'E-governance Performance' respectively in the study context.

Table 3.3: Univariate Analysis of Survey Statistics

Variables	N Valid	Mean	SE (mean)	Range	Min	Max
Strategic Collaboration	**40**	**0.56**	**0.04**	**0.96**	**0.04**	**1.00**
Absorptive capacity	40	0.55	0.04	1.00	0.00	1.00
Coordination capability	40	0.59	0.03	0.94	0.06	1.00
Integrative capability	40	0.57	0.04	0.94	0.06	1.00
E-governance Performance	**40**	**0.61**	**0.04**	**0.95**	**0.05**	**1.00**
Efficiency (Eff)	40	0.65	0.04	0.88	0.12	1.00
Transparency (Trp)	40	0.62	0.04	0.94	0.06	1.00
Reliability (Rel)	40	0.60	0.04	1.00	0.00	1.00
Interactivity (Int)	40	0.56	0.04	1.00	0.00	1.00

(0-0.2:Nil extent, 0.2-0.4: Small extent, 0.4-0.6:Medium extent, 0.6 -0.8:Large extent: Very Large extent)

3.5.1 Analysis of Collaboration

The mean value for 'Strategic Collaboration' is 0.56 which is in the range of 0.4–0.6. This reflects that the overall collaborative indicators of DDA are of a medium extent. Mean values of its constituent micro variables, viz. 'Absorptive capacity, 'Coordination capability' and 'Integrative capability' are 0.55, 0.59 and 0.57 respectively, which are also in the medium extent range. 'Coordination capability' is marginally better than

'Absorptive capacity' and 'Integrative capability'. It indicates that the coordination among the different departments for arranging and deploying tasks (Helfat and Peteraf, 2003), resources and synergies among activities within and across the organization (Eisenhardt and Galunic, 2000; Jansen et al. 2005; Ettlie and Pavlou, 2006; Pavlou and El Sawy, 2011) are better in comparison to the other two. The lower mean value for 'Absorptive capacity' shows that DDA's ability to identify, assimilate, transform, and apply new information or knowledge from the environment (Cohen and Levinthal, 1990; Zollo and Winter, 2002; Malhotra et. al., 2005; Ettlie and Pavlou, 2006; Roberts et. al., 2012) need to be strengthened. Similarly, a lower mean value for 'Integrative capability' indicates that DDA's ability to integrate new knowledge into the environment by the way of contribution (Okhuysen and Eisenhardt, 2002), representation (Crowston and Kammerer, 1998), and interrelation (Grant, 1996) in a collective manner (Pavlou and El Sawy, 2011) is to be improved.

3.5.2 Analysis of Performance

The corresponding overall mean value for 'E-governance Performance' is 0.61 which is in the range of 0.6-0.8. It indicates that a large number of beneficiaries draw benefits from this online scheme of a property conversion. The mean values for constituting micro variables, viz. 'Efficiency', 'Transparency', 'Reliability' and 'Interactivity' are 0.65, 0.62, 0.60 and 0.56 respectively. 'Interactivity' which is found to be of medium extent deals with the targeted beneficiaries' interactions referring to navigational aspects to find out the required pages (Merwe and Bekker, 2003), content coherency, and relevancy (Shareef et al., 2011) to draw more benefits (Verdegem and Verleye, 2009). There is a need for enhancing interactivity by incorporating the changes reviewed periodically. A sound feedback system is required to be put in place for accepting the users' input for a customized interactive system. Mean values for 'Efficiency', 'Transparency' and 'Reliability' are found to be to a large extent and can be treated as satisfactory. Yet, there is scope for improvement by adopting a culture of good human resource practices, minimizing the extra channels for processing, the good system architecture for secure transactions, etc.

3.6   Pilot Study Findings

Mean values of constituents of 'Strategic Collaboration' are at the medium extent seemingly due to the heterogeneity of organisational culture, staff's backgrounds, rigid mindsets as well as the complexity of the processes. The mean values reveal that there is a need for creating synergy among collaborating departments by addressing interprofessional challenges in terms of unfamiliar terminology, different ways of problem-solving, and a lack of common understanding of issues and challenges (Kwon et al., 2009).

The pilot study reflects that the constituent of 'Strategic Collaboration' might be influencing 'E-governance Performance' correspondingly in different manners to actors, i.e., government and non-government officials and target beneficiaries. Empirical studies for exploring such influencing linkages need to be undertaken.

3.7   Concluding Remarks

Establishing a collaborative arrangement that sustains over time is very important for e-government (Kolfschoten et al., 2012). Strategic collaboration helps in sharing knowledge beyond the boundaries of an organization (Cowan et al., 2007). Such collaboration may occur in an absorptive, collaborative and integrative manner to reduce inter-functional and inter-organizational conflict if any, and to promote the development of a distinctive relational advantage (Barratt, 2004). It can, therefore, be argued that collaborating organizations shall have more access to diverse shared information and as such would be able to enhance e-governance performance.

The pilot study has helped in developing a better understanding of the research topic in terms of 'Strategic Collaboration' and 'E-governance Performance'. In particular, the study reveals the significance of creating synergy among collaborating agencies by addressing interprofessional challenges in terms of unfamiliar terminology, different ways of problem-solving, and a lack of common understanding of issues and challenges. The pilot study has also helped in identifying the micro constituents and formulating research hypotheses that have become part of the main study as discussed in the next chapter. Data collection issues during the pilot study

have also helped in preparing questionnaires and working out a data collection plans for the main study.

Chapter 4
Research Design

4.1 Introduction

Assessing strategic collaboration within and across government organizations and evaluating the performance of government projects is a multidisciplinary subject area. The purpose of this study is to analyze 'strategic collaboration and e-governance performance'. To achieve the objective, a conceptual research framework is developed. This chapter highlights the research background for developing the proposed research framework. This framework hypothesizes that 'Collaborative e-governance performance' is constituted by three macro variables and these three macro variables, in turn, are further comprised of fifteen micro variables as presented in Figure 4.1 (p. 46) and Figure 4.2 (p. 57).

In the subsequent sections of this chapter, two sets of hypotheses, i.e., one for the macro variables and the other for micro variables are formulated. This is followed by an overview of the different research methodologies used for the study, i.e., qualitative and quantitative techniques. For the qualitative research analysis, Total Interpretive Structural Modeling (TISM) and for the quantitative research analysis, Partial Lease Squares-Structural Modeling (PLS-SEM) have been used. Finally, a flow chart depicting the steps of research adopted to conduct this study has been presented.

4.2 Research Variables

From the theoretical perspective as discussed in the previous section and the adopted indicators from an extensive literature review related to 'Collaborative e-governance performance', a conceptual framework to assess the 'Collaborative e-governance performance' is hypothesized. The proposed conceptual framework is constituted of three macro variables and fifteen micro variables. Figure 4.1 depicts the possible linkages of the main dimensions with the outcome variable, i.e., 'Collaborative e-governance performance' (CEGP). The macro variables along with their micro variables have been summarized in Table 4.1.

The main construct, 'Value-creation' (VCEG) by collaborative e-governance is constituted by having six sub-dimensions (micro variables) namely, 'Decision-making and Control', 'Service Delivery', 'Responsiveness', 'Transparency', 'Participation', and 'Interactivity'. The second main construct 'Cost-effectiveness' (CEEG) by collaborative e-governance contains four micro-variables namely, 'Time and Effort Savings', 'Efficient Utilisation of Resources', 'Savings of Money Paid to Middlemen', and 'Simplification and Faster Execution of Processes'. The third main construct 'Trust-development' (TDEG) by collaborative e-governance has five micro variables namely, 'Usefulness of Services', 'Security and Privacy', 'Reliability of Services', 'Ease of Use of Services', and 'Customized Services Response'.
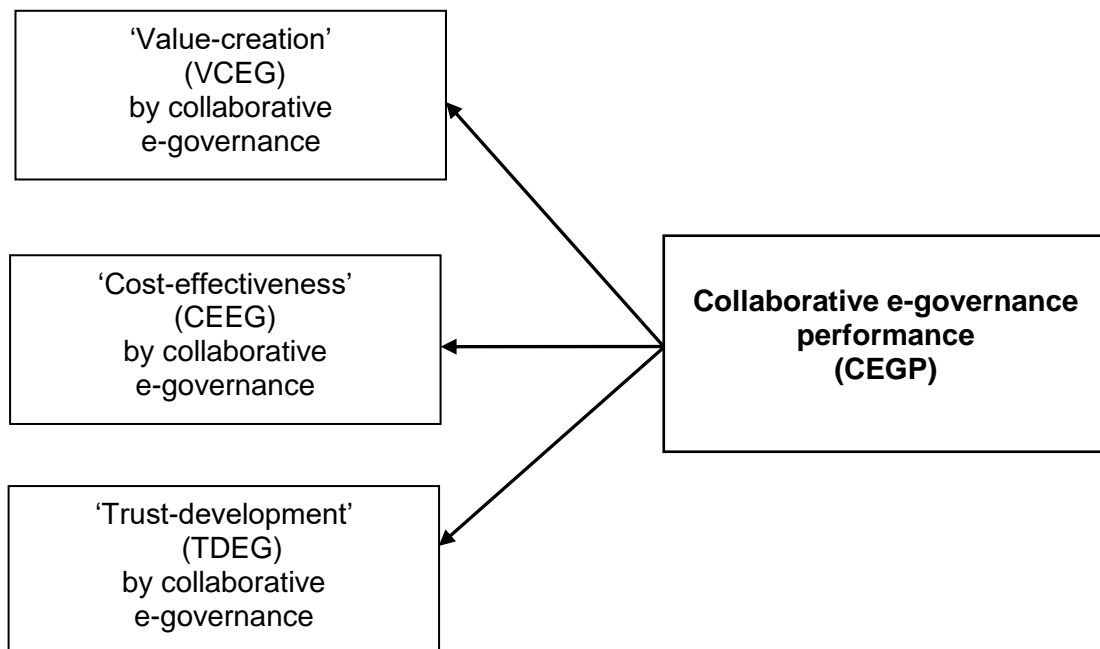
Figure 4.1: Macro Variables of 'Collaborative e-governance performance'

4.2.1 Description of Research Variables

A brief description of the conceptual research variables adopted for the study based on theoretical backgrounds from the literature review is presented below.

'Collaborative e-governance performance' (CEGP)

'Collaborative e-governance performance' taken for this study is considered as the outcome variable and is a third-order construct. The outcome variable contains value creation which is perceived as a significant contributor to the government organisation for framing strategic collaboration. Value creation in a government organisation is

perceived as bringing enhanced decision-making and exercising better monitoring and control, promoting enhanced transparency by full disclosure of information and offering improved online services delivery to the citizens by various means like offering improved responsiveness, encouraging citizen participation, etc. 'Collaborative e-governance performance' contains cost-effectiveness to curtail the likely cost that occurs to avail government services. The use of appropriate technology by collaborative e-governance helps in building trust among the citizens for the government. Due to, prevalent trends in collaborative governance, joined-up government, and public (social) value creation, strategic collaboration has taken a centre stage and it is relevant to e-governance for the reasons that it brings transparency, encourages citizen participation (Golubeva, 2007; Yildiz, 2007; Linders and Wilson, 2011; O'Leary and Vij, 2012; Tripathi et al., 2012; UN, 2016), improve service delivery (Weerakkody et al., 2011; Cordella and Bonina, 2012; Osman et al., 2014; Lonn et al., 2016; Gupta and Suri, 2017), helps in substantial efforts and cost savings (Suri, 2014; Gupta and Suri, 2017), integrate data and link resources (Chun et al., 2012; Suri, 2016), simplify government procedures and enhance the execution of processes (Suri, 2014). Effective collaboration within and across government organizations helps in solving a multiplicity of problems related to the usage of resources and processes, interoperability of technology, compliance with the legal and regulatory framework and other such problems faced by governments across the world (Pardo et al., 2010; 2012; O'Leary and Vij, 2012; Kumar et al., 2016). Collaborative e-governance helps to achieve e-governance objectives and makes lives easier for the citizens (McGuire, 2006; Lofstedt, 2012).

4.2.2 Macro Variables

Three relevant macro variables have been identified based on the literature review. These are explained as follows:

'Value-creation' (VCEG) by collaborative e-governance

Collaborative e-governance can help organizations in creating improved value by combining their distinct resources and capabilities (Austin, 2010; Molina and McKowen, 2012, Flak et al., 2015; Gupta and Suri, 2017) for better planning, decision making and exercising control (Andersen et al., 2010; Suri, 2014; Lonn et al., 2016). It can enhance service delivery by ensuring information availability in a simpler and

easily understandable form, providing accessibility for deprived and disabled persons (Weerakkody et al., 2011; Bhattacharya et al., 2012; Osman et al., 2014; Lonn et al., 2016; Gupta and Suri, 2017). Collaborative e-governance can also help in achieving e-governance domain-specific goals like safety and security (Kelly et al., 2002; Chun et al., 2012), responsiveness to queries and complaints (Kernaghan, 2003; Papadomichelaki and Mentzas, 2012; Satapathy, 2014; Gupta and Suri, 2017). It too helps the organization in bringing transparency into the system by providing information tracking, display and disclosure of full information (Almarabeh et al., 2010; Papadomichelaki and Mentzas, 2012; Suri, 2014), citizens' participation for their valuable suggestions for policy and decisions making (Axelsson et al., 2010; Reddick, 2011; Chun et al., 2012; Cegarra-Navarro et al., 2014; Picazo et al., 2015; Gupta and Suri, 2017) and facilitating hassle-free interactions within and across the government and citizens (Andersen et al., 2010; Karunasena and Deng, 2012, Suri, 2014; 2016).

Table 4.1: Proposed Macro and Micro Variables for
'Collaborative e-governance performance'

S. No.	Macro Variables	Micro Variables
1	Value-creation	• Decision-making and Control • Service Delivery • Responsiveness • Transparency • Participation • Interactivity
2	Cost-effectiveness	• Time and Efforts Savings • Efficient Utilisation of Resources • Savings of Money Paid to Middlemen • Simplification and Faster Execution of Processes
3	Trust-development	• Usefulness of Services • Security and Privacy • Reliability of Services • Ease of Use of Services • Customized Services Response

'Cost-effectiveness' (CEEG) by collaborative e-governance

Strategic collaboration in the e-governance context help in attaining efficiency in terms of effective resource utilization and considerable cost reduction by saving time and efforts (Chun et al., 2012; Osman et al., 2014; Gupta and Suri, 2017) such as time

spent standing in queue for availing services and reduced utilization of pen and paperwork (Karunasena and Deng, 2012; Suri, 2014). It can help in the appropriate utilization of resources such as stationery, storage space, occupancies etc., and cost reduction in searching documents for requested data and in disposing of old records (Papadomichelaki and Mentzas, 2012; Suri, 2014; 2017). Savings of money paid to middlemen for availing government services (Belwal and Zoubi, 2008; Osman et al., 2014; Gupta and Suri, 2017) and bringing efficiency through simplification of procedures and faster execution of government processes (Andersen et al., 2010; Scott et al., 2011; Chun et al., 2012; Suri 2014; Gupta and Suri, 2017) can be achieved through collaborative e-governance as well.

'Trust-development' (TDEG) by collaborative e-governance

Trust development has become an essential issue in the context of collaborative e-governance due to the form of interaction it has among various stakeholders in a virtual model and from a remote location. Trust development plays a major role between citizens and government, where citizens remain unaware of e-governance service providers (Carter and Weerakkody, 2008). Technology plays a very imminent role in trust development for collaborative e-governance for project effectiveness, better quality services, and improved citizen participation (Bryson et al., 2014; Picazo et al., 2015; Luna-Reyes, 2016). Technology-enabled collaborative e-governance helps the organizations in better system design for data integration and to connect citizens for enhancing decision making and linking of useful resources (Chun et al., 2012). Such collaborative e-governance also helps in the usefulness of e-governance services by providing the latest and relevant information (Carter and Weerakody, 2008; Harrison et al., 2011; Bhattacharya et al., 2012; Weerakody et al., 2013; Osman et al., 2014; Gupta and Suri, 2017), protection against loss of security and breach of privacy of data (Kalsi and Kiran, 2013; Satapathy, 2014) and ease of using systems. Reliable systems that do not generate technical errors while submitting application forms (Osman et al., 2014; Satapathy, 2014) and customized e-governance services response through feedback and grievances addressable mechanism (Reddick, 2011; UN, 2016) can also be achieved through 'Collaborative e-governance performance' for trust development.

Table 4.2: List of Macro Variables with Literature Support

S.No.	Macro Variables	Literature Source
1	Value-creation	Moore (1995; 2014), Austin (2010), Molina and McKowen (2012), Chun et al. (2012), Flak et al. (2015), Gupta and Suri (2017), Parameswar et al. (2018; 2019), Ramaswamy and Ozcan (2018), Green and Sergeeva (2019), Pereira et al. (2021)
2	Cost-effectiveness	Planning Commission (2007), Belwal and Zoubi (2008), Chun et al. (2012), Suri (2014), Gupta and Suri (2017), Sindhani et al. (2019), Pereira et al. (2021)
3	Trust-development	Carter and Weerakody (2008), Harrison et al. (2011), Bhattacharya et al. (2012), Chun et al. (2012), Weerakody et al. (2013), Osman et al. (2014), Luna-Reyes (2016), Gupta and Suri (2017), Bellini et al. (2019), Dhir and Dhir (2020)

4.2.3 Micro Variables

Six micro variables for 'Value-creation', four for 'Cost-effectiveness', and five for 'Trust-development' by collaborative e-governance have been identified from the literature review. These are briefly explained below.

Micro variables for 'Value-creation' by collaborative e-governance

There are six micro variables for 'Value-creation' by collaborative e-governance identified through the literature review. These are presented below.

'Decision-making and Control' (VCDM)

Value-based collaborative e-governance helps government organizations in creating improved value by combining their distinct resources and capabilities (Flak et al., 2015; Gupta and Suri, 2017). A government organisation is said to have created better value if appropriate and timely decisions about arising problems are addressed. Similarly, judicious monitoring and effective control over processes play an important role in achieving the target (Andersen et al., 2010; Suri, 2014; Lonn et al., 2016).

'Service Delivery' (VCSD)

'Service Delivery' within the context of 'Value-creation' by collaborative e-governance has been perceived as the delivery of services to the citizens by ensuring the availability of current and relevant information about processes and procedures on the

portal for enabling its usage in an easily understandable manner. Providing the contents of the services in multiple languages, making services accessible through common services centres and providing accessibility to deprived and disabled persons are also perceived as a part of 'Service Delivery' (Weerakkody et al., 2011; Bhattacharya et al., 2012; Osman et al., 2014; Lonn et al., 2016; Gupta and Suri, 2017).

'Responsiveness' (VCRP)

Citizens spend their precious time bringing their issues to the government for their addressing. It becomes the responsibility of the government to address those issues meticulously. Government organisations should, therefore, be responsive to the citizen. In this context 'Responsiveness' has been perceived as keeping citizens informed through generating receipts, token numbers for the application submitted and responding to their queries, complaints and suggestions if any (Kernaghan, 2003; Papadomichelaki and Mentzas, 2012; Satapathy, 2014; Gupta and Suri, 2017).

'Transparency' (VCTR)

It refers to bringing transparency into the e-governance system and is perceived as providing online features of display and disclosure of full information about government schemes, plans, processes and procedures, showing the status of submitted applications and allowing tracking of application forms by the citizens (Papadomichelaki and Mentzas, 2012; Suri, 2014).

'Participation' (VCPT)

To enhance 'Value-creation' by collaborative e-governance, citizens' participation in the government organisation becomes an essential component. 'Participation' of the citizen in the government organisation is perceived as offering their valuable inputs in the form of suggestions, comments, etc. for policy formulation and decision making for improving the 'Value-creation' (Axelsson et al., 2010; Reddick, 2011; Chun et al., 2012; Cegarra-Navarro et al., 2014; Picazo et al., 2015; Gupta and Suri, 2017).

'Interactivity' (VCIN)

Hassle-free interactions among various stakeholders in and across government organizations and beneficiaries shall help in enhancing 'Value-creation' by collaborative e-governance. Government organisations should, therefore, give

adequate attention to it. 'Interactivity' in this context is perceived as, the use of multiple interaction channels including social media platforms, call centres, organizing of events, etc. (Andersen et al., 2010; Karunasena and Deng, 2012; Suri, 2014; 2016).

Micro variables for 'Cost-effectiveness' (CEEG) by collaborative e-governance

Economic parameters are considered an essential component of 'Collaborative e-governance performance'. There are four micro variables for 'Cost-effectiveness' by collaborative e-governance adopted through literature review. These are presented below.

'Time and Effort Savings' (CETS)

'Time and Effort Savings' is perceived as a considerable reduction in cost by saving time and efforts such as time spent standing in queue for availing services, less frequent visits to government offices and reduced pen and paperwork (Planning Commission, 2007; Karunasena and Deng, 2012; Chun et al., 2012; Suri, 2014; Gupta and Suri, 2017).

'Efficient Utilisation of Resources' (CEEU)

'Efficient Utilisation of Resources' is perceived as effective utilization of resources such as stationery, storage space, occupancies etc., substantial cost reduction in searching documents for requested data by the user and cost minimization in disposing of old records by the government agency (MeitY, 2012; Papadomichelaki and Mentzas, 2012; Suri, 2014; Suri and Sushil, 2017, pp. 25-39).

'Savings of Money Paid to Middlemen' (CESM)

In developing countries like India, the use of an intermediary for availing government services are quite prevalent due to the perceived understanding by end-user that getting work done directly from a government organisation is a tedious task. Citizens, therefore, tend to take the help of middlemen. 'Savings of Money Paid to Middlemen' is perceived as extending the citizen-centric services digitally that save money to citizens, avoid the middleman and also thwart spreading corruption (Belwal and Zoubi, 2008; Osman et al., 2014; Gupta and Suri, 2017).

'Simplification and Faster Execution of Processes' (CESF)

To achieve efficiency in the government process, working procedures are required to be simple and the execution of processes should be faster. 'Simplification and Faster Execution of Processes' have been perceived as the name of the e-governance website and applicable texts reflecting the process should be kept simple and informative. Hierarchical distances among the implementers for the execution of the application process should be minimized (Andersen et al., 2010; Scott et al., 2011; Chun et al., 2012; Suri, 2014; Gupta and Suri, 2017).

Micro variables for 'Trust-development' (TDEG) by collaborative e-governance

Five micro variables constituting 'Trust-development' by collaborative e-governance have been adopted through literature review. These are explained below.

'Usefulness of Services' (TDES)

The 'Usefulness of Services' is perceived as making e-governance services useful. Content for the services should, therefore, be up to date and relevant (Carter and Weerakody, 2008; Harrison et al., 2011; Bhattacharya et al., 2012; Weerakodyet al., 2013; Osman et al., 2014; Gupta and Suri, 2017).

'Security and Privacy' (TDSP)

It is found that citizens tend to avail themselves of the services from those organisations where they have trust in the security and privacy of their data. E-governance services should, therefore, have an adequate protection mechanism against the loss of citizen data and breach of privacy. Online transactions for payments and sharing of personal information should be highly restrictive. Organisations should take full responsibility for any such breach and loss of data (Kalsi and Kiran, 2013; Satapathy, 2014).

'Reliability of Services' (TDRL)

A reliable system is a system that does not fail too often and takes the very least time to recover once it fails. It is, therefore, conceived that the e-governance site remains fully functional and generates no errors while accessed by citizens for online filing of forms and making of the payment is trustworthy (Bhattacharya et al., 2012;

Weerakkody et al., 2013; Osman et al., 2014; Satapathy, 2014; Luna-Reyes et al., 2016).

'Ease of Use of Services' (TDEU)

E-governance services should be built around the GUI principles. E-governance services should, therefore, have easy-to-use features such as menu-driven, tooltips and search engine enabled and working across the popular browsers (Scott et al., 2011; Bhattacharya et al., 2012; Weerakkody et al., 2013; Osman et al., 2014).

'Customized Services Response' (TDCR)

It has been noticed that most e-governance website has automated reply facility. Such a reply does not help in solving the problems of end-users. Customized e-governance services response for feedback and grievances redressal mechanism is required to address the specific concerns of the citizen (Reddick, 2011; Satapathy, 2014).

Table 4.3: List of Micro Variables with Literature Support

Macro Variables	Micro Variables	Literature Source
Value-creation	Decision-making and Control	Andersen et al. (2010), Chun et al. (2012), Suri (2014), Lonn et al. (2016), UN (2016), Suri (2016), Parameswar et al. (2018), Green and Sergeeva (2019), Pereira et al. (2021)
	Service Delivery	Weerakkody et al. (2011), Cordella and Bonina (2012), Osman et al. (2014), Lonn et al. (2016), Gupta and Suri (2017), Deng and Karunasena (2018)
	Responsiveness	Papadomichelaki and Mentzas (2012), Satapathy (2014), Gupta and Suri (2017)
	Transparency	Almarabeh et al. (2010), Harrison et al. (2011), Chun et al. (2012), Suri (2014), UN (2016), Deng and Karunasena (2018), Schoenmaker and Schramade (2019)
	Participation	Axelsson et al. (2010), Reddick (2011), Chun et al. (2012), Cegarra-Navarro et al. (2014), Bryson et al. (2014), Picazo et al. (2015), Gupta and Suri (2017), Green and Sergeeva (2019)
	Interactivity	Andersen et al. (2010), Gauld et al. (2010), Karunasena and Deng (2012), Suri (2014), Suri (2016), Ramaswamy and Ozcan (2018)

Cost-effectiveness	Time and Efforts Savings	Planning Commission (2007), Karunasena and Deng (2012), Suri (2014;2016), Suri (2016), Gupta and Suri (2017)
	Efficient Utilisation of Resources	Suri and Sushil (2011), MeitY (2012), Papadomichelaki and Mentzas (2012), Chun et al. (2012), Suri (2014), Suri (2017), Li et al. (2019), Pereira et al. (2021)
	Savings of Money Paid to Middlemen	Belwal and Zoubi (2008), Osman et al. (2014), Gupta and Suri (2017)
	Simplification and Faster Execution of Processes	Andersen et al. (2010), Scott et al. (2011), Karunasena and Deng (2012), Chun et al. (2012), Suri (2014), Gupta and Suri (2017), Paschek et al. (2017), Pons-Morera et al. (2018)
Trust-development	Usefulness of Services	Carter and Weerakkody (2008), Harrison et al. (2011), Bhattacharya et al. (2012), Weerakkody et al. (2013), Osman et al. (2014), Gupta and Suri (2017)
	Security and Privacy	Carter and Weerakkody (2008), Shareef et al. (2011), Kalsi and Kiran (2013), Weerakkody et al. (2013), Satapathy (2014), Luna-Reyes et al., (2016), Singh et al. (2017)
	Reliability of Services	Teo et al. (2008), Andersen et al. (2010), Bhattacharya et al. (2012), Weerakkody et al. (2013), Osman et al. (2014), Luna-Reyes et al. (2016), Deng and Karunasena (2018)
	Ease of Use of Services	Golubeva (2007), Scott et al. (2011), Bhattacharya et al. (2012), Weerakkody et al. (2013), Osman et al. (2014), Suri (2014), Singh et al.(2017)
	Customized Services Response	Reddick (2011), Satapathy (2014), UN (2016)

4.3.4 Justification of Macro and Micro Variables

There are three macro constructs and fifteen micro constructs conceptualized for this study, primarily from the literature review. Adoption of macro and micro variables is also considered from the domain expert's point of view and functional requirement of the projects taken for the study. Conceptualized variables are directly associated with the framing of the questionnaire circulated to the respondent for capturing the insights. Being an interdisciplinary subject of management and information technology, many other aspects could have been included. However, keeping into view the scope and objective of this research work, those are consciously not included in the study.

4.3 Conceptual Research Framework

The theoretical framework paves the foundation for the execution of qualitative as well as quantitative studies. From the perspective of the quantitative study, the theoretical framework assists in hypothesis formulation for analyzing the 'Collaborative e-governance performance'. It further helps in the development of the survey instrument. The proposed framework is conceptualized based on the "reflective measurement theory" given by Hair et al. (2010). As per this theory, the latent factors "cause" or "reflect" the indicative variable. Thus, there are fifteen first-order factors (micro variables), three second-order factors (macro variables) and one third-order factor (construct), i.e., the outcome variable in the proposed framework presented in Figure 4.2.
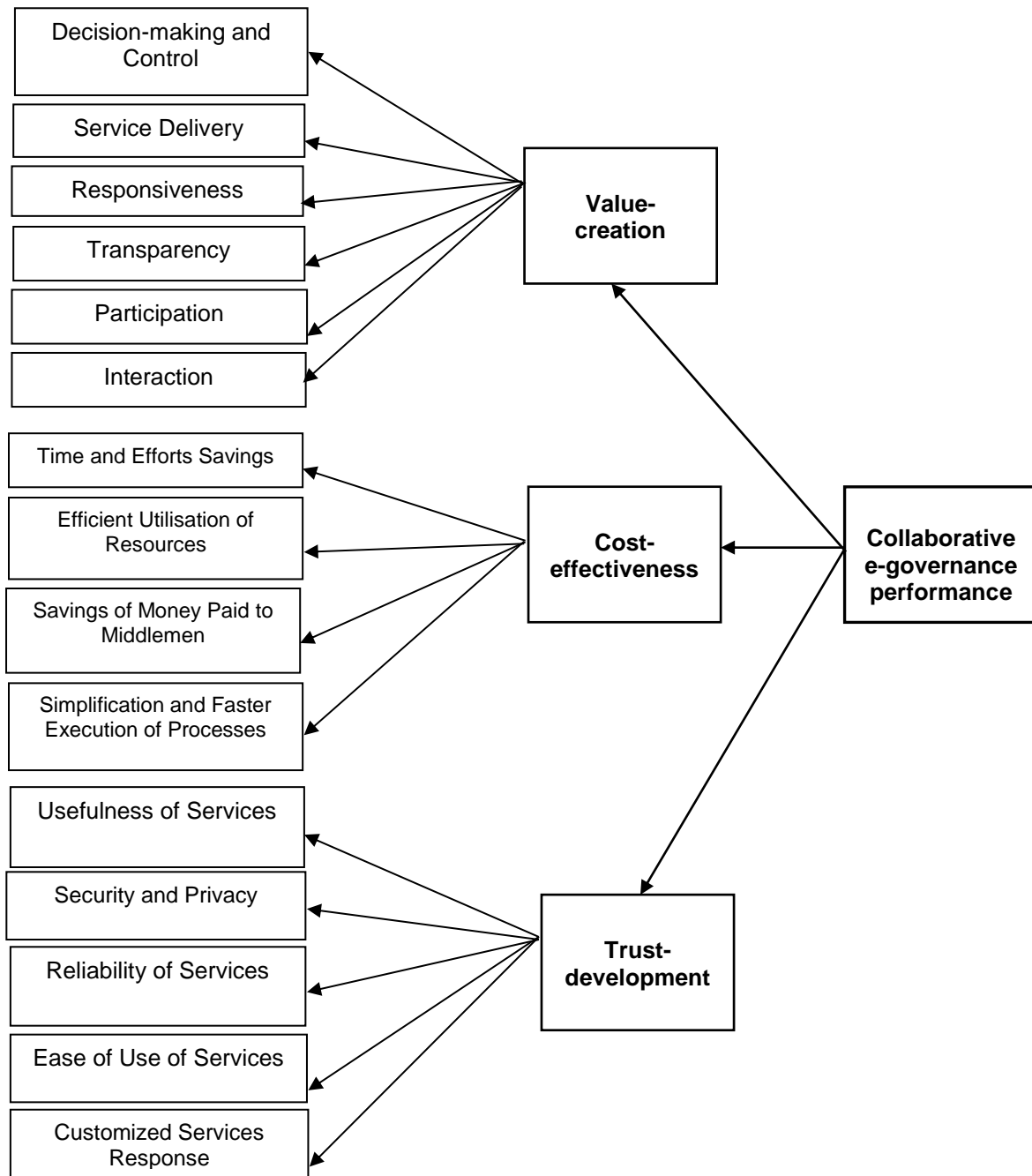
Figure 4.2: Conceptual Framework for Research

4.4   Research Hypotheses Formulation

Given the research objectives and the conceptual framework, as presented in Figure 4.2, two sets of hypotheses are formulated for empirical testing. The first set consists of hypotheses for macro variables and the other set comprises hypotheses for micro variables. Thus, the hypotheses of three sets of macro variables, namely, 'Value-creation', 'Cost-effectiveness' and 'Trust-development' for 'Collaborative e-governance performance' are presented as follows.

4.4.1 Hypotheses Formulation for Macro Variables

All hypotheses for the macro variables have been formulated as both null and alternative hypotheses. A sample hypothesis for one of the macro variables, viz. 'Value-creation' (VCEG) by collaborative e-governance is presented below.

***Hypotheses to* 'Value-creation' (VCEG) by collaborative e-governance**

Null Hypothesis (H01VCEGCEGP): The 'Value-creation' is not a significant
        constituent of 'Collaborative e-governance performance'.

Alternate Hypotheses (HA1VCEGCEGP): The 'Value-creation' is a significant
        constituent of 'Collaborative e-governance performance'.

Other alternative hypotheses for the rest of the macro variables have been formulated and summarized in Table 4.4.

Table 4.4: Hypotheses Relating to Macro Variables

3rd Order Factor	2nd Order Factor	Alternate Hypotheses
'Collaborative e-governance performance' (CEGP)	'Cost-effectiveness' (CEEG) by collaborative e-governance	HA2: 'Cost-effectiveness' is a significant constituent of 'Collaborative e-governance performance'
	'Trust-development'(TDEG) by collaborative e-governance	HA3: 'Trust-development' is a significant constituent of 'Collaborative e-governance performance'

4.4.2 Hypotheses Formulation for Micro Variables

Fifteen micro-variables have been identified for the study and each micro variable corresponds to one hypothesis, totalling fifteen hypotheses. The alternate hypotheses for these micro variables are summarized in a tabular form, along with the first-order factors, i.e., micro variables and second-order factors, i.e., macro variables. Brief details about the hypotheses of micro variables are presented below.

Hypotheses to Micro Variables of 'Value-creation' (VCEG) by collaborative e-governance

Six micro variables are there for micro variables of 'Value-creation' (VCEG) by collaborative e-governance, namely, 'Decision-making and Control' (VCDM), 'Service Delivery' (VCSD), 'Responsiveness' (VCRP), 'Transparency' (VCTP), 'Participation' (VCPT), and 'Interactivity' (VCIT). The relationships among these micro variables have been hypothesized with the macro variable and a sample hypothesis for one of the micro variables, 'Decision-making and Control' is presented below. Table 4.5 summarizes the alternate hypothesis related to the macro variable, **'**Value-creation' by collaborative e-governance.

'Decision-making and Control' (VCDM)

Null Hypothesis (H0VCDMVCEG): 'Decision-making and Control' is not a significant
element of 'Value-creation' by collaborative e-governance

Alternate Hypothesis (HA4VCDMVCEG): 'Decision-making and Control' is a
significant element of 'Value-creation' by collaborative e-governance

Table 4.5: Hypotheses for 'Value-creation'

Macro Variables	Micro Variables	Alternate Hypotheses
'Value-creation' (VCEG) by collaborative e-governance	'Service Delivery' (VCSD)	HA5: 'Service Delivery' is a significant element of 'Value-creation' by collaborative e-governance
	'Responsiveness' (VCRP)	HA6: 'Responsiveness' is a significant element of 'Value-creation' by collaborative e-governance
	'Transparency' (VCTP)	HA7: 'Transparency' is a significant element of 'Value-creation' by collaborative e-governance
	'Participation '(VCPT)	HA8: 'Participation' is a significant element of 'Value-creation' by collaborative e-governance
	'Interactivity' (VCIT)	HA9: 'Interactivity' is a significant element of 'Value-creation' by collaborative e-governance

Hypotheses to Micro Variables of 'Cost-effectiveness' (CEEG) by collaborative e-governance

There are four micro variables for 'Cost-effectiveness' (CEEG) by collaborative e-governance. These are 'Time and Effort Savings' (CETE), 'Efficient Utilisation of Resources' (CEER), 'Saving of Money Paid to Middleman' (CESM), and 'Simplification and Faster Execution of Processes' (CESF). The relationships among these micro variables have been hypothesized with the macro variable and a sample hypothesis for 'Time and Efforts Savings'(CETE) has been presented below. Table 4.6 summarizes the alternate hypothesis related to the macro variable, 'Cost-effectiveness' by collaborative e-governance.

'Time and Efforts Savings' (CETE)

Null Hypothesis (H0CETECEEG): 'Time and Efforts Savings' is not a significant
        element of 'Cost-effectiveness' by collaborative e-governance

Alternate Hypothesis (HA10CETECEEG): 'Time and Efforts Savings' is a significant
        element of 'Cost-effectiveness' by collaborative e-governance

Table 4.6**:** Hypotheses for 'Cost-effectiveness'

Macro Variables	Micro Variables	Alternate Hypotheses
'Cost-effectiveness' (CEEG) by collaborative e-governance	'Efficient Utilisation of Resources' (CEEU)	HA11: 'Efficient Utilisation of Resources' is a significant element of 'Cost-effectiveness' by collaborative e-governance
	'Savings of Money Paid to Middlemen' (CESM)	HA12: 'Savings of Money Paid to the Middlemen' is a significant element of 'Cost-effectiveness' by collaborative e-governance
	'Simplification and Faster Execution of Processes' (CESF)	HA13: 'Simplification and Faster Execution of Processes' is a significant element of 'Cost-effectiveness' by collaborative e-governance

Hypotheses to Micro Variables of 'Trust-development' (TDEG) by collaborative e-governance

Five macro variables are there for the macro variable 'Trust-development' (TDEG) by collaborative e-governance. These are 'Usefulness of Services' (TDUS), 'Security and Privacy' (TDSP), 'Reliability of Services' (TDRL), 'Ease of Use of Services' (TDEU),

and 'Customized Services Response' (TDCR). A sample hypothesis for 'Usefulness of Services' (TDUS) is given below. Alternate hypotheses for other micro variables of 'Trust-development' by collaborative e-governance are tabulated below in Table 4.7.

The hypothesis of 'Usefulness of Services' (TDUS)

Null Hypothesis (H0TDUSTDEG): 'Usefulness of Services' is not
      a significant element of 'Trust-development' by collaborative e-governance

Alternate Hypothesis (HA14TDUSTDEG): 'Usefulness of Services' is
      a significant element of 'Trust-development' by collaborative e-governance

Table 4.7: Hypotheses for 'Trust-development'

Macro Variables	Micro Variables	Alternate Hypotheses
'Trust-development' (TDEG) by collaborative e-governance	'Security and Privacy' (TDSP)	HA15: 'Security and Privacy' is a significant element of 'Trust-development' by collaborative e-governance
	'Reliability of Services' (TDRL)	HA16: 'Reliability of Services' is a significant element of 'Trust-development' by collaborative e-governance
	'Ease of Use of Services' (TDEU)	HA17: 'Ease of Use of Services' is a significant element of 'Trust-development' by collaborative e-governance
	'Customized Services Response' (TDCR)	HA18: 'Customized Services Response' is a significant element of 'Trust-development' by collaborative e-governance

4.5   Research Methodology for Qualitative Study

The research methodology applied for conducting research acts as a skeleton around which a study accomplishes its research objectives (Creswell, 2009). A qualitative research methodology seems to be appropriate for the research through which expert opinion can be obtained.

4.5.1 Qualitative Research

The qualitative research study is related to an interpretive attitude in which the investigator focuses on the theme within the perspective and employs a promising plan where groups or classes are recognized during the action (Collis and Hussey, 2013, p.153). Qualitative research has features like flexibility, which allows it to

respond to the changing environment, it has a relatively small number of participants mostly domain experts and it has a great involvement of the researcher who has their own functional experience. Qualitative research spends crucial time in the context of the subject of the study and tends to be in close contact with the participants (Patton, 2002). Qualitative data collected from the respondent for research can be analyzed using different techniques like SAP-LAP, ISM, TISM, etc. For this study, TISM has been applied.

Total Interpretive Structural Modeling (TISM)

The TISM (Sushil, 2009; 2012) is an innovative extension of Interpretive Structural Modeling (ISM) (Warfield, 1974) that is used to develop a hierarchical structure of the set of variables of interest. The TISM deals with the interpretation of embedded objects by a systematic iterative application of graph theory. This results in the development of a directed graph for the complex system amongst the set of variables, which helps transform poorly articulated mental models into a well-systematic form that can be used for many interpretations. This is a novel qualitative modelling technique that has been used by researchers in diverse fields of investigation (Nasim, 2011; Prasad and Suri, 2011; Wasuja et al., 2012; Srivastava and Sushil, 2013).

TISM is largely used at the preliminary stage of problem-solving as a tool to help those examining the forces to make sense of complex relations (Nasim, 2011). The procedure of implementing the qualitative approach began with the selection of a group of experts who are knowledgeable about the construct. The objective behind it is to ensure the adequacy of items and dimensions (Tojib et al., 2008) of the 'Collaborative e-governance performance'. In all, four content experts participated in the study. Two experts were from professional positions within the government organisation and two from academia.

The experts from academia are well known in their respective fields and were able to provide feedback about different disciplines including e-governance, management and public administration. The experts from the government organisation held leadership positions within their respective professions. Four experts are regarded as acceptable for model building. The literature advises a minimum of three and a maximum of twenty experts (Tilden et al.,1990; Gable and Wolf, 1993).

The domain experts' feedback was individually collected. Ten experts were involved in validating the model.

4.5.2 Model Assessment and Synthesis

Although a TISM model is more meaningful than an ISM, it is much more demanding in terms of time required from the domain experts. They not only need to define the contextual relationships among each pair of dimensions but are also expected to provide the logic behind each response. For example, while developing the TISM model for dimensions constituting 'Collaborative e-governance performance' with four (n) dimensions, an expert had to define and provide a reason for 12 [i.e., n(n-1)] pairs of relations. Scarcity of time being a general constraint for experts across all domains, it is not easy to find enough experts to volunteer for this stage. However, after the models are developed, it becomes easier to find enough experts to evaluate the pictorial representation of relations (digraphs), also the number of valid relations gets smaller.

At the outset, four TISM models have been developed based on the responses from four domain experts. The developed model has been further assessed by another ten domain experts so that the validity of the developed models can be established. For this, an evaluation template has been developed and used. The suitability of the model is established on a Likert-type five-point scale to measure the level of agreement for every relationship linked with the model ranging from 1 (nil extent) to 5 (very large extent). In this way, the model is validated by a comparatively larger number of experts from the private and public organisations involved in the e-governance project in India. The essential nine-step process of TISM is described and presented in Chapter 5. A graphical representation of the nine steps of TISM is presented below in Figure 4.3.
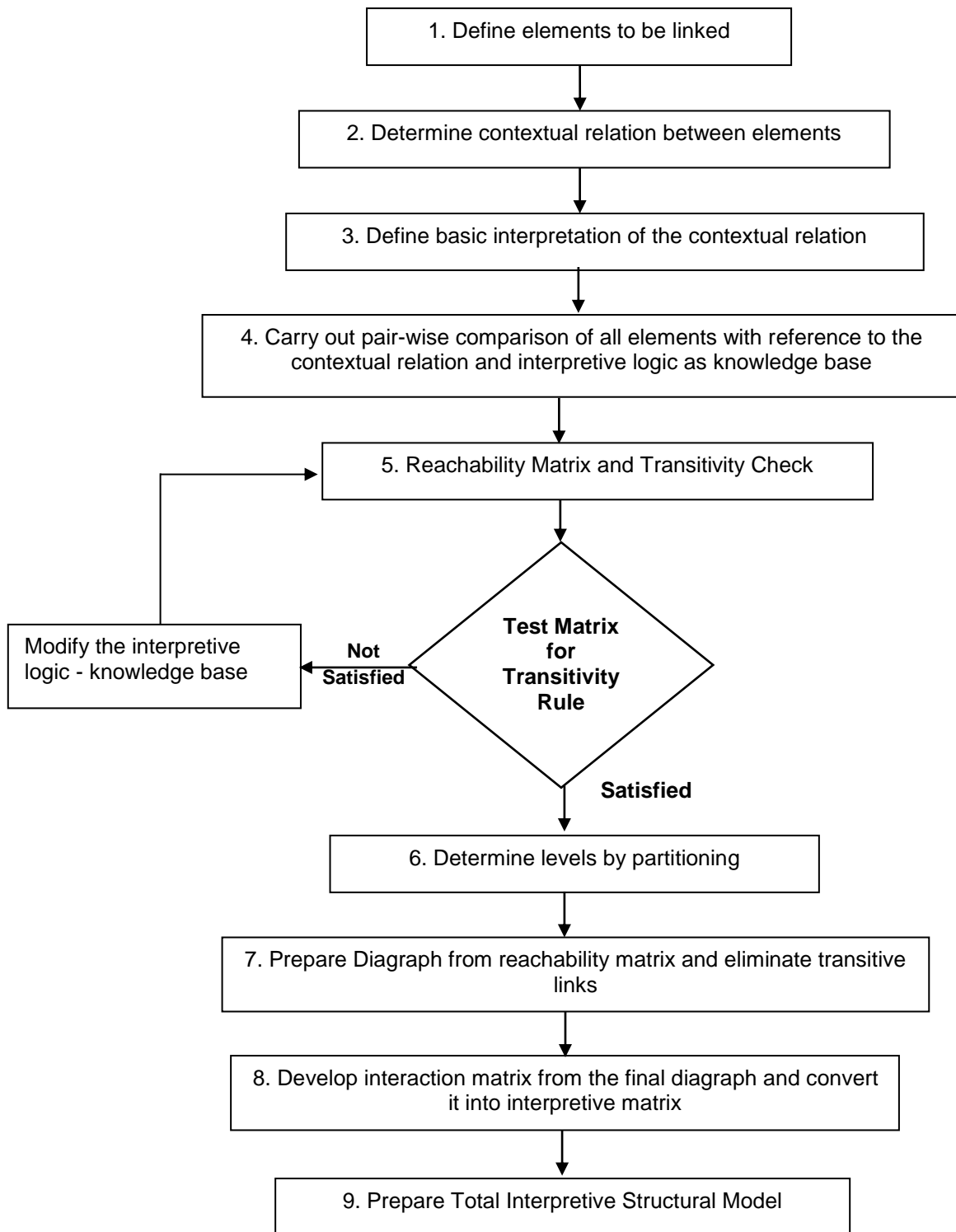
Figure 4.3: Basic Process of Total Interpretive Structural Modeling
(Source: Saxena et al., 2006; Sushil, 2012)

4.6   Research Methodology for Quantitative Study

The quantitative research methodology allows measurable and quantifiable hypotheses through logic and analysis. An empirical survey under quantitative research is conducted through questionnaires, interviews and functional observations (Cresswell et al., 2009; Saunders et al., 2012).

The empirical survey has been conducted by getting responses through structured questionnaires from the respondents who have used e-governance services identified for the study. The proposed research framework has been tested and validated using Partial Least Squares-Structural Equation Modeling (PLS-SEM). The findings of the study through qualitative and quantitative techniques have been synthesized to present a validated research framework for 'Collaborative e-governance performance'.

4.6.1   Survey Questionnaire

A close-ended structured questionnaire was developed for capturing quantitative input from the respondents. The questionnaire contains two sections. The first one is about the demographic data collection of the respondent and the second one is about the collection of information necessary to test and validate the research framework. The questionnaire is prepared based on the five-point Likert-type scale ranging from 1 (nil extent) to 5 (very large extent). The questionnaires for the main study are presented in Appendix E.

Reliability Analysis

The reliability of the questionnaire is tested using Cronbach's alpha measure (Nunnaly,1978; George and Mallery, 2011). Fornell and Larcker (1981) suggest that Cronbach's alpha value should be greater than 0.7 to be considered adequate, while Bagozzi et al., (1991) believe that Cronbach's alpha value greater than 0.6 is desirable. Values of construct reliability below 0.6 indicate a lack of reliability (Hair et al., 2011).

Pilot Testing

It is important to pilot test the questionnaire before using it for data collection. The main aim of the pilot test is to refine the questionnaire and enable the researcher to obtain an assessment of the validity and reliability of the questions. Validity involves the process of asking an expert or a group of experts to comment on the representativeness and suitability of the questionnaire, while reliability is concerned with the internal consistency of responses to questions (Saunder et al., 2012).

A pilot study was conducted using an initially developed questionnaire. A total of 40 responses to questionnaires were collected during the pilot survey to check the clarity of the questionnaire. The pilot study helped in refining the questionnaires to ensure that each respondent has no problem understanding the questions.

4.6.2 Sampling Method and Data Collection for Main Study

This study uses the Snowball sampling method which is also known as referral sampling. It is a non-probabilistic sampling method. Initially, some of the target respondents were identified and they are requested to further refer the questionnaire to others. The population for this study is the Indian citizen who has previously used the service from any of the select e-governance projects taken for study.

Data has been collected in both offline and online modes. Questionnaires in the offline mode were served to the respondents directly. For online data collection, Google Forms were used. A total of 250 responses were received from the respondents. However, only 210 of the responses received were found to be valid for data analysis. Four e-governance projects, i.e., Passport Sewa, Lease-hold to Free-hold Conversion of DDA's Properties, DDA's Booking of Community Halls/Parks and Open Spaces and Driving License have been chosen for the study.

4.6.3 Partial Least Squares-Structural Equation Modeling (PLS-SEM)

The Partial Least Squares (PLS) method was introduced by Wold (1974, 1982, 1985a, and 1989) for the analysis of high dimensional data in a low-structure environment, and has undergone different modifications and extensions thereon. It belongs to the family of alternating least squares algorithms which are used for canonical correlation and principal component analysis. PLS is used primarily in the exploratory analysis,

and it does not require the normal distribution of data and is suitable for a small size sample (Hair et al., 2017) as is the case of this study. The proposed model can be tested by SEM to make better inferences by testing multiple hypotheses at the same time. Also, PLS-SEM helps to note the interaction effect in the same model and makes hypothesis testing easier. PLS-SEM also helps to test the higher-order constructs used in the proposed model like the one taken for this study.

This research uses the PLS-SEM approach due to its applicability as recommended by (Sarstedt et al., 2017) for the research where (a) the objective is explaining and predicting target constructs and/or detecting important driver constructs, (b) the structural model has reflective measured constructs, (c) the model is complex (with many constructs and indicators), (d) the researcher is working with small sample size, and (e) the researcher intends to use latent variable scores in follow-up studies.

Reflective Measurement Model

A reflective model is based on confirmatory factor analysis for PLS-SEM. This test allows testing the null hypothesis that the construct measures are reflective (Coltman et al., 2008). Reflective measures are expected to have high inter-correlations. This is what one usually tests with exploratory or confirmatory factor analysis. The reflective measurement model is tested through the very common Cronbach's alpha, composite reliability, convergent validity and discriminant validity. The measure of indicators reflects on constructs which in turn reflects the latent variable (Bagozzi, 2007).

4.7   Synthesis of Results

To synthesize the findings, this research work uses a mixed-method approach, combining qualitative and quantitative analysis. The combination of research methods is referred to as the process of triangulation, which grants the ability to verify empirical details from differing perspectives (Lee and Gough, 1993; Mingers, 2001). Triangulation provides a better, contextual basis for the interpretation of results and consequently, a more robust collection of results has been achieved through the process of cross-validation (Yin, 1994; Leech and Anthony, 2007).

4.7.1 Research Methods Used in the Study

Various data collection methods and sampling techniques used to achieve the objectives of the study are shown in Table 4.8. Further, Table 4.9 describes the research analysis techniques and objective of the analysis as applied in the context of this study along with the references.

Table 4.8: Description of Data Collection and Sampling Methods Used

Study Phase	The Objective of the Study	Data Collection Method Used	Sampling Method Used
Pilot Study	To conduct a pilot study for developing better insights about 'strategic collaboration and e-governance performance'	Survey questionnaires, field visits and interview	Convenient Sampling
Case Study	To verify and study the interrelationship of the constituent of 'strategic collaboration and e-governance performance in India' through a qualitative study perspective	Personal interviews and interactions with the domain experts	Judgmental sampling
Empirical Survey	To undertake empirical analysis and suggest a validated framework for evaluating 'strategic collaboration and e-governance performance'.	Questionnaire based survey (Tools used: TISM Analysis and PLS-SEM)	Snowball Sampling

Table 4.9: Description of Research Methods Used

Objective of the Analysis	Research Analysis Techniques	Reference
To develop insights about the macro and micro constructs based on the observed sample values	Univariate Analysis	Kothari et al., (2005)
To analyze the conceptualized variables for developing the systemic hierarchical model	TISM Analysis	Sushil (2009; 2012), Nasim (2011), Neetu and Sushil (2014)
To analyze the internal consistency of the construct (Reliability)	Reliability Analysis (Cronbach Alpha and Composite Reliability)	Cronbach (1951), Nunnally (1978), Nunnally and Bernstein (1994)
To assess the validity of constructs	Validity Analysis (Convergent Validity (AVE) and	

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	Discriminant Validity (SQRT AVE))	
For testing the fitment of hypothesized constructs to the observed data	Confirmatory Factor Analysis (CFA)	Hinkin (1998), Thompson (2004)
For testing the research hypotheses and for validating the proposed model	PLS-SEM Analysis	Wold (1974;1982; 1985a; 1985b; 1989), Hair et al. (2010)

4.8   Justification of the Research Methodology Chosen

A mixed approach of research methodology, i.e., qualitative and quantitative for the study has been chosen. It is reported that a single approach generally lacks in providing the richness required for the research (Kaplan and Duchon, 1988). The combination of two research methods strengthens the ability for empirical validation from different perspectives particularly for the research containing multidisciplinary areas such as 'strategic collaboration and e-governance performance' taken up for this study (Lee and Gough, 1993; Lee, 1994; Mingers, 2001). The dual approach of research methodology also provides a better contextual basis for the interpretation of results and such results are considered a robust outcome (Kaplan and Duchon, 1988; Yin, 1994).

4.9   Research Flow Diagram

The research roadmap representing the research process adopted is depicted in Figure 4.5.

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┌─────────────────────────────────────────────────────────────┐
│                      Literature Review                      │
└─────────────────────────────────────────────────────────────┘
                              ⇓
┌─────────────────────────────────────────────────────────────┐
│   Identification of Variables for 'Strategic Collaboration and │
│                 E-governance performance'                   │
└─────────────────────────────────────────────────────────────┘
                              ⇓
           ┌─────────────────────────────────────┐
           │            Research Plan            │
           └─────────────────────────────────────┘
                              ⇓
      ┌───────────────────────────────────────────────┐
      │      Case based Pilot Study and Assessment      │
      └───────────────────────────────────────────────┘
                              ⇓
      ┌───────────────────────────────────────────────┐
      │     TISM (Domain Expert Survey and Assessment)  │
      └───────────────────────────────────────────────┘
                              ⇓
┌─────────────────────────────────────────────────────────────┐
│ Development of Hypotheses, Testing Pilot Questionnaires and Validation │
└─────────────────────────────────────────────────────────────┘
                              ⇓
      ┌───────────────────────────────────────────────┐
      │              Final Questionnaire                │
      └───────────────────────────────────────────────┘
                              ⇓
      ┌───────────────────────────────────────────────┐
      │     Analysis, Data Interpretation and Conclusions │
      └───────────────────────────────────────────────┘
                              ⇓
    ┌─────────────────────────────────────────────────────┐
    │  Synthesis of Findings, Validation of Model and Interpretation │
    └─────────────────────────────────────────────────────┘
                              ⇓
    ┌─────────────────────────────────────────────────────┐
    │                Finding of the Study,                │
    │ Contributions, Further Research Directions, Limitations, etc. │
    └─────────────────────────────────────────────────────┘
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Figure 4.4: Research Flow Diagram

4.10 Brief Description of Projects Taken for the Study

In accordance with the study objectives, such e-governance projects have been selected where citizens are required to visit the government office to fully avail of the service. Citizens are required to collaborate with the government agencies to provide their input, feedback and suggestions to get their job accomplished.

4.10.1   Basis of Projects Selection for the Study

Four citizen-centric e-governance projects have been selected for conducting this study. While selecting the project for the study, adequate considerations have been given to match up with the objectives of the research. Therefore, only those projects have been included where citizen engagement is mandatory to avail of the services. Other criteria for considering the selection of projects are given below.

Firstly, the criterion for project selection is the consideration of a collaborative approach. Selected projects are those whose processes are based on intra- and inter-organisational collaboration to offer services to the citizens.

Another criterion for project selection is a consideration based on target beneficiaries. All selected projects are citizen-centric with the Government to Citizen (G2C) model. E-governance projects based on the Government to Government (G2G) and Government to Business (G2B) are not included in the study.

The e-governance model has several stages of growth. E-governance projects which are in the planning stage or under the implementation stage in India are not considered for selection. All selected projects for study have been implemented successfully and in operation for the last five years or more.

One of the criteria for the project selection for the study is reported corruption issues in the government organisations for conventional service delivery.

To increase the overall scope of the study apart from state-level projects and autonomous organisation projects, the mission mode project (MMP) under the initiative of e-Kranti, one national-level project has also been included in the study.

4.10.2 Lease-hold to Free-hold Conversion of Properties

Lease-hold to Free-hold conversion of properties is one of the two major e-governance projects of the Delhi Development Authority (DDA) which has been taken up for study. The project is based on a collaborative approach. The authority, established in 1957, is a central autonomous body under the Ministry of Housing and Urban Affairs (MoHUA) (previously, Ministry of Urban Development (MoUD)), Government of India (GoI) and has a wide-ranging mandate - "to promote and secure the development of Delhi" (DDA Act, 1957). The central activity of DDA is related to land, housing, and infrastructure development in Delhi - the capital city of India. Overall objectives of DDA are "to promote and secure the development of Delhi" as per its Master Plans and to perform the activities such as, "to acquire, hold, manage and dispose of land and other property; to carry out building, engineering, mining, and other operations and, to provide services and amenities" for such activities (DDA, 1957).

The governance hierarchy of the organisation is straight-up with the Lieutenant-Governor (LG) of Delhi on top acting as ex-officio chairman. The Vice-Chairman (VC), next in command and leader of the organization is appointed by the MoHUA, GoI. There are 12 departments in DDA, viz. Architecture, Engineering and Construction, Finance and Accounts, Housing, Horticulture, Land Management and Disposal, Law, Personnel and Training, Planning, Sports, Systems, and Vigilance. In addition to these, one more department was created in 2008 namely the Unified Traffic and Transport Infrastructure (Planning and Engineering) Centre (UTTIPEC) for coordinating transit and infrastructure projects in Delhi.

The need for collaboration in the organization seems apparent as the staff itself is divided into two distinct groups. On one hand, the elite cadre of bureaucrats formulates the master plan, sets goals and objectives, and acts in response to political priorities. On the other hand, a lower-level cadre of DDA staff implements such plans. The DDA cadre staff is appointed through direct recruitment and rarely reaches the top level in the organization. The top-level management, in contrast, consists of 'deputations' of high-level bureaucrats from various other government organizations (Sheikh and Mandelkern, 2014; Adler, 2014). Such bureaucratic distances between planners and implementers need coordination and collaboration in their strategic planning and implementation (Wade and Gerald, 2010). Without such collaboration, the organisation is not able to manage the infrastructural, societal, and economic

environment of the city effectively and could not deliver its services to residents of Delhi.

Delivery of services offered by DDA to citizens is known for being quite cumbersome, unpredictable, time-consuming, and inconvenient with manual records management. To come out from these maladies DDA started computerization in 1979 by establishing a data bank. Work of off-line data entry and batch processing was continued up to 1999 and then computerization of three major departments, i.e., Housing, Land, and Legal were taken up. Accordingly, interactive applications AWAAS (for housing), BHOOMI (for land disposal) and LMIS (for land management) were developed and made functional. Several other interactive web-based applications for citizens such as Lease-hold to Free-hold Conversion of Properties, Booking System for Community Hall/Open Spaces and Parks, Samasya Nidan Sewa (SNS), (problem mitigation service), etc., were introduced.

DDA constructs the residential flats of different categories comprising Janta, Economic Housing Scheme (EHS), Low Income Group (LIG), Middle Income Group (MIG), High Income Group (HIG) and Self-Financing Scheme (SFS). These flats and flats of the Asian Games Village Complex constructed before 1992 were allotted to the beneficiaries on a leasehold basis by executing a Conveyance Deed (CD). Under directions by the GoI, DDA has to convert a leasehold property allotted to the citizen as freehold within a time frame of 45 days.

The manual processing of freehold conversion of properties is cumbersome and time-consuming as multiple forms and supporting documents are required to be filled in and submitted. These conversion processes mandatorily require the services of outside agencies such as banks and registrar offices apart from DDA's offices. Many a time, beneficiaries become victims of touts for not being familiarized with the process. Such instances tarnish the image of the organization. DDA has, therefore, adopted the e-governance approach and developed an interactive and responsive website with a collaborative approach. The website has attractive features such as easy navigation, user registration, calculation of property conversion fee, tips for filling-up the online forms and application status tracking. The website provides links to internal and external departments involved in the conversion process such as Land,

Housing, Finance, Legal, Systems, Banks, Sub-registrar offices, etc. DDA has also set up Nagrik Suvidha Kendras (NSKs) (Citizen Facilitation Centres) to facilitate the conversion process at four easily approachable locations at zonal offices.

4.10.3 Online Booking of Community Hall/Open Spaces and Parks

The Online Booking System for Community Hall/Open Spaces and Parks of DDA is a Government to Citizen (G2C) project in which different departments need to be strategically collaborated to materialize the outcomes and provide the need-based solutions for services to the citizen. This project study is the case of intra- and inter-organizational strategic collaborations for the delivery of online services. The intra- and inter-organizational departments engaged in offering the online services to the citizens are Lands, Engineering, Finance, Systems, etc. divisions of DDA, banks, and local civic bodies such as police and fire departments.

The main objective of this project is to promote and develop cross-socio-cultural and harmonious relations among citizens for their well-being. Registration for availing the services is on a 'First Come First Serve (FCFS)' basis for the people of all faith for organizing the events like spiritual play, spiritual functions, or any such events like yoga/meditation, organizing blood donation camps, free health checkups and any other societal services. Such voluntary services are organised for social welfare by the registered organizations/charitable trusts, etc. An applicant can make a maximum of one booking per year. However, registered societies can book the space twice a year for a maximum period of 45 days. Unique identification such as Permanent Account Number (PAN) card or AADHAAR card is mandatory for availing of these services.

Booking of sites can also be done for commercial activities, such as organizing exhibitions, clearance sales, filming, photography, circus, trade fair, book fair, lighting fairs, school fete, etc. Community hall booking for marriage, family functions and other cultural activities can be done 120 days before the event of marriage and for all other cases, it can be booked 30 days in advance. A community hall can be booked for up to 2 days only. Concessions on bookings of the hall are also allowed for certain sections of people comprising working and retired staff of the organization. Societies/trusts/organizations who want to avail the facility for booking of community

hall must be registered with the government under Societies Registration Act, and shall also have to get themselves registered with DDA.

4.10.4   Driving License Project

A driving license is a citizen-centric (G2C) project of the transport department of the government of Delhi. This project is in operation since July 2007 and has been implemented in all 13 zonal transport divisions in Delhi. The primary objective of the agency is to ascertain the eligibility of the citizen for the issuance of a driving license. A driving license is a document containing a citizen's name and basic details, making them eligible to drive a motor vehicle as per the Motor Vehicles Act 1988. The motor vehicle category includes personal, passenger, and commercial transport.

This is a collaborative project for which the transport department of Delhi has strategically collaborated with Delhi Integrated Multi-Modal Transit Systems Ltd. (DIMTS) and Infrastructure Development Finance Company (IDFC). DIMTS provide technology-oriented services such as the development and maintenance of an online appointment system (www.transport.delhigovt.nic.in) for prospective license seekers through which they can book an appointment for a test drive and document verifications. The dates for test drives and document verifications are finalized with close coordination with the staff and the beneficiaries. To deposit the requisite fees for processing the case, an online payment facility has also been made available for the citizen. The online system of driving license issuance aims at a better performance by minimizing human intervention ensuring security, transparency, and efficiency by adopting a collaborative e-governance approach.

4.10.5   Passport Sewa Project

A passport is considered as one of the main travels document whose possession is required by the citizen aspiring for travelling abroad for various purposes such as business, education, family visits, medical attendance, pilgrimage, and tourism. During the last few years, the growing economy and spreading globalization have led to an increased demand for passports and related services. This increasing demand for passports and related services is coming from both large cities and smaller towns, creating a need for its wider reach and availability.

Passport Sewa project (PSP) launched in May 2010 by the Ministry of External Affairs (MEA), is a Mission Mode Project (MMP) of the government of India which focuses on reforming passport services in India. The project has been implemented in a Public-Private Partnership (PPP) mode with one of the major private Indian IT firms, viz. Tata Consultancy Services. Under this programme, essential services that are intended to impact the citizens directly such as verification, granting, and issuing of the passport have been retained by the government itself, i.e., MEA. The ownership and strategic control of the core assets including data/information is with the government. The delivery of passports to Indian citizens has been done through a network of 36 passport offices which is spread all across the country.

Before the online processing of the preparation of the passport, the citizens were often required to travel long distances to visit the passport office. Availing passport-related services were tedious, time-consuming and unpredictable. Wastage of resources in terms of pen and paper, occupancies, duplications of efforts, etc were unavoidable. One could easily become prey to unauthorized intermediaries and pay exorbitantly for availing services. The role of the middleman was very pertinent. The online passport sewa project enables simple, efficient, and transparent processes for the delivery of passports and related services. Being a sensitive document, for ensuring the reach of service delivery to the genuine beneficiary, there is a need for strategic collaboration creating a countrywide networked environment for connecting government staff, in terms of integrating with the state police for physical verification of applicant's credentials and with India Post for delivery of passport document.

4.11 Concluding Remarks

The outline for the theoretical backgrounds for proposing the conceptual research framework has been worked out and research variables identified based on the insights developed through literature review, functional experience and a detailed pilot study have been presented in this chapter. Further, a description of research variables comprising both at macro and micro levels as well as research hypotheses related to variables for statistical testing has been formulated. Brief descriptions of research methods in terms of qualitative and quantitative techniques to validate the proposed framework are also covered in this chapter. The implementation of the research

methodology based on a qualitative approach using, TISM to study and verify the interrelationships of the constituents of 'Collaborative e-governance performance' is presented in the next chapter.

Chapter 5

Qualitative Validation of Collaborative E-governance Performance Framework[2]

5.1   Introduction

Collaborative e-governance performance is broadly driven by factors like public value creation, cost/economic parameters, citizen engagement and appropriate technology usage. These factors are arranged into three independent macro variables. It is assumed that 'Collaborative e-governance performance' is influenced by each one of these variables. Hardly any empirically validated framework could be traced in the literature that measures 'Collaborative e-governance performance'. This study is, therefore, a humble effort in the direction of conceptualizing and validating the required framework empirically. To do so, in the previous chapter, a research framework has been conceptualized along with the constituting macro and micro variables. A qualitative research methodology, i.e., Total Interpretive Structural Modeling (TISM) has been applied to find out and analyze the interrelationship among the variables of the proposed framework. The verification of the proposed frameworks has been taken up further by assessing it through the feedback obtained from the domain experts. The domain experts are served with the questionnaire having five options of agreement. A five-point Likert-type scale for registering the agreement ranging from 1 (nil extent) to 5 (very large extent) is used. The following sections describe the TISM approach for questionnaire development and survey methodology.

5.2   TISM Models for the Research

A list of three identified macro variables and fifteen micro variables of 'Collaborative e-governance performance' with literature support is presented in the previous chapter in Table 4.2 and Table 4.3. These variables have been modelled in a hierarchical manner using the Total Interpretive Structural Modeling (TISM) technique. Four TISM models have been developed to have a better insight into the interrelationships. Table 5.1 shows the summarized research variables and their respective constituents used in the Modeling.

- TISM-I: This model depicts the relationship between 'Collaborative e-governance performance' (third-order latent variable) with its three macro variables, i.e., 'Value-creation' (VCEG), 'Cost-effectiveness' (CEEG), and 'Trust-development' (TDEG) by collaborative e-governance. Further, three TISM models, i.e., TISM-II, III and IV have also been developed depicting the hierarchical relationships among the micro variables of each macro variable.

- TISM-II: This model depicts the relationship between 'Value-creation' by collaborative e-governance (macro variable) with its six micro variables, i.e., 'Decision-making and Control', 'Service Delivery', 'Responsiveness', 'Transparency', 'Participation' and 'Interactivity'.

- TISM-III: It depicts the relationship between 'Cost-effectiveness' by collaborative e-governance with its four micro variables, i.e., 'Time and Efforts Savings', 'Efficient Utilization of Resources', 'Savings of Money Paid to Middlemen', and 'Simplification and Faster Execution of Processes'.

- TISM-IV: It depicts the relationship between 'Trust-development' by collaborative e-governance with its five micro variables, i.e., 'Usefulness of Services', 'Security and Privacy', 'Reliability of Services', 'Ease of Use of Services' and 'Customized Services Response'.

Table 5.1: TISM Models with Macro and Micro Variables

TISM Models	Variables	Hierarchy Relationship with Variables
TISM-I	'Collaborative e-governance performance' (CEGP) (3rd order latent variable)	Three Macro Variables • Value-creation • Cost-effectiveness • Trust-development
TISM-II	'Value-creation' (VCEG) by collaborative e-governance (Macro variable)	Six Micro Variables • Decision-making and Control • Service Delivery • Responsiveness • Transparency • Participation • Interactivity

TISM-III	'Cost-effectiveness' (CEEG) by collaborative e-governance (Macro variable)	Four Micro Variables • Time and Efforts Savings • Efficient Utilisation of Resources • Savings of Money Paid to Middlemen • Simplification and Faster Execution of Processes
TISM-IV	'Trust-development' (TDEG) by collaborative e-governance (Macro variable)	Five Micro Variables • Usefulness of Services • Security and Privacy • Reliability of Services • Ease of Use of Services • Customized Services Response

5.3 TISM Analysis

TISM analysis is a stepwise process involving nine steps. These steps are illustrated systematically along with the matrices and other tools using the dimensions affecting 'Collaborative e-governance performance' developed for four TISM models.

Step 1: Identification and Definition of Elements

The identified elements for Modeling the conceptual research framework are the aspects affecting the 'Collaborative e-governance performance' taken for this study. These are presented in Table 5.2 along with the variables used in depicting each of the four TISM models.

Step 2: Defining Contextual Relationship

For developing the structure of the TISM model, the contextual relationship between the concerned variables is required to be defined. For example, the contextual relationship among different variables affecting 'Collaborative e-governance performance' is "Element A will influence or enhance Element B" as shown in Table 5.2. Domain experts' feedbacks are to be sought to capture the contextual relationships among the variables.

Table 5.2: Elements, Contextual Relation and Interpretation

Elements of 'Collaborative e-governance performance' (TISM-I)			
Element code	**Element name**	**Contextual relation**	**Interpretation**
VCEG	'Value-creation' by collaborative e-governance	Element A of 'Collaborative e-governance performance' will influence/enhance the element B of 'Collaborative e-governance performance'	How or in what way will element A of 'Collaborative e-governance performance' influence/enhance the element B of 'Collaborative e-governance performance'
CEEG	'Cost-effectiveness' by collaborative e-governance		
TDEG	'Trust-development' by collaborative e-governance		
CEGP	Collaborative e-governance performance		
Elements of 'Value-creation' by collaborative e-governance (TISM-II)			
VCDM	Decision-making, and Control	Element A of 'Value-creation' by collaborative e-governance will influence/enhance the element B of 'Value-creation' by collaborative e-governance	How or in what way will element A of 'Value-creation' by collaborative e-governance influence/enhance the element B of 'Value-creation' by collaborative e-governance
VCSD	Service Delivery		
VCRP	Responsiveness		
VCTP	Transparency		
VCPT	Participation		
VCIT	Interactivity		
VCEG	'Value-creation' by collaborative e-governance		
Elements of 'Cost-effectiveness' by collaborative e-governance (TISM-III)			
CETS	Time and Efforts Savings	Element A of 'Cost-effectiveness' by collaborative e-governance will influence/enhance the element B of 'Cost-effectiveness' by collaborative e-governance	How or in what way will element A of 'Cost-effectiveness' by collaborative e-governance influence/enhance the element B of 'Cost-effectiveness' by collaborative e-governance
CEEU	Efficient Utilisation of Resources		
CESM	Savings of Money Paid to Middlemen		
CESF	Simplification and Faster Execution of Processes		
CEEG	Cost-effectiveness by collaborative e-governance		
Elements of 'Trust-development' by collaborative e-governance (TISM-IV)			
TDUS	Usefulness of Services	Element A of 'Trust-development' by collaborative e-	How or in what way will Element A of 'Trust-development' by collaborative e-governance
TDSP	Security and Privacy		
TDRL	Reliability of Services		
TDEU	Ease of Use of Services		

TDCR	Customized Services Response	governance will influence/enhance the element B of 'Trust-development' by collaborative e-governance	influence/enhance the element B of 'Trust-development' by collaborative e-governance
TDEG	'Trust-development' by collaborative e-governance		

Step 3: Interpretation of Relationship

Though traditional Interpretive Structural Modeling (ISM) also represents the contextual relation, it does not represent the logic behind the relationship and thus lacks in its interpretation. On the other hand, TISM seeks an explanation from the domain experts on the interpretation/logic behind the expressed relation. It means that the domain experts not only specify whether element A of 'Collaborative e-governance performance' influence/enhance element B of 'Collaborative e-governance performance', but also explains, "In what ways do they influence/enhance?" as shown in Table 5.3. It helps to apprehend the logic behind the specified relationship.

Step 4: Pair-wise Comparisons of Interpretive Logic

"Interpretive Logic–Knowledge Base" is prepared for making comparisons of the factors in pairs. In the Interpretive Structural Model (ISM), a comparison of elements is done to develop a 'Self-Structural Interaction Matrix' (SSIM), this interpretation indicates the only direction of the relationships that exist. In TISM, the concept of the interpretive matrix is used to have the answer to the interpretive query which is obtained from the paired comparison. For doing paired comparisons, each ith element is compared with all the elements from (i+1) to the nth element. Each pair of elements (i,j) may have two possible relations (i-j) or (j-i). For each relation, the entry could be "Yes (Y)" or "No (N)" and if it is "Yes", then it is mandatory to give the reason for the existence of the relation. The interpretive logic-knowledge base of 'Collaborative e-governance performance' (CEGP) is shown in Table 5.3.

Similarly, the interpretive logic-knowledge base has been developed for other TISM models for 'Value-creation', 'Cost-effectiveness', and 'Trust-development' by collaborative e-governance and is given in Appendices A, B and C.

Table 5.3: Interpretive Logic-Knowledge Base
(Paired comparisons of elements of 'Collaborative e-governance performance' (CEGP))

S.No.	Element code	Paired comparisons of elements of 'Collaborative e-governance performance'(CEGP)	Y/N	How or in what way does a variable influence/enhance the other variable? Give reason in brief.
VCEG: 'Value-creation' by collaborative e-governance				
1	VCEG-CEEG	'Value-creation' will influence or enhance 'Cost-effectiveness'	Y	Better decision-making, better service provision, transparency and citizens participation influence cost reduction and resource/processes efficiency
2	CEEG-VCEG	'Cost-effectiveness' will influence or enhance 'Value-creation'	N	
3	VCEG-TDEG	'Value-creation' will influence or enhance 'Trust-development'	N	
4	TDEG-VCEG	'Trust-development' will influence or enhance 'Value-creation'	Y	Ease of use, usefulness, security and privacy, reliability and the customized response of citizen queries shall enhance better service delivery, citizen participation, interactivity and transparency
5	VCEG-CEGP	'Value-creation' will influence or enhance 'Collaborative e-government performance'	Y	Value-creation by the public organization is a significant constituent of e-governance performance
CEEG: 'Cost-effectiveness' by collaborative e-governance TDEG: 'Trust-development' by collaborative e-governance				
6	CEEG-TDEG	'Cost-effectiveness' will influence or enhance 'Trust-development'	N	
7	TDEG-CEEG	'Trust-development' will influence or enhance 'Cost-effectiveness'	Y	Trust development in terms of ease of use, usefulness, reliability and security and privacy of data enhances cost reduction and process/resource efficiency
8	CEEG-CEGP	'Cost-effectiveness' will influence or enhance 'Collaborative e-governance performance'	Y	Economic factors having the focus on cost minimization and simplification of process and resources efficiency enhance e-governance performance

9	TDEG-CEGP	'Trust-development' will influence or enhance 'Collaborative e-governance performance'	Y	Focus on trust development through reliability, ease of use, usefulness and customized response to the citizen queries/complaints and suggestions helps to enhance e-governance performance.

Step 5: Reachability Matrix and Transitivity Check

The reachability matrix shown in Table 5.4 is prepared based on the responses received from the respondent by inserting 1 in the i-j cell for elements affecting 'Collaborative e-governance performance'. The cell that contains 1 corresponds to "Y" in the knowledge base and 0 corresponds to "N" in the knowledge base. This matrix is further, checked for the transitivity rule (if A➤B and B➤C, then A➤C) and has been updated until full transitivity is recognized (Table 5.4a). However, no transitivity is found among the elements.

The reachability matrices along with working notes for the 'Value-creation', 'Cost-effectiveness', and 'Trust development' by collaborative e-governance are shown in Appendices A, B and C respectively.

Table 5.4: Reachability Matrix for 'Collaborative e-governance performance' (CEGP)

	VCEG	CEEG	TDEG	CEGP
VCEG	1	1	0	1
CEEG	0	1	0	1
TDEG	1	1	1	1
CEGP	0	0	0	1

Table-5.4a: Reachability Matrix (with transitivity) for CEGP

	VCEG	CEEG	TDEG	CEGP
VCEG	1	1	0	1
CEEG	0	1	0	1
TDEG	1	1	1	1
CEGP	0	0	0	1

Step 6: Level Partitioning of Reachability Matrix

Level partition on the reachability matrix determines the placement of elements level-wise and is carried out as done in the Interpretive Structural Modeling (ISM) (Warfield,

1974; Neetu and Sushil, 2014). From the reachability matrix, the reachability and antecedent set is found for each factor. The reachability set consists of the element itself besides other elements and helps to achieve levels in the modelling. The antecedent set consists of the element itself and the other elements which may help in achieving levels in the modelling (Attri et al., 2013; Singh and Sushil, 2013). Once the reachability and antecedent sets are developed, elements that are common in both of these sets are placed in the intersection set (Jayalakshmi and Pramod, 2015). The common elements that appear in the reachability and intersection sets are placed in the very first level group (level-1). These elements of level-1 are removed and excluded from the reachability matrix for iteration. The same exercise is repeated until the levels for all the elements are determined. These iterations for popping up the level, help in developing the digraph and designing the final model. For determining the levels, various steps of iterations are shown in Table 5.5. Table 5.6 shows a final list of levels obtained for CEGP in TISM-I.

Table 5.5: Partitioning the Reachability Matrix into Different Levels

Elements	Reachability set	Antecedent set	Intersection set	Level
VCEG	1,2,4	1,3	1	
CEEG	2,4	1,2,3	2	
TDEG	1,2,3,4	3	3	
CEGP	4	1,2,3,4	4	**I**
(Iteration-2)				
VCEG	1,2	1,3	1	
CEEG	2	1,2,3	2	**II**
TDEG	1,2,3	3	3	
(Iteration-3)				
VCEG	1	1,3	1	**III**
(Iteration-4)				
TDEG	3	3	3	**IV**

Table 5.6: List of CEGP Variables and Their Levels in TISM

Element Code	Variables	Level in TISM
CEGP	'Collaborative e-governance performance'	I
CEEG	'Cost-effectiveness' by collaborative e-governance	II
VCEG	'Value-creation' by collaborative e-governance	III
TDEG	'Trust-development' by collaborative e-governance	IV

Step 7: Developing Digraph

The level obtained in the TISM for elements is represented graphically by the way of node and directed links that shows the relationship existing among the element following the reachability matrix. A simpler version of the initial digraph (Figure 5.1) is obtained by removing transitivity step by step by examining their interpretation from the knowledge base.
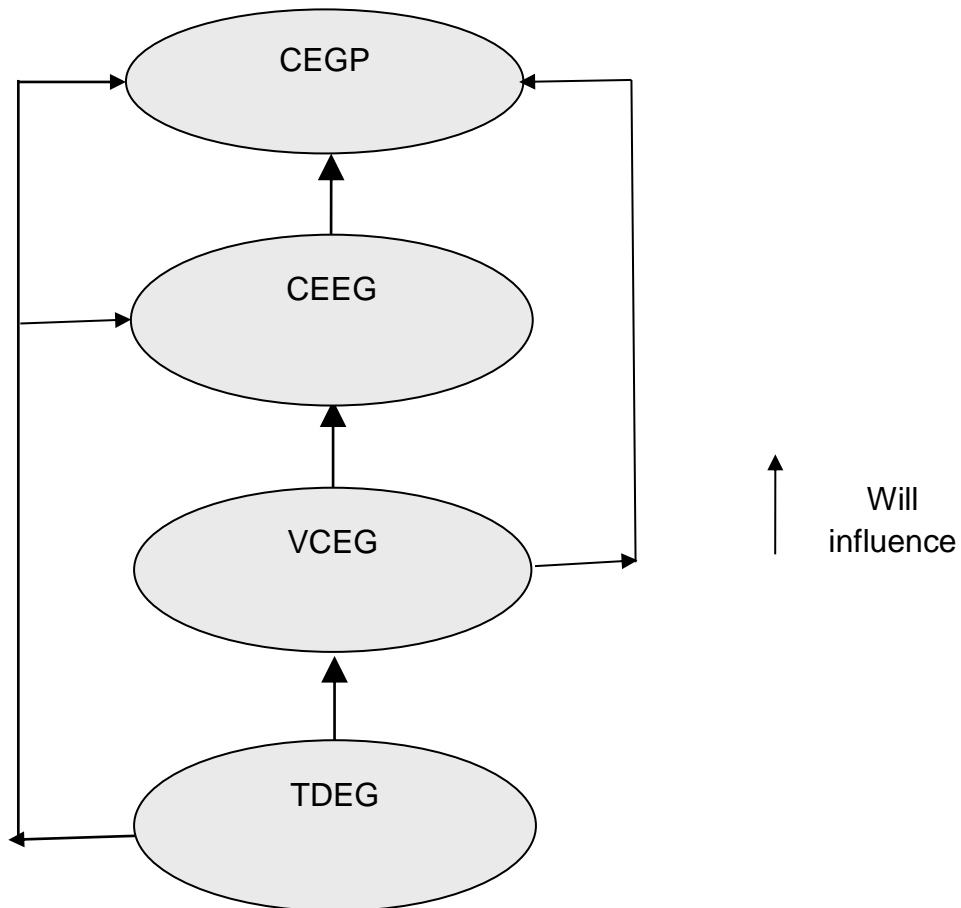
Figure-5.1: Digraph for 'Collaborative e-governance performance' (CEGP)

Step 8: Interaction Matrix

The digraph developed in step 7 is represented by a binary matrix showing interactions by marking 1 entry in the respective cell as shown in Table 5.7. The cells containing 1 are interpreted based on the knowledge base and represented as an interpretive matrix, shown in Table 5.7 a.

Table 5.7: Direct Interaction Matrix (Binary Matrix)

	VCEG	CEEG	TDEG	CEGP
VCEG	-	1	0	1
CEEG	0	-	0	1
TDEG	1	1	-	1
CEGP	0	0	0	-

Table 5.7a: Direct Interaction Matrix (Interpretive Matrix)

	VCEG	CEEG	TDEG	CEGP
VCEG	1	Value creation in terms of better decision making, and better service provisioning influence cost reduction and resource/processes efficiency	0	Value creation is a significant constituent of e-governance performance in terms of improved decision-making and control, service delivery, transparency, citizen participation and interactivity
CEEG	0	1	0	Economic factors with cost-effectiveness constituents and resource/process efficiency enhance e-governance performance
TDEG	Ease of use, usefulness, security and privacy, reliability and the customized response of citizen queries enhance trust among beneficiaries	Trust development in terms of ease of use, usefulness, reliability and security and privacy of data influence cost reduction and process/resource efficiency	1	Focus on trust development helps to enhance e-governance performance
CEGP	0	0	0	1

Step 9: Total Interpretive Structural Model

Final TISM is developed based on the information obtained from the digraph and interaction matrix obtained in step-7 and step-8. Nodes of the digraph are replaced by the interpretations of elements given in boxes. The interpretation in the cells of the interaction matrix is given along with the links in the structural model. This way total interpretation of the model is obtained from its nodes and links as presented in Figure 5.2.

Focus on trust development helps to enhance e-governance performance

CEGP
'Collaborative e-governance performance'

Cost-effectiveness along with resource/process efficiency enhance e-governance performance

Value-creation is a significant constituent of e-governance performance in terms of improved decision making and control, service delivery, transparency, citizen participation and interactivity

CEEG
'Cost-effectiveness' by collaborative e-governance

Trust development in terms of ease of use, usefulness, reliability and security and privacy of data influence cost reduction and process/resource efficiency

Value-creation in terms of better decision making, better service provisioning influence cost reduction and resource/processes

VCEG
'Value-creation' by collaborative e-governance

Ease of use, usefulness, security and privacy, reliability and the customized response of queries enhance trust among beneficiaries

TDEG
'Trust-development' by collaborative e-governance

Figure 5.2: TISM-I for 'Collaborative e-governance performance' (CEGP)

5.3.1 TISM-I: Interpretation for 'Collaborative e-governance performance' (CEGP)

The TISM-I model presented in Figure 5.2 shows the relationship between 'Collaborative e-governance performance' (CEGP) with its three constituents macro variables, i.e., 'Value-creation' (VCEG), 'Cost-effectiveness' (CEEG) and 'Trust-development' (TDEG) by collaborative e-governance.

> ➤ The constructs 'Collaborative e-governance performance' (CEGP) has direct links with all other main dimensions and is placed at the top level of the model which indicates, that it is an outcome variable for the proposed

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conceptual research framework. In this way, CEGP has emerged as the dependent variable.

➢ 'Trust-development' (TDEG) by collaborative e-governance has emerged as the most prominent variable of 'Collaborative e-governance performance' (CEGP) placed at the bottom shows it has maximum driving power. The variables at the top of the model have higher dependence and those at the bottom have a high driving capability.

➢ 'Trust-development' (TDEG) by collaborative e-governance has a direct impact on 'Value-creation' (VCEG), 'Cost-effectiveness' (CEEG) as well as on 'Collaborative e-governance performance' (CEGP).

➢ 'Value-creation' (VCEG) by collaborative e-governance is the second most prominent variable that directly influences 'Cost-effectiveness' (CEEG) and 'Collaborative e-governance performance' (CEGP).

5.3.2 TISM-II: Interpretation for 'Value-creation' (VCEG)

TISM for 'Value-creation' (VCEG) by collaborative e-governance with interpretive outcomes is presented below in Figure 5.3. Its logic-knowledge base with paired comparisons of the element, reachability matrix with transitivity and partitioning into different levels along with digraph are presented in Appendix A.

➢ TISM-II for 'Value-creation' (VCEG) by collaborative e-governance shows the relationship among its six micro variables, i.e., 'Decision-making and Control' (VCDM), 'Service Delivery' (VCSD), 'Responsiveness' (VCRP), 'Transparency' (VCTP), 'Participation' (VCPT) and 'Interactivity' (VCIN).

➢ All the constructs are hierarchically positioned into five levels with 'Value-creation' (VCEG) by collaborative e-governance placed at the top-level reflecting it as the main construct and constituted by six other constructs.

➢ Among all constructs 'Participation' and 'Interactivity' has emerged as the key constructs placed at the bottom level that shows the maximum driving

power. The variables at the top of the model have higher dependence and those at the bottom have a high driving capability.

- ➢ 'Interactivity' and 'Participation' and 'Participation' and 'Interactivity' are interrelated influencing each other. It shows that interactivity within the organization leads to enhanced citizen participation. Similarly, citizen participation in the government organisation helps in enhanced interactivity within and across an organization.
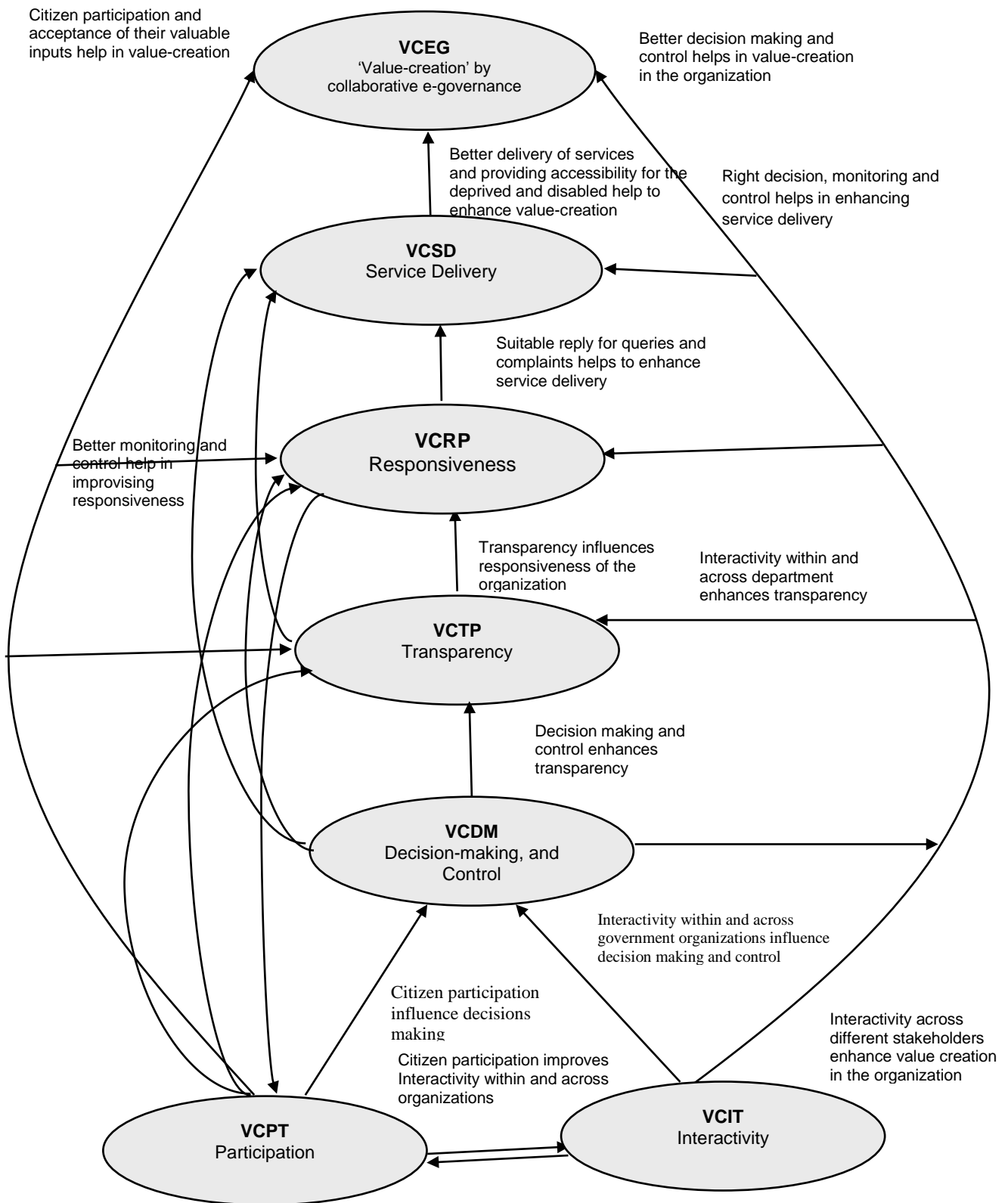
Figure 5.3: TISM-II for 'Value-creation' (VCEG)

5.3.3 TISM-III: Interpretation for 'Cost-effectiveness' (CEEG)

TISM for 'Cost-effectiveness' (CEEG) by collaborative e-governance with interpretive outcomes is presented below in Figure 5.4. Reachability matrix with its transitivity, logic knowledge-base with pairwise comparisons, partitioning into different levels, digraph and interaction matrix (binary and interpretive) are presented in Appendix B.

➢ TISM-III for 'Cost-effectiveness' (CEEG) by collaborative e-governance shows the relationship among its four micro variables 'Time and Efforts Savings' (CETE), 'Efficient Utilisation of Resources' (CEEU), 'Savings of Money Paid to Middlemen' (CESM) and 'Simplification and Faster Execution of Processes' (CESF).

➢ All the constructs are hierarchically positioned into five levels with 'Cost-effectiveness' by collaborative e-governance placed at the top-level reflecting it as the main construct and constituted by four other constructs.

➢ Among all constructs, 'Efficient Utilization of Resources' has emerged as the key construct placed at the bottom level that shows the maximum driving power. The variables at the top of the model have higher dependence and those at the bottom have a high driving capability.

➢ 'Saving of Money Paid to Middlemen' has emerged as another key construct. It shows that services delivered through e-governance have a direct impact on the citizens and they avoid middlemen to accomplish their tasks.
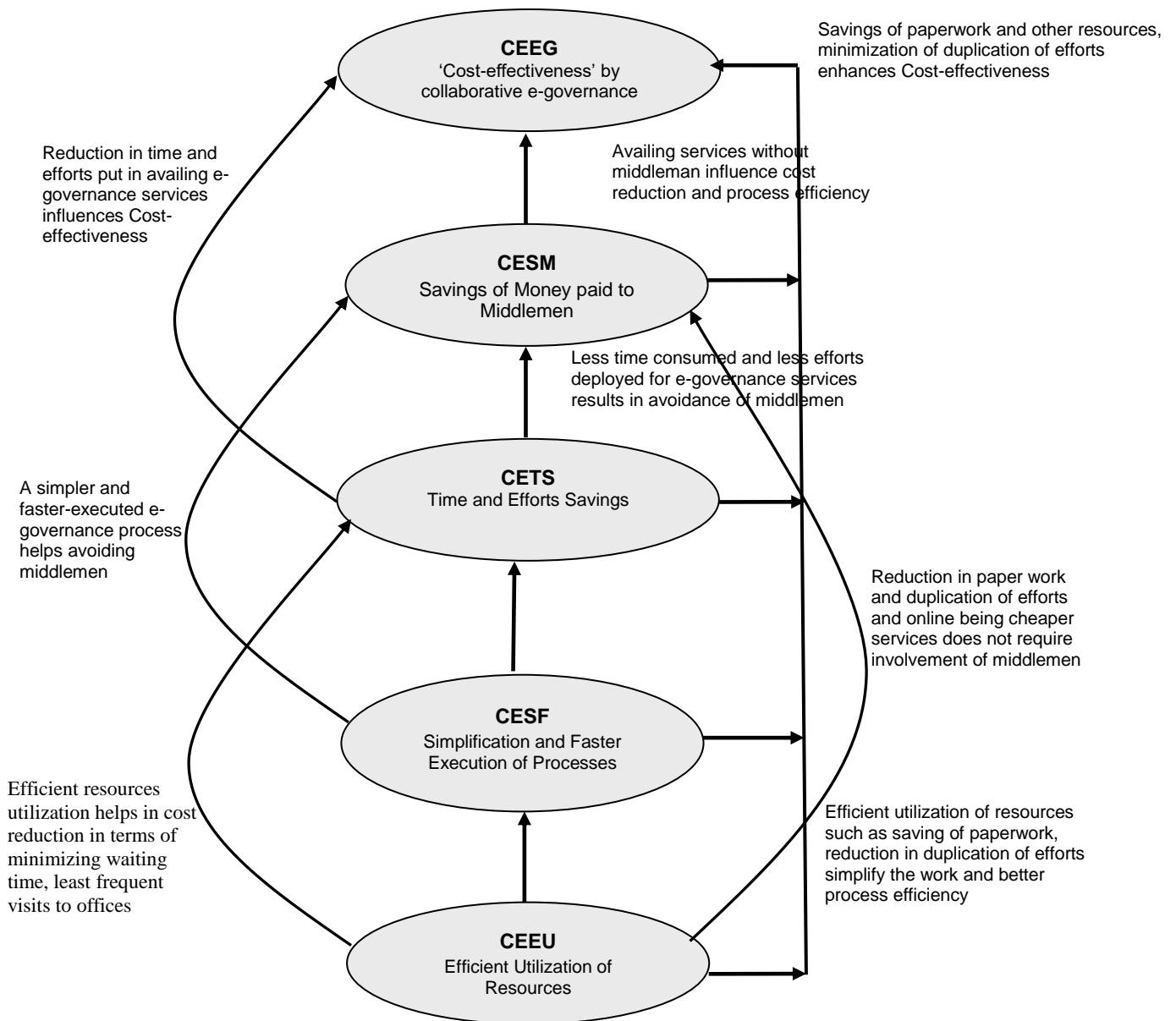
Figure 5.4: TISM-III for 'Cost-effectiveness' (CEEG)

5.3.4 TISM-IV: Interpretation for 'Trust-development' (TDEG)

TISM for 'Trust-development' by collaborative e-governance (TDEG) with interpretive outcomes is presented below in Figure 5.5. Reachability matrix with its transitivity, logic knowledge-base with pairwise comparisons, partitioning into different levels, digraph and interaction matrix (binary and interpretive) are presented in Appendix C.

➢ TISM-IV for 'Trust-development' (TDEG) by collaborative e-governance shows the relationship among its five micro variables, i.e., 'Usefulness of Services'

(TDUS), 'Security and Privacy' (TDSP), 'Reliability of Services' (TDRL), 'Ease of Use of Services' (TDEU) and 'Customized Services Response' (TDCR).

➢ All the constructs are hierarchically positioned into five levels with 'Trust-development' (TDEG) by collaborative e-governance placed at the top-level reflecting it as the main constructs and constituted by five other constructs.

➢ Among all constructs, 'Customized Services Response' has emerged as the key construct placed at the bottom level that shows the maximum driving power. The variables at the top of the model have higher dependence and those at the bottom have a high driving capability.

➢ The 'Usefulness of Services' has emerged as another key construct having direct links from four constructs namely, 'Reliability of Services', 'Security and Privacy', 'Ease of Use of Services' and 'Customized Response'.
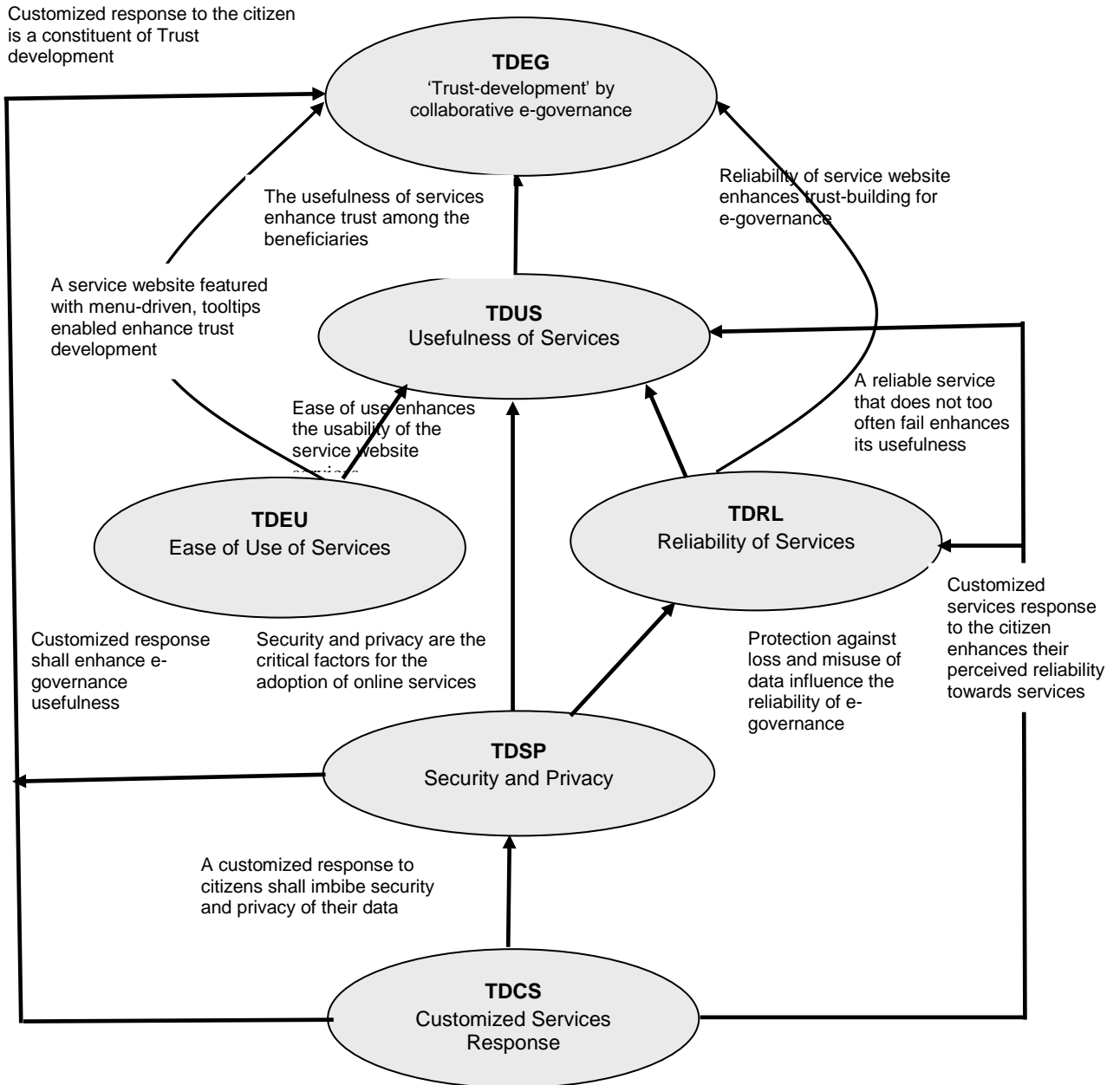
Figure 5.5: TISM-IV for 'Trust-development'

5.4 TISM Model Assessment and Synthesis

The contextual relationship between the perceived 'Collaborative e-governance performance' and its constituents along with the interpretive logic was obtained based on the responses from the ten domain experts. The feedback obtained from the domain experts was used for the assessment of the TISM models (TISM-I to TISM-IV). As per the 2/3 majority criteria (Sushil, 2009), links of the model are accepted if the average score computed for the model is above three and the entire model is

considered for acceptance if the average score of all the links is more than three. An assessment of the TISM-I model is presented in this section with the average score of all the links and the average score for the model is given in Table 5.8.

Assessment depicting the average score of all the links and the average score of all the three TISM models (TISM-II, TISM-III and TISM-IV) are given in the appendix. However, the average score of TISM-II ('Value-creation' by collaborative e-governance) is 3.90, TISM-III ('Cost-effectiveness' by collaborative e-governance) is 3.82, and TISM-IV ('Trust-development' by collaborative e-governance) is 3.48 and being above 3 all are accepted. Table 5.9 summarizes the average score of all the TISM models.

Table 5.8: TISM-I - Assessment of 'Collaborative e-governance performance' (CEGP)
(E1, E2 reflects experts1,2, etc.)

S.no.	Dimension linked	Reasons Quoted by Domain experts	E1	E2	E3	E4	E5	E6	E7	E8	E9	E10	Avg score for link	Avg score for model
1	'Cost-effectiveness' will influence or enhance 'Value-creation'	Cost reduction in terms of time and effort savings, efficient resources utilization, savings of money paid to the middlemen and simple and faster execution of the process for availing government services enhances value-creation.	5	4	4	4	5	3	4	5	3	5	4.2	4.016 Accept the model
2	'Trust-development' will influence or enhance 'Value-creation'	Trust development through reliability, security and privacy and usefulness of e-governance services enhances public value.	4	5	4	3	4	4	5	4	4	3	4.0	
3	'Value-creation' will influence or enhance 'Collaborative e-governance performance'	Value-creation by taking appropriate decisions, ensuring better service delivery, better transparency and better responsiveness helps to enhance collaborative e-governance performance.	4	4	3	4	4	3	4	5	4	4	3.9	
4	'Trust-development' will influence or enhance 'Cost-effectiveness'	Trust development in terms of reliability of services, security and privacy of citizen data, ease of use and usefulness helps in cost reductions for availing e-governance services.	4	4	4	5	4	4	3	4	3	4	3.9	
5	'Cost-effectiveness' will influence or enhance 'Collaborative e-governance performance'	Reduction of cost for resource utilisation, simplifying processes and process efficiency enhance collaborative e-governance performance.	5	4	4	4	3	4	4	5	4	4	4.1	
6	'Trust-development' will influence or enhance 'Collaborative e-governance performance'	A trusted service portal having better reliability, ease of use, usability and ensuring security and privacy enhances e-governance performance.	4	4	5	4	3	4	4	3	5	4	4.0	

Table 5.9: Average Model Scores for TISM Models

TISM Model	Aspects	Average Score
TISM-I	'Collaborative e-governance performance' (CEGP)	4.016
TISM-II	'Value-creation' (VCEG) by collaborative e-governance	3.900
TISM-III	'Cost-effectiveness' (CEEG) by collaborative e-governance	3.820
TISM-IV	'Trust-development' (TDEG) by collaborative e-governance	3.480

5.5   Concluding Remarks

Macro and micro variables identified for study through literature review, practical experience and content experts helped in developing the conceptual framework. TISM templates served to ten domain experts for recording their answers. The reasoning of the agreement has been captured through an interpretive logic knowledge base. The logic knowledge base enabled the creation of a hierarchical level of the variables represented through the digraph for validating the conceptual framework. The variable placed at the top of the model has higher precedence and those at the bottom have a high driving capability. The logic-knowledge-base obtained from the analysis is further synthesised in the form of an interpretive matrix for deriving the relationship amongst the variables. This results in a valuable knowledge base that can be further used by the practitioners for a better understanding of the domain. This study uses the dual approach of validation of conceptualised framework. Validation of the framework through a qualitative approach is presented in this chapter. Statistical validation of the research framework through a quantitative approach by applying the PLS-SEM tool is presented in the next chapter.

Chapter 6

Empirical Validation of Collaborative E-Governance Performance Framework

6.1 Introduction

This chapter presents empirical validation of the proposed research framework for analysing the 'Collaborative e-governance performance'. Partial Least Squares-Structural Equation Modeling (PLS-SEM) has been used for analysing the survey data collected. The conceptual research model has been tested and it has been examined whether the related hypotheses are statistically supported or not.

The chapter has been organized as follows. Initially, a description of survey questionnaire development and sampling method followed by a discussion of how the data set is prepared for the analysis has been presented. Further, the reliability and validity test has been conducted to establish the reliability for internal consistency and validity of the constructs through the appropriate measurement model. Finally, the hypotheses framed based on conceptual frameworks of research in Chapter 4 (Figures 4.1 and 4.2) have been analyzed.

6.2 Survey Questionnaire and Pre-Testing

This section sheds light on the development of survey questionnaires, sampling strategy, and data collection used for the research work.

6.2.1 Questionnaire Development

A close-ended questionnaire having five options of an agreement to select has been used during the period 1st April 2020 to 31st December 2020. The initial version of the questionnaire is pre-tested with the help of captive audiences (Bailey, 1994) such as academic experts, and e-governance practitioners. A group of 10 participants was included in the pre-testing team. Each participant was given a draft questionnaire typed with triple line space which allowed them to write comments on each questionnaire item. Participants checked all the aspects of the questionnaire such as question-wording, question order, missing questions, inappropriate, inadequate, or confusing response categories, and so forth (Baily,1994). Participants were asked to

re-state questions that are difficult to understand or to answer by the respondents. Positive feedback was received from the pretesting of the questionnaire.

The questionnaire is shown in Appendix E which includes two sections. The first section is designed for collecting demographic information containing gender, age group, educational qualification and profession of the participants. The second section is used to collect the information necessary for testing and validating the conceptual framework. The questionnaire items contained in section two use a five-point liker-type scale for agreement ranging from nil (1) extent to a very large extent (5). The Likert-type scale is well known as a summated scale with which a respondent can record his/her agreement or disagreement on each item in a question on an intensity scale (Miller,1970). Feedback received helped in refining and finalizing the questionnaire. While developing the questionnaire the issue of non-response bias and Common Method Bias (CMB) was also addressed.

To avoid the non-response bias, a close-ended questionnaire was developed. A neutral questionnaire was prepared and due care was taken to avoid the personal opinions of the researcher. Double-barreled questions, i.e., questions that touch on more than one issue but allow for only one answer have also been avoided. Further, it has been ensured that options for the questions cover the required possible answers and provide an "interest hypothesis" (Franzen et al.,1945; Benson, 1946; Donald, 1960). The "interest hypothesis" assumes that respondents who are more interested in the subject matter of the questionnaire respond more promptly (Reuss, 1943; Baur, 1947; Larson and Catton, 1959).

6.2.2 Sampling Method

In this study, the referral sampling approach has been used for data collection due to the non-availability of the sampling frame and difficulties faced in identifying the beneficiaries of services. The questionnaire for conducting the survey was first served to the identified beneficiaries in person and they were requested to further refer to those whom they know and have availed the services of select projects taken for the study. They have provided the prospective respondents' contact details in terms of contact numbers and e-mail addresses. The prospective respondents were contacted

through WhatsApp, email and Facebook. Survey questionnaires to them have been served through these platforms.

Target Respondents and Sample Size

The sample size should be large enough to address the research questions and the sample should better represent the population (Collis and Hussey, 2014). At times a small sample size may prevent some important statistical tests among the proposed relationships of the hypotheses (Collis and Hussey, 2014). As this study uses PLS-SEM to analyze the proposed conceptual model, a sample size of 210 was considered to be adequate (Sarstedt et al., 2017).

To test the proposed framework for assessing the collaborative e-governance projects' performance, typical respondents for the survey are the citizens who have used the e-governance projects selected for study (Passport Sewa project, Driving License project, Lease-hold to Free-hold Conversion of Properties of DDA and Online Booking of Community Halls and Open Spaces).

For data collection, 300 respondents were aimed for conducting the survey. Both offline and online data collection approach was adopted for conducting the survey. In offline data collection, the questionnaire was served to the identified respondent physically. For online data collection, Google forms were used. The link to the google form-based questionnaire was forwarded to prospective respondents by email, Facebook and Whatsapp. The process of data collection was stopped after collecting 250 responses. Out of these 250 collected responses, 210 were found valid for analysis.

6.2.3 Pilot Testing

A pilot study is adopted as a small-scaled version or trial run before conducting a full-fledged study that may become successful (Polit et al., 2002). Pilot testing of questionnaires helps in removing the redundancy and ambiguity that may exist in them. It also helps the researchers in obtaining the assessment of the validity and reliability of the questionnaires (Saunders et al., 2012). Validity contains the process of asking an expert or group of experts to comment which helps in freezing the

representativeness and suitability of the questionnaire. Reliability is concerned with the consistency of responses to questions (Saunders et al., 2012).

There are several rules for determining the sample size for a pilot study. For example, Cooper and Schindler (2011) suggested a sample between 25 and 100 individuals. It is also said that a range from 10 to 30 individuals is enough for a pilot test (Isaac and Michael, 1995; Hill, 1998). Moreover, several scholars suggested that the sample size should be 10 per cent of the sample project for the main study (Connelly, 2008). Furthermore, the sample size could also be decided based on the type of analysis at the preliminary stage (Cooper and Schindler, 2011). A sample of 30 respondents is usually advocated as adequate for conducting a pilot study (Memon et al., 2017). A total of 40 responses for the pilot survey were collected to check the validity and reliability of the questionnaire.

To reduce the common method bias, (Podsakoff et al., 2003; Ketokivi and Schroeder, 2004; MacKenzie and Podsakoff, 2012) following approaches have been followed:-

i.   The purpose of the research and instructions were provided to respondents. Respondents were provided with the research information and a set of instructions as to how to register their response and how their information will be used and how their correct response shall help the government organisation to cater for the better e-governance services to the citizens (Podsakoff et al., 2003; 2012). To have a more accurate response, the survey was kept short and redundant and overlap measures were minimized.

ii.   Scale item clarity was improved. Ambiguous scale items are difficult to understand and interpret, therefore, ambiguous terms such as *'occasionally' and 'somewhat', and* words with multiple meanings and multiple ideas that may link together in an item were removed.

iii.   Positive and negative items were balanced. The questionnaire was presented to the respondents in a manner to break the patterns that may cause common method bias.

6.2.4 Respondents Profile

A survey was conducted on two basic aspects namely demographic data and data points through questionnaires. Demographic statistics contain the respondent's gender, age group, qualification level and profession. Table 6.1 shows frequency analysis of the demographic profile of respondents to understand the usage pattern of select collaborative e-governance services by different demographic groups.

As is seen in Table 6.1, the respondents mostly belonged to the age group of 18 to 55 years. Very few were above 56 years (4.28%). Male (77.14%) representation was more than the females (22.85%). The education status of the respondent has been reflected in five different categories as Secondary/10th, Higher Secondary/10+2, Bachelor Degree, Master Degree, and Professional Education. However, the qualification of a greater number of respondents was graduation or above (91.40%). Profession-wise, most of the responses were government employed (50.4%) followed by private employees (33.33%) and students (12.38%). As far as the e-governance services usage pattern is concerned, the majority of the respondents (78.56%) have used e-governance services for 'Passport Sewa' and 'Driving License', and 21.42% of the respondent has used the 'Online Booking of DDA's Park and Open Spaces' and Lease-hold to Free-hold Conversion of Properties.

Table 6.1: Sample Profile of Respondents

Variables	Groups	Frequency	Percentage
Gender	Male	162	77.14
	Female	48	22.85
Age	18-24 Years	35	16.66
	25-35 Years	98	46.66
	36-45 Years	39	18.57
	46-55 Years	29	13.80
	56 years or above	9	4.28
Qualification	Secondary/10th	-	-
	Sr. Secondary/12th	18	8.57
	Graduate	90	42.85
	Post Graduate	72	34.28
	Professional education (MCA/B.Tech, MBA, etc)	30	14.28
Profession	Govt. Employee	105	50.00
	Pvt. Employee	70	33.33
	Self Employed	5	2.38
	Housewife	4	1.90

	Students	26	12.38
E-governance Services Used	Passport Sewa project	100	47.61
	Driving License project	65	30.95
	Online Booking of Community Hall and Open Spaces	23	10.95
	Lease-hold to Free-hold Conversion of DDA's Properties	22	10.47

The collected sample data was edited through coding, tabulation, grouping, and organised according to the requirement of the study. Smart PLS version 3.0 has been used to feed the data and run the model.

6.3   Validity and Reliability Test

For assessing the appropriateness of specific constructs, a validity test through factor analysis is required to be conducted. However, the choice of factor analysis for the validity test of constructs remains elusive among most researchers. Researchers tend to confuse when it comes to using exploratory factor analysis (EFA) or confirmatory factor analysis (CFA). EFA is primarily used for theory generation, whereas CFA is used for a theory-testing method (Henson and Roberts, 2006). EFA can be employed when little is known regarding the factor structure and number of factors (Green et al., 2016). As such, this method is mainly adopted during the scale development process and used to specify construct dimensions (Reise et al., 2000; Thompson, 2004; Pallant, 2007). Apart from these purposes, it is unnecessary to use both CFA and EFA. However, CFA is more appropriate with a well-established scale and a priori knowledge of the factor structure (Green et al., 2016). Unlike EFA, CFA is driven by theoretical expectations regarding the structure of the data (Henson and Roberts, 2006). Therefore, the researchers should proceed with CFA if the scale is well established and adopted from past literature with explicit theoretical grounding.

Moreover, using both EFA and CFA on the same data set seems to be a common practice among the researchers. Henson and Roberts (2006, p. 400) prohibit using EFA with CFA by stating, "It is not informative, and can be potentially misleading, to follow an EFA with a CFA on the same data set". According to Green et al. (2016, p.15) "conducting both EFA and CFA on the same dataset confirms nothing else

except demonstrating that the two Modeling approaches on the same data converge". Therefore, it is recommended by Green et al., (2016, p.18) that the "factor structure from an EFA should be confirmed with CFA on a different data set". The researchers should just apply CFA so long as the questionnaire is well designed (adopted or adapted) with the support from theory and literature review.

In this study, the proposed conceptual framework based on the literature review has been first validated using the TISM approach (*Chapter 5*). The questionnaire designed for the empirical analysis is well supported by theory. The confirmatory factor analysis (CFA) approach has, therefore, been followed to validate the constructs. Cronbach's alpha and composite reliability has been computed to ascertain internal consistencies and the reliability of the questionnaire. The correlation analysis has been undertaken to ascertain the relationship between variables. The subsequent sections describe these analyzes in detail.

6.3.1 Reliability Analysis

Fornell and Larcker (1981) suggest that Cronbach's alpha value should be greater than 0.70 to be considered adequate, while Bagozzi (1991) advise that Cronbach's alpha value with a value greater than 0.60 is desirable. An alpha value below 0.60 indicates a lack of reliability (Hair et al., 2011) but in some cases, 0.60 may also be acceptable (Hair et al.,1998). In this study, Cronbach's alpha value of 0.70 has been taken as the cutoff point. Table 6.2 presents the Cronbach's alpha value for the survey questionnaire items associated with each micro variable. An analysis of Cronbach's alpha value reveals that all the alpha values are greater than the recommended threshold of 0.70.

Table 6.2: Summary of Cronbach's Alpha Value of Survey Questionnaire

Sr. No.	Macro Variables	Micro Variables	Cronbach's Alpha
1	'Value-creation' by collaborative e-governance	Decision-making and Control	0.896
		Service Delivery	0.785
		Responsiveness	0.790
		Transparency	0.806
		Participation	0.912
		Interactivity	0.818
2		Time and Efforts Savings	0.854

	'Cost-effectiveness' by collaborative e-governance	Efficient Utilization of Resources	0.812
		Savings of Money Paid to Middlemen	0.875
		Simplification and Faster Execution of Processes	0.886
3	'Trust-development' by collaborative e-governance	Usefulness of Services	0.835
		Security and Privacy	0.881
		Reliability of Services	0.876
		Ease of Use of Services	0.864
		Customized Services Response	0.804

6.4   Data Analysis

The primary focus of the research is to identify and explain the key target constructs and/or identify the key driver constructs (Rigdon, 2014; Hair et al., 2017) of 'Collaborative e-governance performance'. The conceptual framework proposed for validation in this study is a reflective-reflective model. Statistical tool, PLS-SEM has been adopted based on the requirement of explaining the key target constructs and reflective model (Hair et al., 2014). This tool also facilitates both modes (regression and correlation weights) in the measurement model more efficiently (Hair et al., 2017). Details of PLS-SEM based analysis of measurement and structural model are presented below.

6.4.1   Partial Least Squares-Structural Equation Modeling (PLS-SEM)

PLS-SEM is capable of handling complex cause-effect structural models (Rigdon, 2014; Richter et al., 2016). For models with many constructs and indicators, PLS-SEM is a suitable analytical tool (Hair et al., 2017). Additionally, the use of PLS-SEM is also reasoned due to data characteristics, such as small sample size and non-normal data. Hair et al. (2017) suggested that the complexity of a structural model does not require a large sample size because the "PLS algorithm does not compute all the relationships at the same time". As far as the data distribution is concerned, PLS-SEM is labelled as soft-Modeling because of its greater flexibility to accommodate distributional assumptions (Wold, 1984; Hair et al., 2017). Hence, when the multivariate normality assumption is a concern, PLS-SEM would be a better option for analysis (Hair et al., 2017).

6.4.2 Evaluation of Measurement Model for 'Value-creation'

Structural Equation Modeling (SEM) is divided into two models, i.e., the measurement model and the structural model. The measurement model helps in assessing the reliability and validity of the construct. The reliability of the construct shows its consistency whereas the validity of the construct shows its accuracy. In this section evaluation of measurement and structural model of 'Value-creation' by collaborative e-governance is presented.

Construct Reliability and Validity

Primarily, construct reliability is analyzed in terms of alpha value referred to as Cronbach's alpha and it should have a value >=0.70. In our case, as shown in Table 6.2 all the alpha values are as per recommended threshold. The value of Composite Reliability (CR) is also taken into consideration along with the alpha value. CR value should also be >=0.70. In this case, CR values as shown in Table 6.3 are also as per the recommended threshold. This too, reflects that our constructs are reliable. Rho is also considered one of the measures of reliability for the construct. The Rho value should be in between the value of Cronbach's alpha and CR values. It can be seen in Table 6.3 that all Rho values are in between Cronbach's alpha and CR values.

Table 6.3: Measurement Model Evaluation (Internal Consistency) of 'Value-creation'

	Cronbach's Alpha	Rho_A	Composite Reliability (CR)	Construct Reliability Result
Decision-making and Control	0.896	0.898	0.924	Established
Interactivity	0.818	0.826	0.880	Established
Participation	0.912	0.915	0.945	Established
Responsiveness	0.790	0.796	0.864	Established
Service Delivery	0.785	0.787	0.861	Established
Transparency	0.806	0.810	0.873	Established

The validity of the construct shows that the construct taken for the study is acceptable and can measure the outcome of the construct through its indicators. To analyze the validity of the constructs two types of validity are generally analyzed in terms of convergent validity and discriminate validity.

Convergent Validity

It shows that all the data items converge into a construct to which they represent. To measure convergent validity, the value of Average Variance Extracted (AVE) is computed. The value of AVE should be greater than 0.50. It can be seen from Table 6.4 that the value of AVE of all the constructs is >0.50 which confirms the convergent validity of the constructs.

The convergent validity of a construct is also assessed through factor loadings. Factor loadings in PLS are termed as outer loadings and the value of 0.708 or more is considered appropriate. As shown in Table 6.5, the factor loadings are found to be within the recommended threshold for all of the indicators except PTN4 which has a loading of 0.679 of the construct 'Participation'. One more indicator, i.e., SDL5 has a loading value of 0.582 of 'Interactivity'. Therefore, indicators PTN4 and SDL5 have been dropped for further assessment. All other indicators taken for the study are valid for the constructs, i.e., 'Decision-making and Control', 'Interactivity', 'Participation', 'Responsiveness', 'Service Delivery' and 'Transparency'. Convergent validity, therefore, stands established for the 'Value-creation' by collaborative e-governance.

Table. 6.4: Convergent Validity Result for 'Value-creation'

Constructs & Data Items*	Factor Loadings	Criteria >0.708	Result	AVE	Criteria >0.5	Result
Decision-making and Control				0.708		Fulfilled
DMC1	0.812		Fulfilled			
DMC2	0.876		Fulfilled			
DMC3	0.888		Fulfilled			
DMC4	0.782		Fulfilled			
DMC5	0.843		Fulfilled			
Interactivity				0.647		Fulfilled
ITN1	0.789		Fulfilled			
ITN2	0.805		Fulfilled			
ITN3	0.827		Fulfilled			
ITN4	0.795		Fulfilled			
Participation				0.851		Fulfilled
PTN1	0.915		Fulfilled			
PTN2	0.943		Fulfilled			
PTN3	0.909		Fulfilled			
PTN4	*0.679*		*Not Fulfilled*			

Responsiveness				0.614		Fulfilled
RSP1	0.762		Fulfilled			
RSP2	0.851		Fulfilled			
RSP3	0.772		Fulfilled			
RSP4	0.746		Fulfilled			
Service Delivery				0.608		Fulfilled
SDL1	0.796		Fulfilled			
SDL2	0.813		Fulfilled			
SDL3	0.733		Fulfilled			
SDL4	0.775		Fulfilled			
SDL5	*0.582*		*Not Fulfilled*			
Transparency				0.633		Fulfilled
TPN1	0.849		Fulfilled			
TPN2	0.762		Fulfilled			
TPN3	0.782		Fulfilled			
TPN4	0.785		Fulfilled			

* Codes such as DMC1, DMC2, etc. are defined and given in Appendix-G.

Discriminant Validity

Discriminant validity is about the differentiation of the construct. It is a measure of the similarity of constructs. All constructs should, therefore, have a different identity and should be different from others. Thus, established discriminant validity implies that a construct is unique and captures phenomena not represented by other constructs in the model. To establish discriminant validity, the criterion of Fornell-Larcker, cross-loadings and Heterotrait-Monotrait (HTMT) are required to be met. As per the Fornell-Larcker criterion, the AVE of a latent variable should be higher than the squared correlations between the latent variable of other variables (Fornell and Larker, 1981; Chin, 1998; Chin, 2010). The discriminant validity (DV) should be the square root of the AVE value of the construct and it should be greater than 0.50. Table 6.5 shows the discriminant validity of all the constructs of 'Value-creation' by collaborative e-governance and it can be seen that the value of DV of all the constructs is the square root of its AVE and is also greater than 0.50. This way convergent validity criteria are established.

Table 6.5: Measurement Model Evaluation (Convergent and Discriminant Validity) for 'Value-creation'

	Average Variance Extracted (AVE) Criteria (>0.50)	Convergent Validity Result	Fornell-Larcker Citerion (SQRT AVE)	Discriminant Validity Result
Decision-making and Control	0.708	Established	0.841	Established
Interactivity	0.647	Established	0.804	Established
Participation	0.851	Established	0.922	Established
Responsiveness	0.614	Established	0.784	Established
Service Delivery	0.608	Established	0.780	Established
Transparency	0.633	Established	0.795	Established

Cross Loadings

To establish the discriminant validity cross-loadings criteria is also required to be met. All the items in a construct should load better in themselves compared to other construct items. Cross-loadings value of the indicator's outer loadings on the associated construct should be greater than all of its loadings on other constructs. It can be seen in Table 6.6 that cross-loadings criteria for the construct of 'Value-creation' by collaborative e-governance stand established.

Table 6.6: Cross-loadings for the Constructs of 'Value-creation'

	Decision-making and Control (VCDM)	Interactivity (VCIN)	Participation (VCPT)	Responsiveness (VCRP)	Service Delivery (VCSD)	Transparency (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

Heterotrait-Monotrait Ratio (HTMT)

The similarity between latent variables is measured by the HTMT. An estimate of the correlation between the construct is represented by HTMT. It is one of the criteria to establish the discriminant validity of the constructs and is based on the average of Heterotraiat-Monotrait correlations. The ratio of HTMT is expected to be lower than 1. However, the threshold is set as 0.90 at a 95% confident interval (Henseler et al., 2015). To examine the HTMT ratio, it is tested whether the HTMT values are significantly different from 1. The value of HTMT higher than 0.9 indicates there is a lack of discriminant validity. In our case, all the value of the construct is lower than 0.9 except service delivery which is 0.913 which is just above the recommended threshold of 0.9 but is lower than 1. Discriminant validity for 'Value-creation' by collaborative e-governance hence stands established. Table 6.7 shows the value of HTMT.

Table 6.7: HTMT Values for the Construct of 'Value-creation'

	Decision-making and Control	Interactivity	Partici pation	Responsive ness	Service Delivery	Transpar ency
Decision-making and Control						
Interactivity	0.49					
Participation	0.29	0.74				
Responsiveness	0.89	0.74	0.40			
Service Delivery	0.89	0.70	0.53	0.90		
Transparency	0.83	0.76	0.60	0.92	0.91	

All the recommended measures to establish the reliability and validity criteria for the measurement model have been presented above. In Table 6.8 result summary for the reflective measurement model, 'Value-creation' by collaborative e-governance is

presented to have a glimpse of consolidated outcomes. It can be seen that all the recommended thresholds and the recommended criteria are fulfilled.

Table 6.8: Result Summary for Measurement Models of 'Value-creation'

Latent Variables	Indicators	Internal Consistency/ Reliability		Convergent Validity		Discriminant Validity (HTMT confidence level doesn't include 1)
		Cronbach's Alpha	Composite Reliability	Loadings	AVE	
Decision-making and Control	DMC1	0.896	0.924	0.812	0.708	Yes
	DMC2			0.876		
	DMC3			0.888		
	DMC4			0.782		
	DMC5			0.843		
Interactivity	ITN1	0.818	0.880	0.789	0.647	Yes
	ITN2			0.805		
	ITN3			0.827		
	ITN4			0.795		
Participation	PTN1	0.912	0.945	0.915	0.851	Yes
	PTN2			0.943		
	PTN3			0.909		
Responsiveness	RSP1	0.790	0.864	0.762	0.614	Yes
	RSP2			0.851		
	RSP3			0.772		
	RSP4			0.746		
Service Delivery	SDL1	0.785	0.861	0.796	0.608	Yes
	SDL2			0.813		
	SDL3			0.733		
	SDL4			0.775		
Transparency	TRP1	0.806	0.873	0.849	0.633	Yes
	TRP2			0.762		
	TRP3			0.782		
	TRP4			0.785		

6.4.3 Evaluation of Structural Model for 'Value-creation'

In the previous section, measurement model evaluation is done and a reliability and validity test of all the constituents of 'Value-creation' by the collaborative government is conducted. The internal consistency through reliability check and accuracy through the validity check of all the constructs has been established. Similarly, convergent validity is established and the shown result reflects that there is no issue of any discriminant validity.

The next step is to validate and establish a structural model, i.e., to validate how the variables are related to each other. Assessment of the structural model helps in determining the model's capability to predict one or more target constructs. Assessment of structural model is accomplished through a. Collinearity assessment, b. Path coefficients, c. Coefficients of determination (R^2 value), d. Effect size (f^2 value), e. Blindfolding and Predictive relevance (Q^2 value) and f. Effect size (q^2 value).

Collinearity Assessment

Collinearity among the data items arises when two indicators are highly correlated. Collinearity among latent variables is assessed by using the Variance Inflation Factor (VIF). The threshold value for VIF >=5 indicates a potential collinearity problem (Hair et al., 2011). Therefore, VIF should be less than 5. VIF values for all the latent variables are found to be less than 5. It means that there is no collinearity problem in our structural model of 'Value-creation' by collaborative e-governance. Table 6.9 shows the collinearity value of the constructs of 'Value-creation' by collaborative e-governance.

Table 6.9: VIF Values for 'Value-creation'

	Variance Inflation Factor (VIF)	Criteria (<5)	Result
Decision-making and Control	1.000		Fulfilled
Interaction	1.000		Fulfilled
Participation	1.000		Fulfilled
Responsiveness	1.000		Fulfilled
Service Delivery	1.000		Fulfilled
Transparency	1.000		Fulfilled

Path Coefficients

Path-coefficient is the coefficient linking construct in structural modeling. It represents the hypothesized relationship or the strength of the relationship. Path coefficient close to +1 indicates a strong positive relationship. The closer the estimated coefficients are to 0, the weaker the relationships. Very low values (close to 0) generally are not statistically validated. The value of path coefficients for the 'Value-creation' by collaborative e-governance is shown in Table 6.10.

Table 6.10: Path-coefficients of 'Value-creation'

	Path-coefficients Value	Criteria (0-1)	Result
Decision-making and Control	0.856		Positive relationship
Interactivity	0.755		Positive relationship
Participation	0.510		Positive relationship
Responsiveness	0.885		Positive relationship
Service Delivery	0.864		Positive relationship
Transparency	0.897		Positive relationship

Links to path coefficients are shown in Figure 6.1. It can be seen that all values are greater than 0 and close to 1. It means that the relationship of all the constructs of 'Value-creation' by collaborative e-governance is strong.
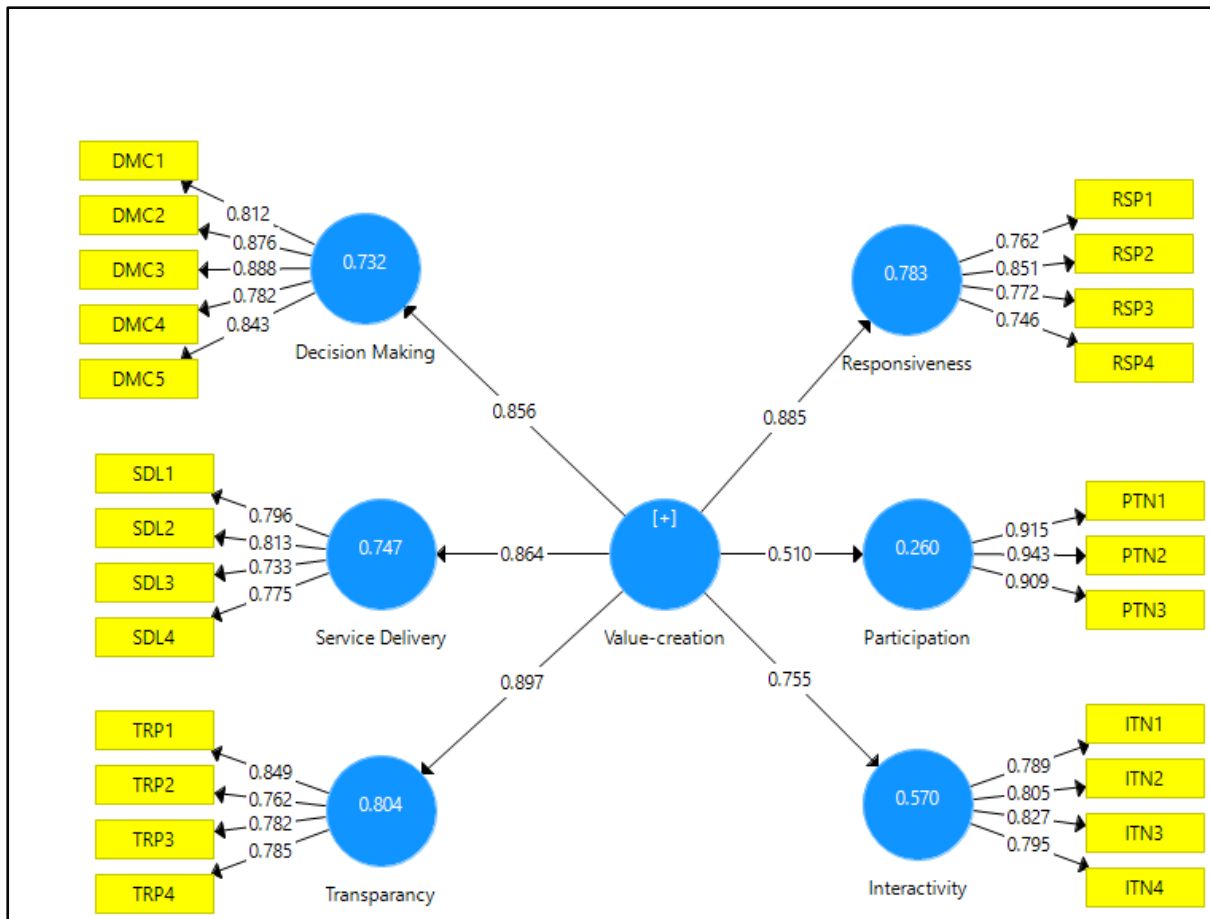
Figure 6.1: Path-coefficients of 'Value-creation'

Whether a coefficient is significant or not depends on the standard error that is obtained by the bootstrapping process in PLS-SEM. A table with mean value, standard errors, etc. obtained from the bootstrapping process is shown in Appendix-D (Smart

PLS Report). Bootstrapping process also enables computing the empirical t-values, p-values for structural path coefficients.

t- Statistic

When an empirical t-value is larger than the critical value, we conclude that the coefficient is statistically significant at a certain error probability. Commonly used critical values for the two-tailed test are 1.65 (at a 10% significant level) and 1.96 (at a 5% significant level). Table 6.11 shows the t-values for the construct of 'Value-creation' by collaborative e-governance.

Table 6.11: t-Statistic for 'Value-creation'

	t-Statistic	Critical Value	Statistically Significance?
Value-creation -> Decision-making and Control	41.255	1.96	Yes
Value-creation -> Interactivity	16.781	1.96	Yes
Value-creation -> Participation	06.710	1.96	Yes
Value-creation -> Responsiveness	60.706	1.96	Yes
Value-creation -> Service Delivery	47.872	1.96	Yes
Value-creation -> Transparency	59.565	1.96	Yes

Pictorial representations of the outcome of bootstrapping process for 'Value-creation' of collaborative e-governance are presented in Figure 6.2. It can be seen that all the values for the path coefficients are higher than the critical value of 1.96 taken at a significant level of 95%.
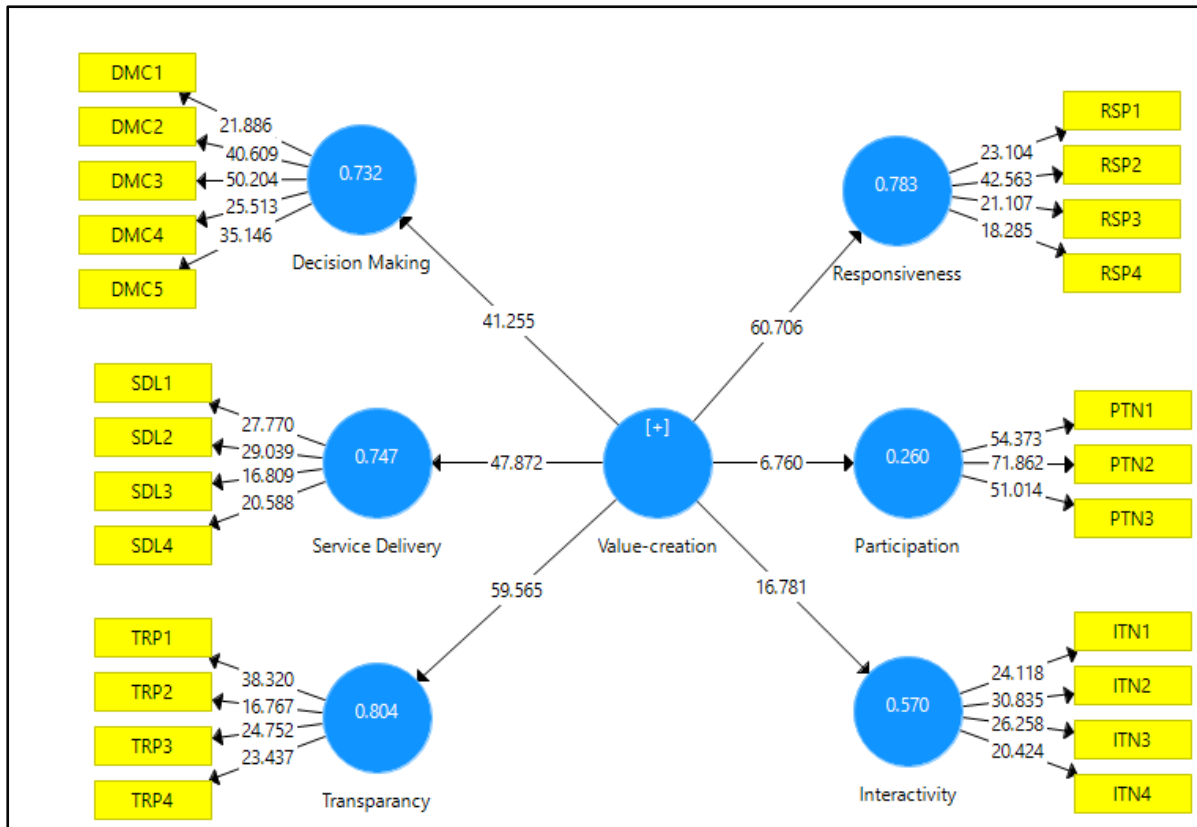
Figure 6.2: Bootstrapping of 'Value-creation'

Coefficient of Determination (R² Value)

The R^2 value indicates the variance in the endogenous variable explained by the exogenous variable. The R^2 value range from 0 to 1. In the range, a higher level indicates higher levels of predicting accuracy. According to Chin (1998), the value of R^2 as 0.67, 0.33 and 0.19 is considered substantial, moderate and weak. Table 6.12 shows the R^2 and R^2 adjusted values for 'Value-creation' by collaborative e-governance. The R^2 value is within the range of 0-1 which shows that predicting accuracy is moderate and substantial.

Table 6.12: R^2 Value for 'Value-creation'

	R^2	R^2 Adjusted	Criteria	Result
Decision-making and Control	0.732	0.731	0-1	Substantial
Interactivity	0.570	0.568	0-1	Moderate
Participation	*0.260*	*0.256*	*0-1*	*Moderate*
Responsiveness	0.783	0.782	0-1	Substantial
Service delivery	0.747	0.745	0-1	Substantial
Transparency	0.804	0.803	0-1	Substantial

In the above table, it can be seen that the latent variable 'Participation' has the R^2 value of 0.260 which is the lowest among all and just above the recommended threshold of 0.19 (to be considered the weak). Though value falls under the moderate range of predicting accuracy, government organizations should take adequate measures to enhance citizens' participation within and across organisations to improve value creation.

Effect Size (f^2 Value)

Assessment of effect size allows us to observe the effect of each exogenous construct on the endogenous construct. According to Cohen (1998) for assessing f^2, the value of 0.02 should be interpreted as a 'small' representation, 0.15 as a 'medium' and 0.35 as a 'large' effect of the exogenous latent variable. Effect size values of less than 0.02 indicate that there is no effect. Table 6.13 shows the value of effect size (f^2). It can be seen that all values of the constructs represent a large effect size on 'Value-creation'. Though 'Participation' has qualified as a large effect size. However, it is just above the recommended threshold of 0.35 for a large effect size which is the lowest among all constructs. Citizen participation in the government organization should, therefore, be given more focus to enhance the public value of government organization.

Table 6.13: Effect size (f^2) for 'Value-creation'

	Value-creation (f^2)	Criteria (0.35: Large, 0.15: Medium, 0.02: Small,)	Result
Decision-making and Control	2.738		Large
Interactivity	1.325		Large
Participation	*0.351*		*Large*
Responsiveness	3.604		Large
Service Delivery	2.948		Large
Transparency	4.101		Large

Blindfolding and Predictive Relevance (Q^2 Value)

In addition to evaluating the magnitude of R^2 values as a criterion of predictive accuracy, Stone-Geisser's, Q^2 value is also to be examined (Geisser,1974; Stone 1974). This measure is an indicator of the model's predictive power or predictive relevance. The Q^2 value is obtained by using blindfolding procedures for a specified omission distance D with a value between 5 and 10. It is calculated as 1-SSE/SSO

where SSE is the Sum of Squared prediction Errors based on a comparison of the original data and predicted data and SSO is the Sum of Squares of Observations based on prediction with mean. If the predicted data contain the group's attribute, the value of the mean is calculated separately for each group excluding the predicted group from the calculation. Q^2 value of larger than 0 suggests that the model has predictive relevance for a certain endogenous construct. In contrast, values of 0 and below indicates a lack of predictive relevance. Table 6.14 shows the Q^2 values of all the constructs of 'Value-creation' which are greater than 0 indicating that the model has predictive relevance.

Table 6.14: Predictive Relevance (Q^2) for 'Value-creation'

	SSO	SSE	$Q^2 =(1-SSE/SSO)$	Criteria ($Q^2>0$)	Result
Decision-making and Control	1000.000	444.433	0.556		Fulfilled
Interactivity	800.000	549.154	0.314		Fulfilled
Participation	800.000	587.800	0.265		Fulfilled
Responsiveness	800.000	415.664	0.480		Fulfilled
Service Delivery	800.000	420.920	0.474		Fulfilled
Transparency	800.000	401.350	0.498		Fulfilled

All the required values for the measurement of the structural model have been computed and found to be within the recommended threshold. In chapter four, macro and micro variables are presented and accordingly, a conceptual research framework has been constructed. Based on the adoption of variables for the study and the development of a conceptual framework. Hypotheses for testing have been framed. The result of tested hypotheses for 'Value-creation' by collaborative e-governance is presented below.

6.4.4 Result of Hypotheses for 'Value-creation'

Table 6.15 summarizes the hypotheses test results which were framed for 'Value-creation' by collaborative e-governance in chapter four. Six alternate hypotheses, HA4, HA5, HA6, HA7, HA8 and HA9 were formulated. To test the result of hypotheses, the value of the key statistics in terms of assessment of collinearity (VIF), path coefficients, t-value, determination of coefficients (R^2), effect size (f^2) and predictive relevance (Q^2) as recommended by the experts are considered.

All the laid down criteria of statistical assessment of structural modelling for hypotheses testing are found to be within the recommended threshold. Hypothesized paths from 'Value-creation' (VCEG) by collaborative e-governance to its constructs, i.e., 'Decision-making and Control' (VCDM), 'Service Delivery' (VCSD), 'Responsiveness' (VCRP), 'Participation' (VCPT), 'Transparency' (VCTP) and 'Interactivity' (VCIT) are found to be significant. It is, therefore, statistically tested that all the six hypotheses may be accepted as summarized in Table 6.15.

Table 6.15: Result of Hypotheses for 'Value-creation'

Alternate Hypothesis	The Structural Relationship	VIF	t-Value	Path-Coefficients	R^2	f^2	Q^2	Result of Hypothesis Test
		Criteria (<5)	Criteria (>1.96)	Criteria (0-1)	Criteria (0.67=substantial, 0.33= moderate, 0.19= weak)	Criteria (0.35: large, 0.15: medium, 0.02: small)	Criteria (Q^2>0)	
HA4	VCDM◄VCEG	1.000	41.255	0.856	0.732	2.738	0.556	Supported
HA5	VCSD◄VCEG	1.000	47.872	0.864	0.747	2.948	0.474	Supported
HA6	VCRP◄ VCEG	1.000	60.706	0.885	0.783	3.604	0.480	Supported
HA7	VCTP◄VCEG	1.000	59.565	0.897	0.804	4.101	0.498	Supported
HA8	VCPT◄VCEG	1.000	06.710	0.510	0.260	0.351	0.265	Supported
HA9	VCIT◄VCEG	1.000	16.781	0.755	0.570	1.325	0.314	Supported

HA4: 'Decision-making and Control' is a significant element of 'Value-creation' by collaborative e-governance

HA5: 'Service Delivery' is a significant element of 'Value-creation' by collaborative e-governance

HA6: 'Responsiveness' is a significant element of 'Value-creation' by collaborative e-governance

HA7: 'Transparency' is a significant element of 'Value-creation' by collaborative e-governance

HA8: 'Participation' is a significant element of 'Value-creation' by collaborative e-governance

HA9: 'Interactivity' is a significant element of 'Value-creation' by collaborative e-governance

Evaluation of the measurement model and structural model has been covered in the previous section for the first macro variable, namely, 'Value-creation' by collaborative e-governance of outcome variable 'Collaborative e-governance performance' in detail. All formulated hypotheses were tested and supported statistically. The relevant statistics for both measurement and structural models for the second macro variable, i.e., 'Cost-effectiveness' by collaborative e-governance are presented in the following section.

6.4.5 Evaluation of Measurement Model for 'Cost-effectiveness'

The measurement model helps in assessing the reliability and validity of the construct. The reliability of the construct shows its consistency whereas the validity of the construct shows its accuracy. In this section evaluation of measurement and structural model of 'Cost-effectiveness' by collaborative e-governance is presented. Theoretical details about the evaluation of the measurement model in terms of construct reliability and validity, cross-loadings, HTMT, etc. are explained in the previous section on the evaluation of the measurement model for 'Value-creation'. Theoretical aspects of the measurement model for 'Cost-effectiveness' and 'Trust-development', therefore, are not presented in the following sections.

Construct Reliability and Validity

Construct reliability is measured in terms of Alpha value, CR value and the value of Rho. In this case, as shown in Table 6.16 all the alpha values, CR values and values of Rho are found to be within the recommended threshold. CR values are also found to be as per the recommended threshold.

Table 6.16: Measurement Model Evaluation (Internal Consistency) for 'Cost-effectiveness'

	Cronbach's Alpha	Rho_A	Composite Reliability (CR)	Construct Reliability Result
Efficient Utilization of Resources	0.812	0.817	0.889	Established
Savings of Money Paid to Middlemen	0.837	0.839	0.902	Established
Simplification and Faster Execution of Processes	0.822	0.862	0.894	Established
Time and Efforts Savings	0.847	0.851	0.897	Established

Convergent Validity

To measure convergent validity, the value of Factor Loading (FL) and Average Variance Extracted (AVE) is computed. These values are found to be within the recommended threshold and are presented in Table 6.17 and Table 6.18 respectively.

Table. 6.17: Convergent Validity for 'Cost-effectiveness'

Constructs	Factor Loadings	Criteria >0.708	Result	AVE	Criteria >0.50	Result
Efficient Utilization of Resources				0.728		Fulfilled
EUR1	0.880		Fulfilled			
EUR2	0.884		Fulfilled			
EUR3	0.793		Fulfilled			
Savings of Money Paid to Middlemen				0.755		Fulfilled
SMP1	0.858		Fulfilled			
SMP2	0.887		Fulfilled			
SMP3	0.862		Fulfilled			
Simplification and Faster Execution of Processes				0.737		Fulfilled
SFE1	0.838		Fulfilled			
SFE2	0.864		Fulfilled			
SFE3	0.873		Fulfilled			
Time and Efforts Savings				0.686		Fulfilled
TES1	0.797		Fulfilled			
TES2	0.872		Fulfilled			
TES3	0.810		Fulfilled			
TES4	0.833		Fulfilled			

Discriminant Validity

To establish discriminant validity, the criterion of Fornell-Larcker, cross-loadings and Heterotrait-Monotrait (HTMT) are required to be met. The discriminant validity (DV) should be the square root of the AVE value of the construct and it should be greater than 0.50. Table 6.18 shows the discriminant validity of all the constructs of 'Cost-effectiveness' by collaborative e-governance and are found to be within the recommended threshold.

Table 6.18: Measurement Model Evaluation (Convergent and Discriminant Validity) for 'Cost-effectiveness'

	Average Variance Extracted (AVE)	Criteria (>0.50)	Convergent Validity Result	Fornell-Larcker Citerion (SQRT AVE)	Discriminant Validity Result
Efficient Utilization of Resources	0.728		Established	0.853	Established
Savings of Money Paid to Middlemen	0.755		Established	0.869	Established
Simplification and Faster Execution of Processes	0.737		Established	0.859	Established
Time and Efforts Savings	0.686		Established	0.829	Established

Cross Loadings

All the items in a construct should load better in themselves compared to other items of the construct. It can be seen in Table 6.19 that cross-loading criteria for the construct of 'Cost-effectiveness' by collaborative e-governance stand established.

Table 6.19 Cross-loadings of 'Cost-effectiveness'

	Efficient Utilization of Resources (CEEU)	Savings of Money Paid to Middlemen (CESM)	Simplification and Faster Execution of Processes (CESF)	Time and Efforts Savings (CETE)
EUR1	0.880	0.635	0.609	0.601
EUR2	0.899	0.606	0.645	0.605
EUR3	0.772	0.573	0.578	0.498
SMP1	0.538	0.848	0.613	0.525
SMP2	0.658	0.902	0.634	0.529
SMP3	0.635	0.854	0.723	0.551
SFE1	0.550	0.598	0.831	0.504
SFE2	0.560	0.656	0.861	0.560
SFE3	0.715	0.683	0.882	0.592
TES1	0.545	0.502	0.482	0.792
TES2	0.593	0.547	0.548	0.886
TES3	0.488	0.424	0.512	0.808
TES4	0.584	0.556	0.597	0.825

Heterotrait-Monotrait Ratio (HTMT)

The ratio of HTMT is expected to be lower than 1. However, the threshold is set as 0.90 at a 95% confident interval (Henseler et al., 2015). To examine the HTMT ratio, it is tested whether the HTMT values are significantly different from 1. Table 6.20 shows the value of HTMT for the constructs of 'Cost-effectiveness' by collaborative e-governance.

Table 6.20: Heterotrait-Monotrait Ratio (HTMT) of 'Cost-effectiveness'

	Efficient Utilization of Resources	Savings of Money Paid to Middlemen	Simplification and Faster Execution of Processes	Time and Efforts Savings
Efficient Utilization of Resources				
Savings of Money Paid to Middlemen	0.85			
Simplification and Faster Execution of Processes	0.86	0.90		
Time and Efforts Savings	0.80	0.72	0.77	

All the recommended statistical measures to establish the reliability and validity criteria for the measurement model of 'Cost-effectiveness' has been presented above and the result summary of its measurement model is presented in Table 6.21.

Table 6.21: Result Summary for Measurement Model of 'Cost-effectiveness'

Latent Variables	Indicators	Internal Consistency Reliability		Convergent Validity		Discriminant Validity (HTMT confidence level doesn't include 1)
		Cronbach's Alpha	Composite Reliability	Factor-loadings	AVE	
Efficient Utilization of Resources	EUR1	0.812	0.889	0.880	0.727	Yes
	EUR2			0.884		
	EUR3			0.793		
Savings of Money Paid to Middlemen	SMP1	0.837	0.902	0.858	0.754	Yes
	SMP2			0.887		
	SMP3			0.862		
Simplification and Faster Execution of Processes	SFE1	0.822	0.894	0.838	0.736	Yes
	SFE2			0.864		
	SFE3			0.873		
Time and Efforts Savings	TES1	0.847	0.897	0.797	0.686	Yes
	TES2			0.872		
	TES3			0.810		
	TES4			0.833		

6.4.6 Evaluation of Structural Model for 'Cost-effectiveness'

In the previous section, an evaluation of the measurement model for 'Cost-effectiveness' by collaborative e-governance is presented. The internal consistency of the constructs through reliability checks and accuracy through the validity checks of the constructs is established. Similarly, convergent validity is also computed and it is found that there is no issue of any discriminant validity.

The next step is to validate and establish a structural model, i.e., to validate how the variables are related to each other. Assessment of the structural model helps in determining the model's capability to predict one or more target constructs. It has been done through a. Collinearity assessment, b. Path coefficients, c. Coefficients of determination (R^2 value), d. Effect size (f^2 value) and e. Blindfolding and Predictive relevance (Q^2 value).

Collinearity Assessment

Collinearity is assessed by using the Variance Inflation Factor (VIF). The threshold value for VIF is <=5. VIF value for the constructs of 'Cost-effectiveness' is shown in Table 6.22. It is found that no colinearity problem exists in the structural model of 'Cost-effectiveness' by collaborative e-governance.

Table 6.22: VIF for 'Cost-effectiveness'

	VIF Values	VIF (Criteria <5)	Result
Efficient Utilization of Resources	1.000		Fulfilled
Savings of Money Paid to Middlemen	1.000		Fulfilled
Simplification and Faster Execution of Processes	1.000		Fulfilled
Time and Efforts Savings	1.000		Fulfilled

Path Coefficients

Path-coefficient represents the hypothesized relationship or the strength of the relationship. Path coefficient close to +1 indicates a strong positive relationship. The value of path coefficients for the constructs of 'Value-creation' by collaborative e-governance is shown in Table 6.23.

t- Statistic

When an empirical t-value is larger than the critical value, we conclude that the coefficient is statistically significant at a certain error probability. It can be seen in Table 6.23 that the t-values for the construct of 'Cost-effectiveness' by collaborative e-governance are as per the recommended threshold of >1.96 for the two-tailed test at a significant level of 5%.

Table 6.23: t-Statistic and Path-coefficients of 'Cost-effectiveness'

	t-Value Criteria (>1.96)	Result	Path Coefficient Criteria (0-1)	Result
Cost-effectiveness -> Efficient Utilization of Resources	47.910	Fulfilled	0.878	Fulfilled
Cost-effectiveness -> Savings of Money Paid to Middlemen	38.005	Fulfilled	0.877	Fulfilled
Cost-effectiveness -> Simplification and Faster Execution of Processes	53.931	Fulfilled	0.887	Fulfilled
Cost-effectiveness -> Time and Efforts Savings	30.556	Fulfilled	0.852	Fulfilled

Links to path coefficients are shown in Figure 6.3. It can be seen that all values are greater than 0 and close to 1. It means that the relationship of all the constructs of 'Cost-effectiveness' by collaborative e-governance is strong.
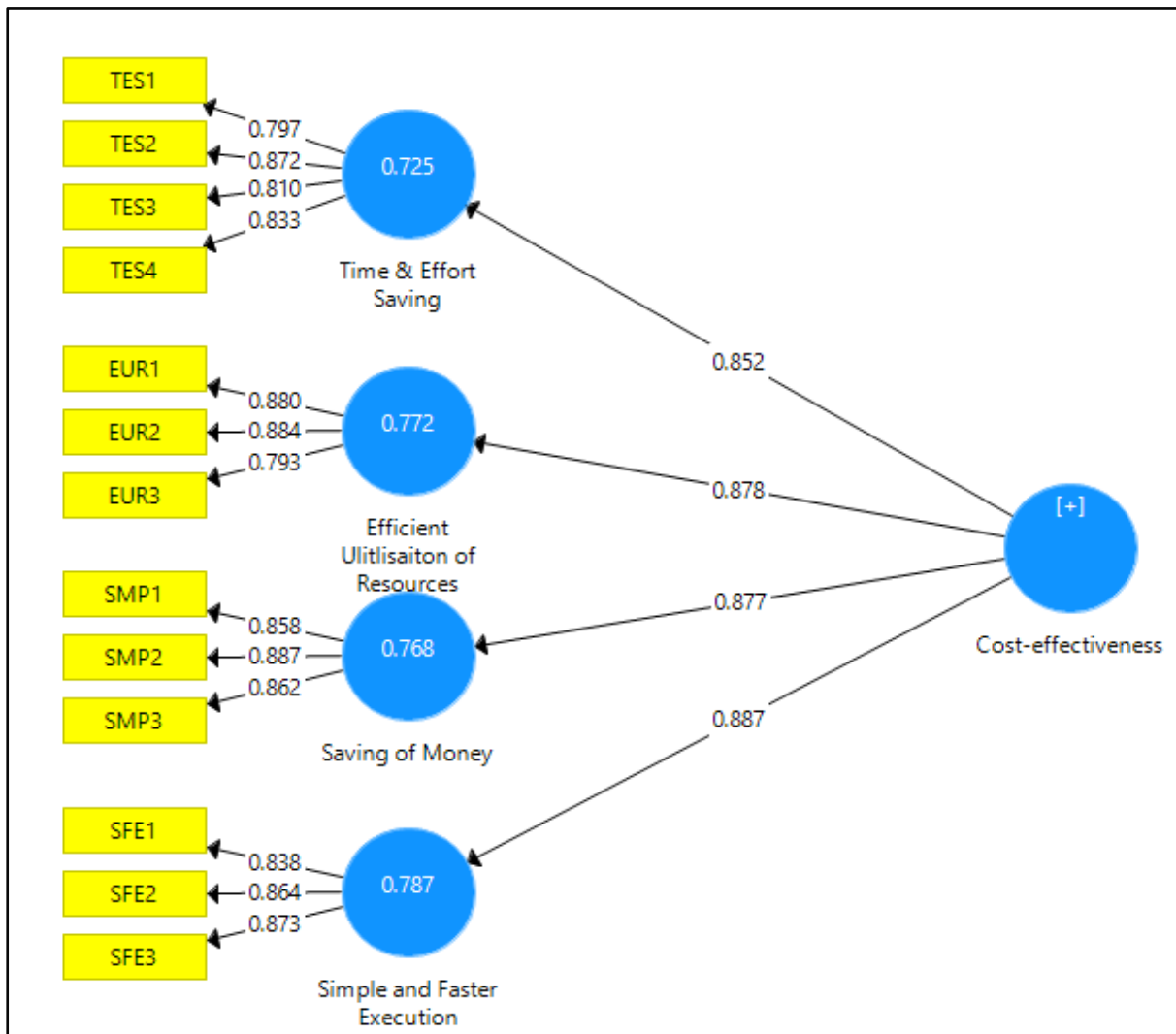
Figure 6.3: Path-coefficients for 'Cost-effectiveness'

Pictorial representations of the outcome of bootstrapping process for 'Cost-effectiveness' by collaborative e-governance are presented in Figure 6.4. Bootstrapping process is the standard practice in path modelling, which shows the t statistic. It can be seen that all the t-values for the path coefficients are higher than the critical value of 1.96 taken at a significant level of 95%.
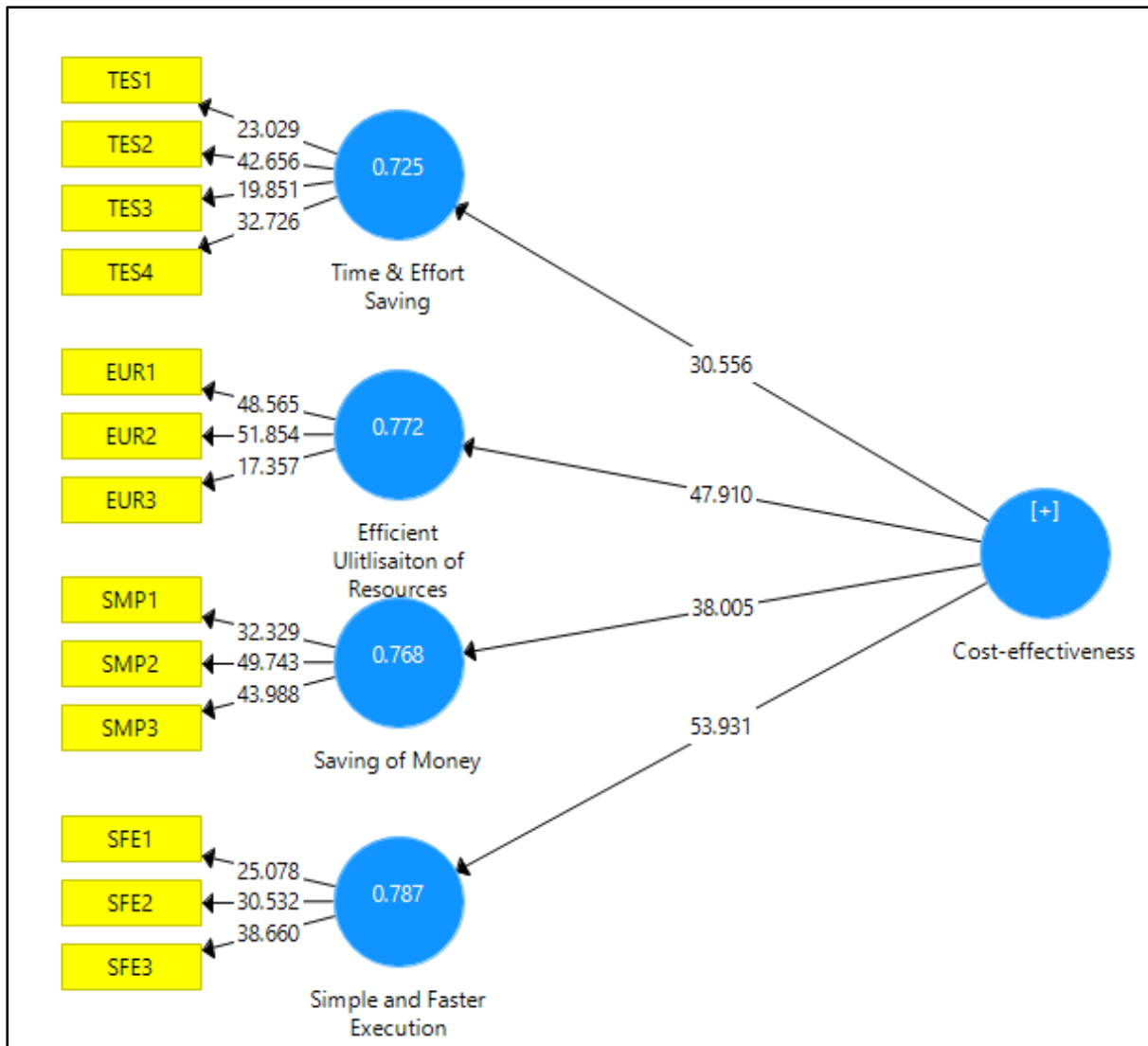
Figure 6.4: Bootstrapping of 'Cost-effectiveness'

Determination of Coefficient (R² Value)

The R^2 value range from 0 to 1. In the range, a higher level indicates higher levels of predicting accuracy. Table 6.24 shows the R^2 and R^2 adjusted values for 'Cost-effectiveness' by collaborative e-governance. The R^2 value is within the range of 0-1 which shows that predicting accuracy is substantial.

Table 6.24: R^2 for 'Cost-effectiveness'

	R^2	R^2 Adjusted	Criteria (0.67=substantial, 0.33 = moderate, 0.19 = weak)	Result
Efficient Utilization of Resources	0.772	0.770		Substantial
Savings of Money Paid to Middlemen	0.768	0.767		Substantial
Simplification and Faster Execution of Processes	0.789	0.786		Substantial
Time and Efforts Savings	0.725	0.724		Substantial

Effect Size (f^2 Value)

Table 6.25 shows the value of effect size (f^2). It can be seen that all values of the constructs represent a large effect size on 'Cost-effectiveness' by collaborative e-governance.

Table 6.25: Effect Size (f^2) of 'Cost-effectiveness'

	Effect size (f^2)	Criteria (0.35: large, 0.15: medium, 0.02: small)	Result
Efficient Utilization of Resources	3.377		Large
Savings of Money Paid to Middlemen	3.317		Large
Simplification and Faster Execution of Processes	3.694		Large
Time and Efforts Savings	2.640		Large

Blindfolding and Predictive Relevance (Q^2 Value)

The model's predictive power or predictive relevance is examined by Stone-Geisser's, Q^2 value. Table 6.26 shows the Q^2 values of all the constructs of 'Cost-effectiveness' which are greater than 0 indicating that the model has predictive relevance.

Table 6.26: Predictive Relevance (Q^2) for 'Cost-effectiveness'

	SSO	SSE	Q^2 (=1- SSE/SSO)	Criteria (Q^2>0)	Result
Efficient Utilization of Resources	600.000	266.280	0.556		Fulfilled
Savings of Money Paid to Middlemen	600.000	256.675	0.572		Fulfilled
Simplification and Faster Execution of Processes	600.000	257.673	0.571		Fulfilled
Time and Efforts Savings	800.000	409.642	0.488		Fulfilled

6.4.7 Result of Hypotheses for 'Cost-effectiveness'

Table 6.27 summarizes the hypothesis test results for 'Cost-effectiveness' by collaborative e-governance which were formulated in chapter four. Four alternate Hypotheses, HA10, HA11, HA12 and HA13, were formulated. To test the hypotheses, we have used the value of the key statistics for the assessment of collinearity (VIF), path coefficients, t-statistic, determination of coefficients (R^2), effect size (f^2) and predictive relevance (Q^2) as recommended by the experts. All the laid down criteria for statistical assessment for structural modelling are met and stand fulfilled.

All the hypothesized paths from 'Cost-effectiveness' (CEEG) by collaborative e-governance to its constructs, i.e., 'Time and Efforts Savings' (CETE), 'Efficient Utilization of Resources' (CEEU), 'Savings of Money Paid to Middlemen' (CESM) and 'Simple and Faster Execution of Processes' (CESF) are found to be significant. Hence, all the four hypotheses for the macro variable CEEG have been supported and may be accepted.

Table 6.27: Results of Hypotheses for 'Cost-effectiveness'

Alternate Hypothesis	The Structural Relationship	Collinearity (VIF)	t-Statistic	Path-Coefficients	Determination of Coefficient (R^2)	Effect Size (f^2)	Predictive Relevance (Q^2)	Result of Hypotheses
		Criteria (<5)	Criteria (>1.96)	Criteria (0-1)	Criteria (0.67: substantial, 0.33 : moderate, 0.19 : weak)	Criteria (0.35:large, 0.15:medium, 0.02: small)	Criteria (>0)	
HA10	CETE ← CEEG	1.000	30.556	0.852	0.725	2.640	0.488	Supported
HA11	CEEU ← CEEG	1.000	47.910	0.878	0.772	3.377	0.556	Supported
HA12	CESM ← CEEG	1.000	38.005	0.877	0.768	3.317	0.572	Supported
HA13	CESF ← CEEG	1.000	53.931	0.887	0.789	3.694	0.571	Supported

HA10: 'Time and Efforts Savings' is a significant element of 'Cost-effectiveness' by collaborative e-governance

HA11: 'Efficient Utilisation of Resources' is a significant element of 'Cost-effectiveness' by collaborative e-governance

HA12: 'Savings of Money Paid to Middlemen' is a significant element of 'Cost-effectiveness' by collaborative e-governance

HA13: 'Simplification and Faster Execution of Processes' is a significant element of 'Cost-effectiveness' by collaborative e-governance

Evaluation of the measurement model and structural model for two of the macro variables i.e., 'Value-creation' and 'Cost-effectiveness' by collaborative e-governance for the outcome variable 'Collaborative e-governance performance' has been presented in the previous section. The recommended threshold values and laid down criteria for testing the model have been fulfilled and established. Now, the model assessment in terms of the measurement model and structural model for the third macro variable 'Trust-development' by collaborative e-governance is presented below.

6.4.8 Evaluation of Measurement Model for 'Trust-development'

In this section evaluation of the measurement model comprising reliability and validity checks of 'Trust-development' by collaborative e-governance is presented.

Construct Reliability and Validity

The reliability of constructs is measured by computing the value of Cronbach's Alpha and CR along with Rho which comes to be in between the Alpha and CR values. Table 6.28 presents the construct reliability values for 'Trust-development' by collaborative e-governance. All values are found to be within the recommended threshold.

Table 6.28: Measurement Model Evaluation (Internal Consistency)
for 'Trust-development'

	Cronbach's Alpha	Rho_A	Composite Reliability (CR)	Construct Reliability Result
Customized Services Response	0.804	0.812	0.884	Established
Ease of Use of Services	0.864	0.870	0.908	Established
Reliability of Services	0.876	0.877	0.915	Established
Security and Privacy	0.881	0.884	0.918	Established
Usefulness of Services	0.835	0.842	0.890	Established

Convergent Validity

The value of Factor Loadings (FLs) and Average Variance Extracted (AVE) are computed to measure convergent validity. These values should be greater than 0.50. Table 6.29 and Table 6.30 represent these values for all the constructs of 'Trust-development' by collaborative e-governance which are found to be within the recommended threshold.

Table. 6.29: Convergent Validity for 'Trust-development'

Constructs	Factor Loadings	Criteria >0.708	Result	AVE	Criteria >0.5	Result
Customized Services Response				0.718		Fulfilled
CSR1	0.826		Fulfilled			
CSR2	0.840		Fulfilled			
CSR3	0.876		Fulfilled			
Ease of Use of Services				0.711		Fulfilled
EUS1	0.886		Fulfilled			
EUS2	0.855		Fulfilled			
EUS3	0.851		Fulfilled			
EUS4	0.779					
Reliability of Services				0.728		Fulfilled
RES1	0.822		Fulfilled			
RES2	0.885		Fulfilled			
RES3	0.854		Fulfilled			
RES4	0.852		Fulfilled			
Security and Privacy				0.738		Fulfilled
SPD1	0.861		Fulfilled			
SPD2	0.855		Fulfilled			
SPD3	0.831		Fulfilled			
SPD4	0.888		Fulfilled			
Usefulness of Services				0.669		Fulfilled
UES1	0.849		Fulfilled			
UES2	0.852		Fulfilled			
UES3	0.778		Fulfilled			
UES4	0.790		Fulfilled			

Discriminant Validity

To establish Discriminant Validity (DV), the criterion of Fornell-Larcker, cross-loadings and Heterotrait-Monotrait (HTMT) are required to be met. As per the Fornell-Larcker criterion, the AVE of a latent variable should be higher than the squared correlations between the latent variable of other variables (Fornell and Larker, 1981; Chin, 1998; Chin, 2010). Table 6.30 presents values of DV of all the constructs of 'Trust-development' by collaborative e-governance which are the square root of the value of AVE and are found to be greater than 0.50.

Table 6.30: Measurement Model Evaluation (Convergent and Discriminant Validity) for 'Trust-development'

	Average Variance Extracted (AVE)	Criteria (>0.50)	Convergent Validity Result	Fornell-Larcker Citerion (SQRT AVE)	Discriminant Validity Result
Customized Services Response	0.718		Established	0.848	Established
Ease of Use of Services	0.711		Established	0.843	Established
Reliability of Services	0.728		Established	0.854	Established
Security and Privacy	0.738		Established	0.859	Established
Usefulness of Services	0.669		Established	0.818	Established

Cross Loadings

The cross-loadings value of the indicators for the associated construct should be greater than all of its loadings on other constructs. Table 6.31 presents the cross-loadings value for the construct of 'Trust-development' by collaborative e-governance.

Table.6.31: Cross-loadings of 'Trust-development'

	Customized Services Response (TDCR)	Ease of Use of Services (TDEU)	Reliability of Services (TDRS)	Security and Privacy (TDSP)	Usefulness of Services (TDUE)
CSR1	0.826	0.604	0.579	0.531	0.651
CSR2	0.840	0.582	0.522	0.521	0.589
CSR3	0.876	0.724	0.686	0.684	0.644
EUS1	0.713	0.886	0.747	0.693	0.682
EUS2	0.554	0.855	0.729	0.691	0.592
EUS3	0.661	0.851	0.729	0.672	0.650
EUS4	0.618	0.779	0.567	0.575	0.516
RES1	0.585	0.669	0.822	0.698	0.624
RES2	0.633	0.736	0.885	0.719	0.706
RES3	0.526	0.683	0.854	0.740	0.651
RES4	0.669	0.729	0.852	0.698	0.657
SPD1	0.590	0.683	0.787	0.861	0.725
SPD2	0.591	0.624	0.684	0.855	0.613
SPD3	0.568	0.653	0.609	0.831	0.549
SPD4	0.617	0.723	0.777	0.888	0.639
UES1	0.657	0.645	0.692	0.660	0.849
UES2	0.597	0.669	0.695	0.674	0.852
UES3	0.597	0.511	0.499	0.481	0.778
UES4	0.576	0.537	0.622	0.580	0.790

Heterotrait-Monotrait Ratio (HTMT)

The ratio of HTMT is expected to be lower than 1. However, the threshold is set as 0.90 at a 95% confident interval (Henseler et al., 2015). To examine the HTMT ratio, it is tested whether the HTMT values are significantly different from 1. Table 6.32 shows the value of HTMT for 'Trust-development' by collaborative e-governance. It is found that the 'Reliability of Services' and 'Security and Privacy' have values of 0.94 which is slightly higher than 0.9. However, their value is lower than 1 and is, therefore, in the acceptance range.

Table 6.32: Heterotrait-Monotrait Ratio (HTMT) for 'Trust-development'

	Customized Services Response	Ease of Use of Services	Reliability of Services	Security and Privacy	Usefulness of Services
Customized Services Response					
Ease of Use of Services	0.90				
Reliability of Services	0.83	*0.94*			
Security and Privacy	0.81	0.89	*0.94*		
Usefulness of Services	0.90	0.84	0.89	0.85	

All recommended statistical measures for the validation of the measurement model of 'Trust-development' by collaborative e-governance have been presented above. The total result summary for the measurement model in a summarized form is presented below in Table 6.33.

Table 6.33: Result Summary for Measurement Models of 'Trust-development'

Latent Variables	Indicators	Internal Consistency Reliability		Convergent Validity		Discriminant Validity (HTMT confidence level doesn't include 1)
		Cronbach's Alpha	Composite Reliability	Factor Loadings	AVE	
Customized Services Response	CSR1	0.804	0.884	0.826	0.718	Yes
	CSR2			0.840		
	CSR3			0.876		
Ease of Use of Services	EUS1	0.864	0.908	0.886	0.711	Yes
	EUS2			0.855		
	EUS3			0.851		
	EUS4			0.779		
	RES1	0.876	0.915	0.822	0.728	Yes

Reliability of Services	RES2			0.885		
	RES3			0.854		
	RES4			0.852		
Security and Privacy	SPD1	0.881	0.918	0.861	0.738	Yes
	SPD2			0.855		
	SPD3			0.831		
	SPD4			0.888		
Usefulness of Services	UES1	0.835	0.890	0.849	0.669	Yes
	UES2			0.852		
	UES3			0.778		
	UES4			0.790		

6.4.9 Evaluation of Structural Model for 'Trust-development'

In the previous section, an evaluation of the measurement model is presented for 'Trust-development' by collaborative e-governance. Assessment of the structural model helps in determining the model's capability to predict one or more target constructs. It has been done through a. Collinearity assessment, b. Path coefficients, c. Coefficients of determination (R^2 value), d. Effect size (f^2 value) and e. Blindfolding and Predictive relevance (Q^2 value).

Collinearity Assessment

Collinearity is assessed by using the Variance Inflation Factor (VIF). The threshold value for VIF <=5. Table 6.34 presents VIF values of 'Trust-development' by collaborative e-governance which are found to be within the recommended threshold.

Table 6.34: VIF for 'Trust-development'

	VIF Criteria (<5)	Result
Customized Services Response	1	Fulfilled
Ease of Use of Services	1	Fulfilled
Reliability of Services	1	Fulfilled
Security and Privacy	1	Fulfilled
Usefulness of Services	1	Fulfilled

Path Coefficients

It represents the hypothesized relationship or the strength of the relationship. Path-coefficient close to +1 indicates a strong positive relationship. The value of path-

coefficients for the 'Trust-development' by collaborative e-governance is presented in Table 6.35.

t- Statistic

Commonly used critical values for the two-tailed test are 1.65 at a significant level of 10% and 1.96 at a significant level of 5%. Table 6.35 presents the t-values for the construct of 'Trust-development' by collaborative e-governance and are found within the recommended threshold at a 5% significance level.

Table 6.35: t-Statistic and Path-coefficients of 'Trust-development'

	t-Value Criteria (>1.96)	Result	Path-coefficients Criteria (0-1)	Result
Trust-development -> Ease of Use of Services	61.994	Fulfilled	0.914	Fulfilled
Trust-development -> Reliability of Services	93.661	Fulfilled	0.931	Fulfilled
Trust-development -> Security and Privacy	66.225	Fulfilled	0.909	Fulfilled
Trust-development -> Usefulness of Services	45.828	fulfilled	0.883	Fulfilled
Trust-development -> Customized Services Response	36.502	fulfilled	0.850	Fulfilled

Links to path coefficients are shown in Figure 6.5. It can be seen that all values are greater than 0 and near to 1. It means that the relationship of all the constructs of 'Trust-development' by collaborative e-governance is strong.
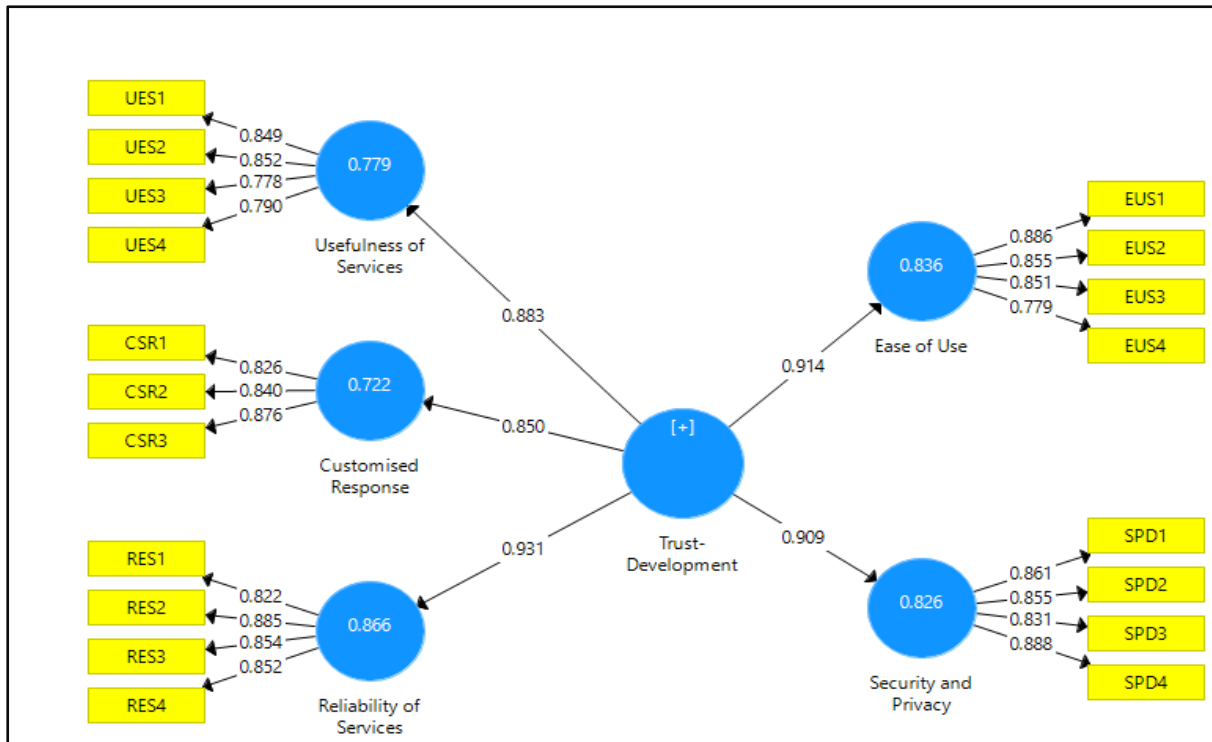
Figure 6.5: Path-coefficients of 'Trust-development'

A pictorial representation of the outcome of bootstrapping process for 'Trust-development' of collaborative e-governance is presented in Figure 6.6. All the values for the path coefficients are found to be higher than the critical value of 1.96 taken at a significant level of 95%.
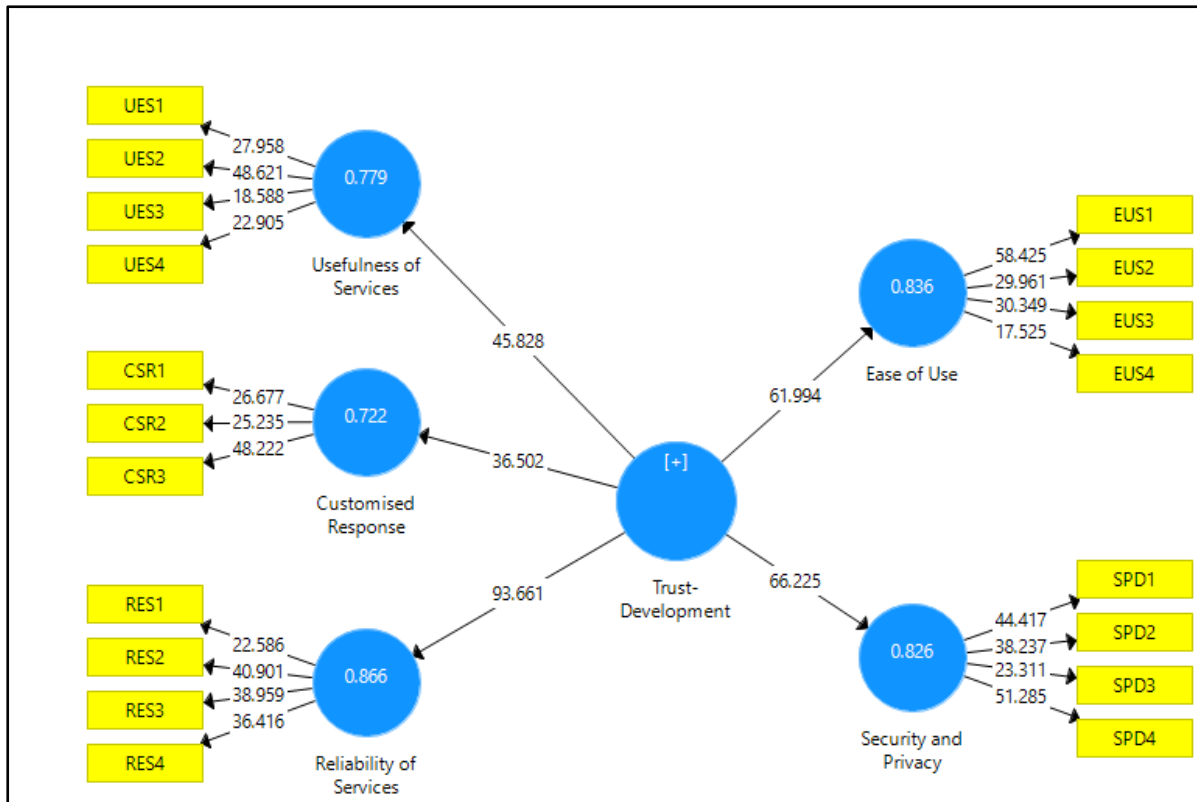
Figure 6.6: Bootstrapping of 'Trust-development'

Coefficient of Determination (R² Value)

The R^2 value ranges from 0 to 1. In the range, a higher level indicates higher levels of predicting accuracy. Table 6.36 shows the R^2 and R^2 adjusted value for 'Trust-development' by collaborative e-governance. The R^2 value is within the recommended range and indicates predicting accuracy is substantial in this case.

Table 6.36: R^2 of 'Trust-development'

	R^2	R^2 Adjusted	Criteria (0.67=substantial, 0.33= moderate, 0.19= weak)	Result
Customized Services Response	0.722	0.720		Substantial
Ease of Use of Services	0.838	0.835		Substantial
Reliability of Services	0.866	0.865		Substantial
Security and Privacy	0.826	0.826		Substantial
Usefulness of Services	0.779	0.778		Substantial

Effect Size (f² Value)

The value of f^2 of the latent variable is interpreted as 'small', 'medium' and 'large', if it is 0.02, 0.15 and 0.35. Table 6.37 shows the value of effect size (f^2) indicating all

constructs represent a large effect size on 'Trust-development' by collaborative e-governance.

Table 6.37: Effect size (f^2) of 'Trust-development'

	Effect Size (f^2)	Criteria (0.35: large, 0.15: medium, 0.02: small)	Result
Customized Services Response	*2.593*		*Large*
Ease of Use of Services	5.092		Large
Reliability of Services	6.471		Large
Security and Privacy	4.762		Large
Usefulness of Services	3.523		Large

Blindfolding and Predictive Relevance (Q^2 Value)

Stone-Geisser's, Q^2 value is to be examined as a measurable indicator of the model's predictive relevance. Table 6.38 shows the Q^2 values of all the constructs of 'Trust-development' by collaborative e-governance.

Table 6.38: Predictive Relevance (Q^2) for 'Trust-development'

	SSO	SSE	Q^2 (=1-SSE/SSO) Criteria ($Q^2>0$)	Result
Customized Services Response	600.000	294.683	0.509	Fulfilled
Ease of Use of Services	800.000	331.137	0.586	Fulfilled
Reliability of Services	800.000	300.143	0.625	Fulfilled
Security and Privacy	800.000	318.421	0.602	Fulfilled
Usefulness of Services	800.000	389.134	0.514	Fulfilled

6.4.10 Result of Hypotheses for 'Trust-development'

Table 6.39 summarizes the hypothesis test results for 'Trust-development' by collaborative e-governance. Five alternate hypotheses, HA14, HA15, HA16, HA17 and HA18 were formulated. All the hypothesized paths from 'Trust-development' (TDEG) to its constructs, i.e., 'Usefulness of Services' (TDUS), 'Security and Privacy' (TDSP), 'Reliability of Services' (TDRL), 'Ease of Use of Services' (TDEU) and 'Customized Services Response' (TDCR) are found to be significant and supported statistically. Hence all the five hypotheses for the main variable 'Trust-development' have remained testified and established. However, 'Usefulness of Services' (TDUS), followed by

'Reliability of Services' (TDRL) emerged as the key significant factors, whereas, 'Customized Services Response' (TDCR) emerged as the least significant factor. These signify that among all the constructs of 'Trust-development', 'Usefulness of Services' is most sought after by the citizens however, in availing of e-governance services they are not getting the customized response to their problems from the government agencies and therefore, government agencies are to look into it, to improve the response systems.

Table 6.39: Result of Hypotheses for 'Trust-development'

Alternate Hypothesis	The Structural Relationship	VIF (<5)	t-Value (>1.96)	Path-Coefficients (0-1)	R^2 (0.67=substantial, 0.33 = moderate, 0.19 = weak)	f^2 (0.35: large 0.15: medium, 0.02: small)	Q^2 (Q^2>0)	Result of Hypothesis
HA14	TDUS ← TDEG	1	45.828	0.883	0.779	3.523	0.514	Supported
HA15	TDSP ← TDEG	1	66.225	0.909	0.826	4.762	0.602	Supported
HA16	TDRL ← TDEG	1	93.661	0.931	0.866	6.471	0.625	Supported
HA17	TDEU ← TDEG	1	61.994	0.914	0.826	5.092	0.586	Supported
HA18	TDCR ← TDEG	1	36.502	0.850	0.722	*2.593*	0.509	Supported

HA14:'Usefulness of Services' is a significant element of 'Trust-development' by collaborative e-governance

HA15:'Security and Privacy' is a significant element of 'Trust-development' by collaborative e-governance

HA16:'Reliability of Services' is a significant element of 'Trust-development' by collaborative e-governance

HA17:'Ease of Use of Services' is a significant element of 'Trust-development' by collaborative e-governance

HA18:'Customized Services Response' is a significant element of 'Trust-development' by collaborative e-governance

6.5　Correlation Analysis

The correlation matrix for all micro variables is presented in Table 6.40 except 'Participation' (VCPT). This variable was found insignificant and dropped due to lesser factor loadings of 0.517 from the 'Value-creation'. The remaining 14X14 matrix shows that all the variables have a high positive correlation with each other. A positive correlation is considered as good to interpret that the statement was simple, understandable and relevant to the respondents. Due to positive correlations among the variables, these are retained in the conceptual model.

Table 6.40: Correlation Matrix of All Latent Variables

	TDCR	VCDM	TDEU	CEEU	VCIT	TDRL	VCRP	CESM	TDSP	VCSD	CESF	CETE	VCTP	TDUS
TDCR	1.000	0.589	0.756	0.522	0.629	0.708	0.615	0.500	0.689	0.545	0.612	0.537	0.597	0.742
VCDM	0.589	1.000	0.631	0.573	0.426	0.677	0.754	0.588	0.584	0.791	0.611	0.603	0.720	0.638
TDEU	0.756	0.631	1.000	0.576	0.589	0.826	0.643	0.562	0.782	0.566	0.684	0.618	0.578	0.727
CEEU	0.522	0.573	0.576	1.000	0.389	0.614	0.610	0.706	0.564	0.497	0.713	0.668	0.494	0.579
VCIT	0.629	0.426	0.589	0.389	1.000	0.590	0.602	0.344	0.605	0.519	0.413	0.529	0.622	0.565
TDRL	0.708	0.677	0.826	0.614	0.590	1.000	0.688	0.672	0.836	0.545	0.742	0.673	0.598	0.773
VCRP	0.615	0.754	0.643	0.610	0.602	0.688	1.000	0.585	0.604	0.714	0.589	0.578	0.750	0.652
CESM	0.500	0.588	0.562	0.706	0.344	0.672	0.585	1.000	0.626	0.476	0.756	0.617	0.467	0.617
TDSP	0.689	0.584	0.782	0.564	0.605	0.836	0.604	0.626	1.000	0.502	0.666	0.618	0.562	0.738
VCSD	0.545	0.791	0.566	0.497	0.519	0.545	0.714	0.476	0.502	1.000	0.555	0.508	0.756	0.583
CESF	0.612	0.611	0.684	0.713	0.413	0.742	0.589	0.756	0.666	0.555	1.000	0.646	0.504	0.760
CETE	0.537	0.603	0.618	0.668	0.529	0.673	0.578	0.617	0.618	0.508	0.646	1.000	0.512	0.625
VCTP	0.597	0.720	0.578	0.494	0.622	0.598	0.750	0.467	0.562	0.756	0.504	0.512	1.000	0.583
TDUS	0.742	0.638	0.727	0.579	0.565	0.773	0.652	0.617	0.738	0.583	0.760	0.625	0.583	1.000

6.6   Validation of Final Model

In previous sections validation of Low Order Construct (LOC) of three macro variables, i.e., 'Value-creation' (VCEG), 'Cost-effectiveness' (CEEG) and 'Trust-development' (TDEG) by collaborative e-governance have been presented through the measurement and structural model. Now, High Order Construct (HOC) is required to be validated for the outcome variable, i.e., 'Collaborative e-governance performance' (CEGP). In the reflective-reflective model first, low order constructs and then high order constructs are required to be validated (Sarstedt et al., 2019). To validate the outcome variable, i.e., CEGP. Macro variables taken for the study under it, i.e., VCEG, CEEG and TDEG were treated as high order constructs. These variables shall now be treated as low order constructs. Statistical validation of CEGP through measurement and structural model is presented below.

6.6.1 Evaluation of Measurement Model of 'Collaborative e-governance performance'

In the preceding sections, the measurement model for assessing the reliability and validity of the constructs for all macro variables is presented. In this section evaluation of the measurement model of the outcome variable, i.e., 'Collaborative e-governance performance' is presented.

Construct Reliability and Validity

The construct reliability is analyzed in terms of the value of Cronbach's Alpha, CR and Rho. The value of Rho should be in between the value of Alpha and CR. Table 6.41 presents the relevant values and are found to be within the recommended threshold for 'Collaborative e-governance performance'.

Table 6.41: Measurement Model Evaluation (Reliability) for
'Collaborative e-governance performance'

	Cronbach's Alpha	Rho_A	Composite Reliability (CR)	Construct Reliability Result
Value-creation	0.886	0.913	0.915	Established
Cost-effectiveness	0.897	0.898	0.928	Established
Trust-development	0.940	0.941	0.954	Established

Convergent Validity

To measure convergent validity, the value of Factor Loadings (FLs) and Average Variance Extracted (AVE) is computed. Table 6.42 shows the values of FL and AVE and are found to be within the recommended threshold.

Discriminant Validity

To establish discriminant validity, the criterion of Fornell-Larcker, cross-loadings and Heterotrait-Monotrait (HTMT) are required to be established. As per the Fornell-Larcker criterion, the AVE of a latent variable should be higher than the squared correlations between the latent variable of other variables (Chin, 1998; Chin, 2010; Fornell and Larker, 1981). The discriminant validity (DV) should be the square root of the AVE value of the construct and it should be greater than 0.50. Table 6.42 shows the discriminant validity of the higher-order constructs and it is found that the value of DV of all the constructs is the square root of its AVE and are also greater than 0.50.

Table 6.42: Measurement Model Evaluation (Validity)
for 'Collaborative e-governance performance'

Constructs	Convergent Validity		Discriminant Validity Validity Result		Validity Result
	Factor Loadings (>0.708)	(AVE >0.50)	Fornell-Larcker Citerion (SQRT AVE)	HTMT (Confidence level doesn't include 1)	
Value-creation		0.650	0.806	Yes	Established
Decision-making and Control	0.845				
Interactivity	0.761				
Participation	*0.507*				
Responsiveness	0.891				
Service Delivery	0.865				
Transparency	0.898				
Cost-effectiveness		0.764	0.874	Yes	Established
Efficient Utilization of Resources	0.881				
Saving of Money	0.879				
Simple and Faster Execution	0.895				
Time & Effort Saving	0.839				
Trust-development		0.805	0.898	Yes	Established

Customized Response	0.863				
Ease of Use	0.911				
Reliability of Services	0.926				
Security and Privacy	0.902				
Usefulness of Services	0.887				
Collaborative e-governance performance		0.835	0.914	Yes	Established
Value-creation	0.898	0.650	0.806		
Cost-effectiveness	0.905	0.764	0.898		
Trust-development	0.939	0.805	0.914		

Cross Loadings

All items in a construct should load better in themselves compared to other items of the construct. Cross-loadings value of the indicators on the associated construct should be greater than all of its loadings on other constructs. Table 6.43 presents cross-loadings for the construct of 'Collaborative e-governance performance'.

Table 6.43: Cross-loadings for 'Collaborative e-governance performance'

	Cost-effectiveness	Trust-development	Value-creation
Efficient Utilization of Resources	0.881	0.637	0.588
Saving of Money Paid to Middlemen	0.879	0.665	0.559
Simple and Faster Execution of Processes	0.895	0.773	0.614
Time and Effort Savings	0.839	0.685	0.636
Customized Services Response	0.623	0.863	0.705
Ease of Use of Services	0.700	0.911	0.697
Reliability of Services	0.774	0.926	0.720
Security and Privacy	0.709	0.902	0.667
Usefulness of Services	0.741	0.887	0.705
Decision-making and Control	0.680	0.696	0.845
Interactivity	0.480	0.662	0.761
Participation	0.199	0.365	0.507
Responsiveness	0.676	0.714	0.891
Service Delivery	0.584	0.610	0.865
Transparency	0.566	0.650	0.898

Heterotrait-Monotrait Ratio (HTMT)

The ratio of HTMT is expected to be lower than 1. However, the threshold is set to 0.90 at a 95% confident interval (Henseler et al., 2015). Table 6.44 presents the value of HTMT. It can be seen that 'Reliability of Services' and 'Security and Privacy' have

a value of 0.94 which is slightly higher than 0.9. However, their value is lower than 1. Discriminant validity for 'Collaborative e-governance performance' stands established.

Table 6.44: Heterotrait-Monotrait Ratio (HTMT) for
'Collaborative e-governance performance'

	Cost-effectiveness	Trust-development	Value-creation
Cost-effectiveness			
Trust-development	*0.859*		
Value-creation	0.745	0.846	

All the recommended statistical measures for the measurement model of 'Collaborative e-governance performance' has been presented above. Evaluation of the structural model for the same is presented below.

6.6.2 Evaluation of Structural Model of 'Collaborative e-governance performance'

In the previous section, an evaluation of the measurement model of 'Collaborative e-governance performance' is presented. The next step is to validate and establish the structural model, i.e., to validate how the variables are related to each other. Assessment of the structural model helps in determining the model's capability to predict one or more target constructs and has been done through a. Collinearity assessment, b. Path coefficients, c. Coefficients of determination (R^2 value), d. Effect size (f^2 value) and e. Blindfolding and Predictive relevant (Q^2 value)

Collinearity Assessment

Collinearity is assessed by computing the value of the Variance Inflation Factor (VIF). The threshold value for VIF <=5. Table 6.45 reflects that no collinearity problem exists in the structural model of 'Collaborative e-governance performance'.

Table 6.45: VIF for 'Collaborative e-governance performance'

	VIF Criteria (<5)	Result
Value-creation	1	Fulfilled
Cost-effectiveness	1	Fulfilled
Trust-development	1	Fulfilled

Path Coefficients

Path-coefficient represents the hypothesized relationship or the strength of the relationship. Path-coefficient close to +1 indicates a strong positive relationship. The closer the estimated coefficients are to 0, the weaker the relationships. The value of path coefficients for the 'Collaborative e-governance performance' is shown in Table 6.46.

t-Statistic

Commonly used critical values for the two-tailed test are 1.65 (significant level 10%) and 1.96 (significant level 5%). It can be seen in Table 6.46 that the t-values for the construct of 'Collaborative e-governance performance' are within the recommended threshold.

Table 6.46: t-Statistic and Path-coefficients of 'Collaborative e-governance performance'

	t-Value Criteria (>1.96)	Result	Path-coefficients Criteria (0-1)	Result
Collaborative e-governance performance -> Value-creation	51.847	Fulfilled	0.897	Fulfilled
Collaborative e-governance performance -> Cost-effectiveness	58.380	Fulfilled	0.904	Fulfilled
Collaborative e-governance performance -> Trust-development	107.812	Fulfilled	0.939	Fulfilled

Links to path coefficients are shown in Figure 6.7. It can be seen that all values are greater than 0 and close to 1. It means that the relationship of all the constructs with 'Collaborative e-governance performance' is strong. However, it can also be seen that the factor loading value of 'Participation' is 0.507 which is insignificant as it is below the recommended threshold of 0.708 and hence it has been dropped for further evaluation. A revised model without the construct 'Participation' of 'Value-creation' for 'Collaborative e-governance performance' is given in Figure 6.8.
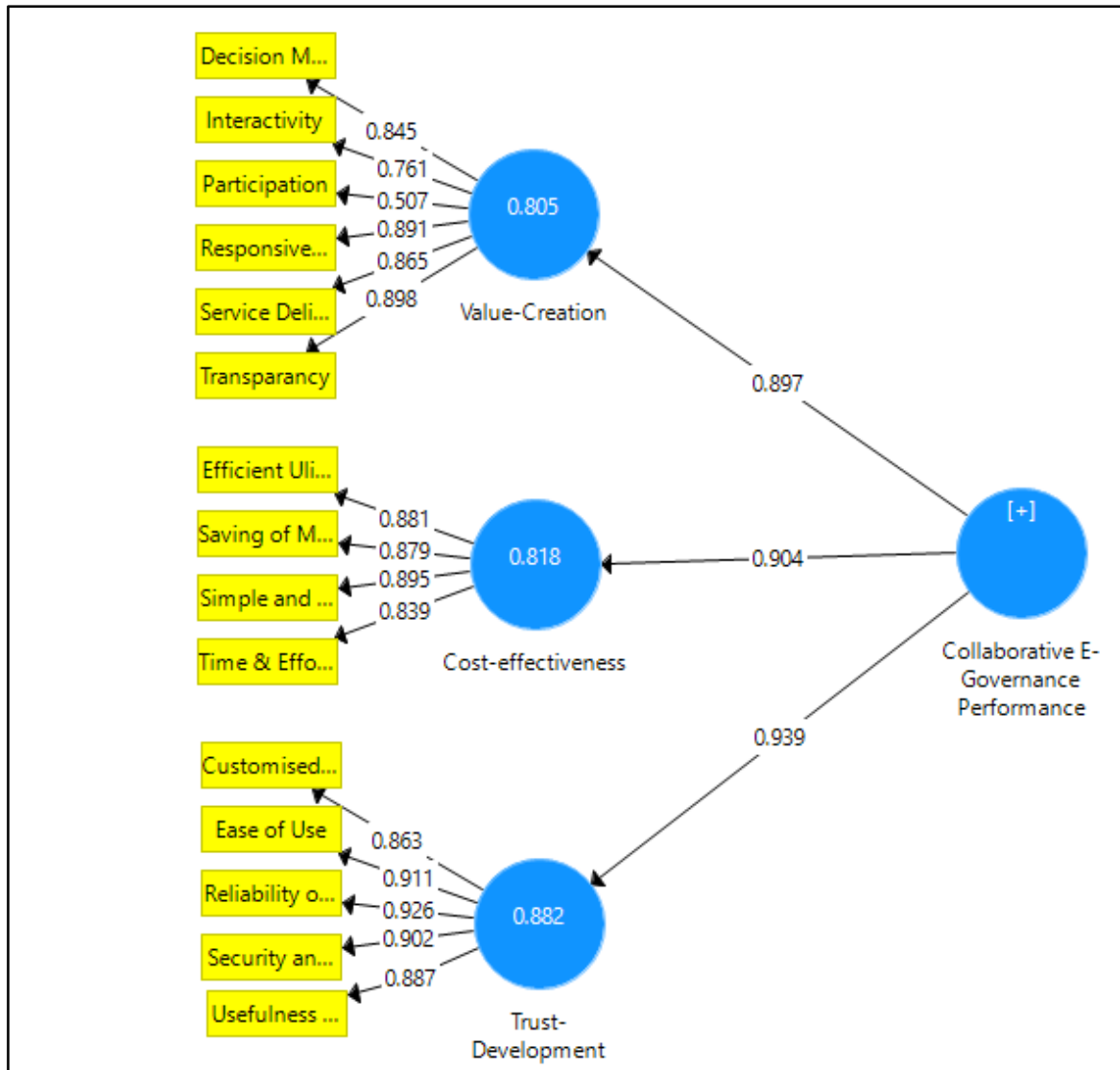
Figure 6.7: Path-coefficients of 'Collaborative e-governance performance'

Coefficient of Determination (R² Value)

According to Chin (1998), the value of R^2 as 0.67, 0.33 and 0.19 is considered substantial, moderate and weak. Table 6.47 shows the R^2 and R^2 adjusted values for 'Collaborative e-governance performance. The R^2 value is within the range of 0-1, which shows that predicting accuracy is substantial.

Table 6.47: R² of 'Collaborative e-governance performance'

	R²	R² Adjusted	Criteria (0.67=substantial, 0.33= moderate, 0.19= weak)	Result
Cost-effectiveness	0.818	0.817		Substantial
Trust-development	0.882	0.881		Substantial
Value-creation	0.805	0.804		Substantial
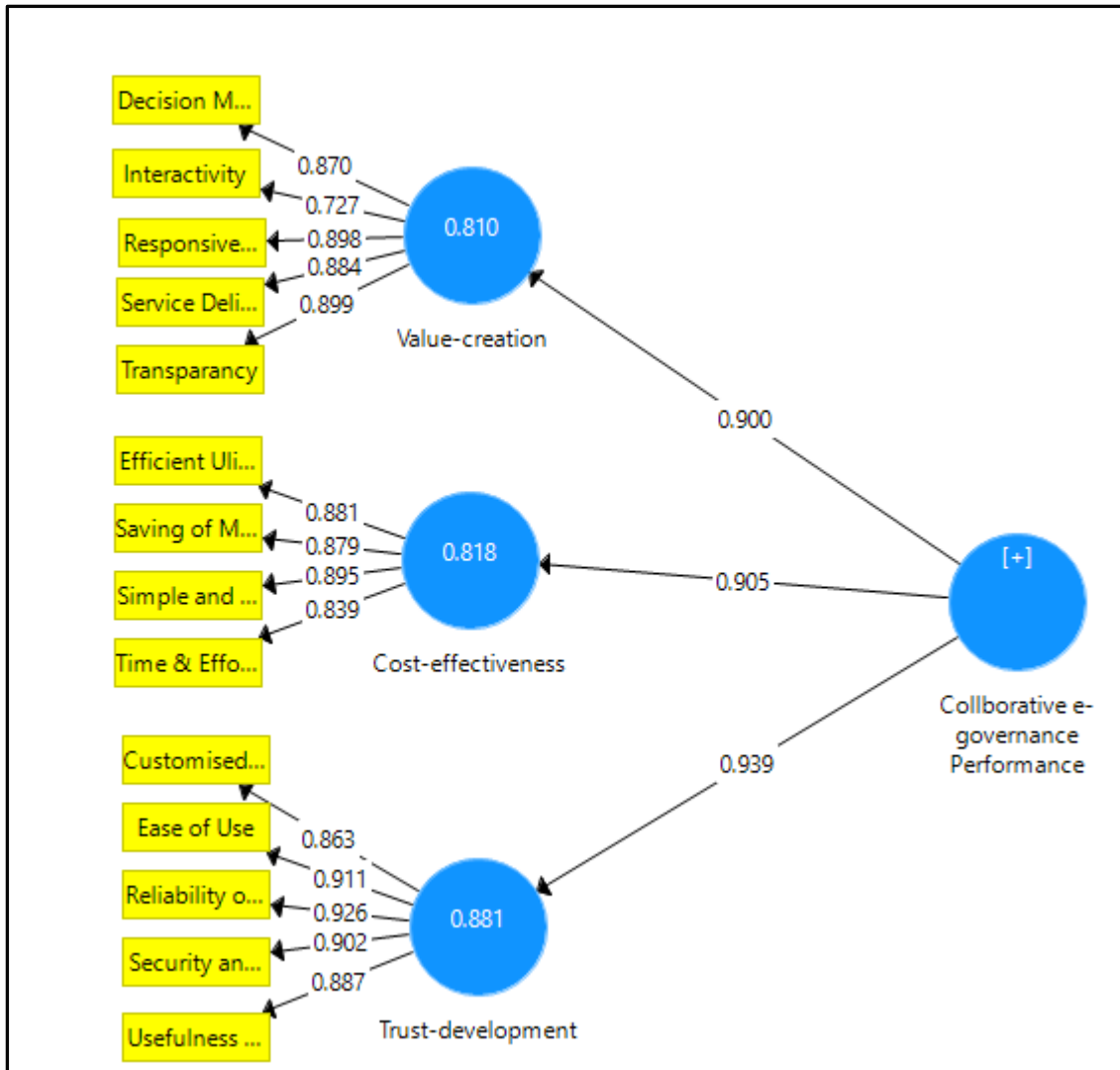
Figure 6.8: Revised path-coefficients of 'Collaborative e-governance performance'

Effect Size (f² Value)

The value of f² of the latent variable is interpreted as 'small', 'medium' and 'large' if it is 0.02, 0.15 and 0.35. Table 6.48 shows the value of effect size (f²). It can be seen that all values of the constructs represent a large effect size on 'Collaborative e-governance performance'.

Table 6.48: Effect Size (f²) of 'Collaborative e-governance performance'

	Effect Size (f²) (0.35: large, 0.15: medium, 0.02: small)	Result
Cost-effectiveness	4.482	Large
Trust-development	7.444	Large
Value-creation	4.127	Large

Blindfolding and Predictive Relevance (Q² Value)

Stone-Geisser's, Q^2 value is to be examined for the model's predictive power or predictive relevance. Table 6.49 shows the Q^2 values of all the constructs of 'Collaborative e-governance performance' which are greater than 0 indicating that the model has predictive relevance.

Table 6.49: Predictive Relevance (Q^2) for 'Collaborative e-governance performance'

	SSO		SSE	Q² (=1-SSE/SSO) Criteria (Q²>0)	Result
Cost-effectiveness	800.000		307.144	0.616	Fulfilled
Trust-development	1000.000		294.891	0.705	Fulfilled
Value-creation	1200.000		582.645	0.514	Fulfilled

6.6.3 Result of Hypotheses for 'Collaborative e-governance performance'

Table 6.50 summarizes the hypotheses test results for 'Collaborative e-governance performance'. Three alternate hypotheses, HA1, HA2, and HA3 were formulated. All the recommended threshold and laid down criteria for statistical assessment for structural modelling is met. All the hypothesized paths from 'Collaborative e-governance performance' (CEGP) to its constructs, i.e., 'Value-creation' (VCEG), 'Cost-effectiveness' (VCEG), and 'Trust-development' (TDEG) by collaborative e-governance are found to be significant and supported statistically. Hence all the three hypotheses for the outcome variable CEGP stand testified and established. These hypotheses, may, therefore, be accepted.

Table 6.50: Results of Hypotheses for 'Collaborative e-governance performance'

Alternate Hypothesis	The Structural Relationship	VIF (<5)	t-Value (>1.96)	Path-Coefficients (0-1)	R² (0.67: substantial, 0.33: moderate, 0.19: weak)	f² (0.02: small, 0.15: medium, 0.35: large)	Q² (>0)	Result of Hypothesis
HA1	CEEG← CEGP	1	58.380	0.904	0.818	4.482	0.616	Supported
HA2	TDEG← CEGP	1	107.812	0.939	0.882	7.444	0.705	Supported
HA3	VCEG← CEGP	1	51.847	0.897	0.805	4.127	0.514	Supported

HA1: 'Value-creation' is a significant constituent of 'Collaborative e-governance performance'.

HA2: 'Cost-effectiveness' is a significant constituent of 'Collaborative e-governance performance'

HA3: 'Trust-development' is a significant constituent of 'Collaborative e-governance performance'

6.6.4 Summary of Final Measurement Model

A summary of the final measurement model of 'Collaborative e-governance performance' with its macro variables and macro variables is presented in Table 6.51.

Table 6.51: Summary of 'Collaborative e-governance performance' (CEGP) - Final Measurement Model

Macro Variables	Micro variables	Statements	Construct Reliability	Convergent Validity		Discriminant Validity
			Cronbach's Alpha (>0.7)	Factor loadings (>0.708)	AVE (>0.5)	HTMT (<0.9) (Confidence level doesn't include 1)
Value-creation (VCEG)	Decision-making and Control (VCDM)	The government decision on my application has been taken favourably	0.896	0.812	0.708	yes
		Application status is displayed on the website		0.876		
		Service timelines for my work appropriately followed		0.888		
		Queries and complaints are resolved		0.782		
		The service website is well-structured and widely informative		0.843		
	Interactivity (VCIN)	Interactions via telephone, face-to-face, e-mail, etc. are provided	0.818	0.789	0.647	yes
		Call centres are there for live interactions		0.805		
		Campaigning is done for government programs/events		0.827		
		A live webcast is done for a better understanding		0.795		
	Participation (VCPT)	Citizen can participate in government meetings	0.912	0.915	0.851	yes
		Government invites citizens' opinions for decision making		0.943		
		Government accepts comments and valuable inputs		0.909		
	Responsiveness (VCRP)	Response in the form of text messages, receipts, token numbers, etc. are given	0.790	0.762	0.614	yes
		Queries and complaints are responded		0.851		
		Automatic responses to submission and emails are there		0.772		
		The website has a provision for citizens to request any help		0.746		
	Service Delivery (VCSD)	Relevant and up-to-date information is delivered	0.785	0.796	0.608	yes
		Full disclosure about processes and procedures is given		0.813		
		Content is delivered in multiple languages		0.733		

		The website is accessible through Common Services Centers		0.775		
	Transparency (VCTP)	Public policy, rules and regulations are available and displayed	0.806	0.849	0.633	yes
		The organization chart, contact details, duties and responsibilities are displayed		0.762		
		Application is trackable		0.782		
		Upcoming information is published		0.785		
Cost-effectiveness (CEEG)	Efficient Utilization of Resources (CEEU)	Online transaction saves paperwork and other resources	0.812	0.880	0.728	yes
		Minimization of duplication of efforts and resources		0.884		
		Online services are cheaper		0.793		
	Savings of Money Paid to Middlemen (CESM)	Online services enable the government availing services directly from the government	0.875	0.858	0.755	yes
		The role of an agent between the citizen and the government removed		0.887		
		Corruption is reduced by creating fear of exposure		0.862		
	Simplification and Faster Execution of Processes (CESF)	The service website is simple	0.886	0.838	0.737	yes
		Online services are simple compared to physical modes of availing services		0.864		
		Online services are faster		0.873		
	Time and Efforts Savings (CETE)	The inconvenience of travelling is reduced	0.854	0.797	0.686	yes
		Waiting in the queue for availing services is reduced		0.872		
		Only limited visits are required for service		0.810		
		Lesser efforts are required for service		0.833		
Trust-development (TDEG)	Usefulness of Services (TDES)	Useful information provided	0.835	0.849	0.711	yes
		Updated information provided is there		0.852		
		Answer to FAQs is given		0.778		
		Other useful links are available		0.790		
	Security and Privacy (TDSP)	Adequate data security features are available	0.881	0.861	0.738	yes
		The organization take full responsibility for any loss and breach		0.855		
		Personal information is not sharable		0.831		

		Citizens are confident about the technological advancement that make transactions safe		0.888		
	Reliability of Services (TDRL)	The website is fully functional and generates no error	0.876	0.822	0.728	yes
		Website is reliable in terms of accuracy of information and service delivery		0.885		
		Making an online payment is trustworthy		0.854		
		The citizen can rely upon the information to comply with		0.852		
	Ease of Use of Services (TDEU)	The website is easy to use and user-friendly	0.864	0.886	0.598	yes
		The website is easy to browse and navigate		0.855		
		The website supports multiple browsers		0.851		
		The website is menu-driven and with search engine		0.779		
	Customized Services Response (TDCR)	Relevant and accurate response for citizen query and complaint	0.804	0.826	0.717	yes
		Pre-listed options are available to submit the query		0.840		
		Response systems are comprehensive and beneficial		0.876		

6.6.5 Validated Structural Model for 'Collaborative e-governance performance'

The structural model of the proposed conceptual framework for 'Collaborative e-governance performance' which stands validated depicts the strong support for all the paths. The path coefficients as recommended by the experts are within the range of 0-1. Figure 6.9 shows the final structural model with path coefficients. It can be seen that all the values for the path coefficients are higher than the critical value of 1.96 taken at a significant level of 95%.
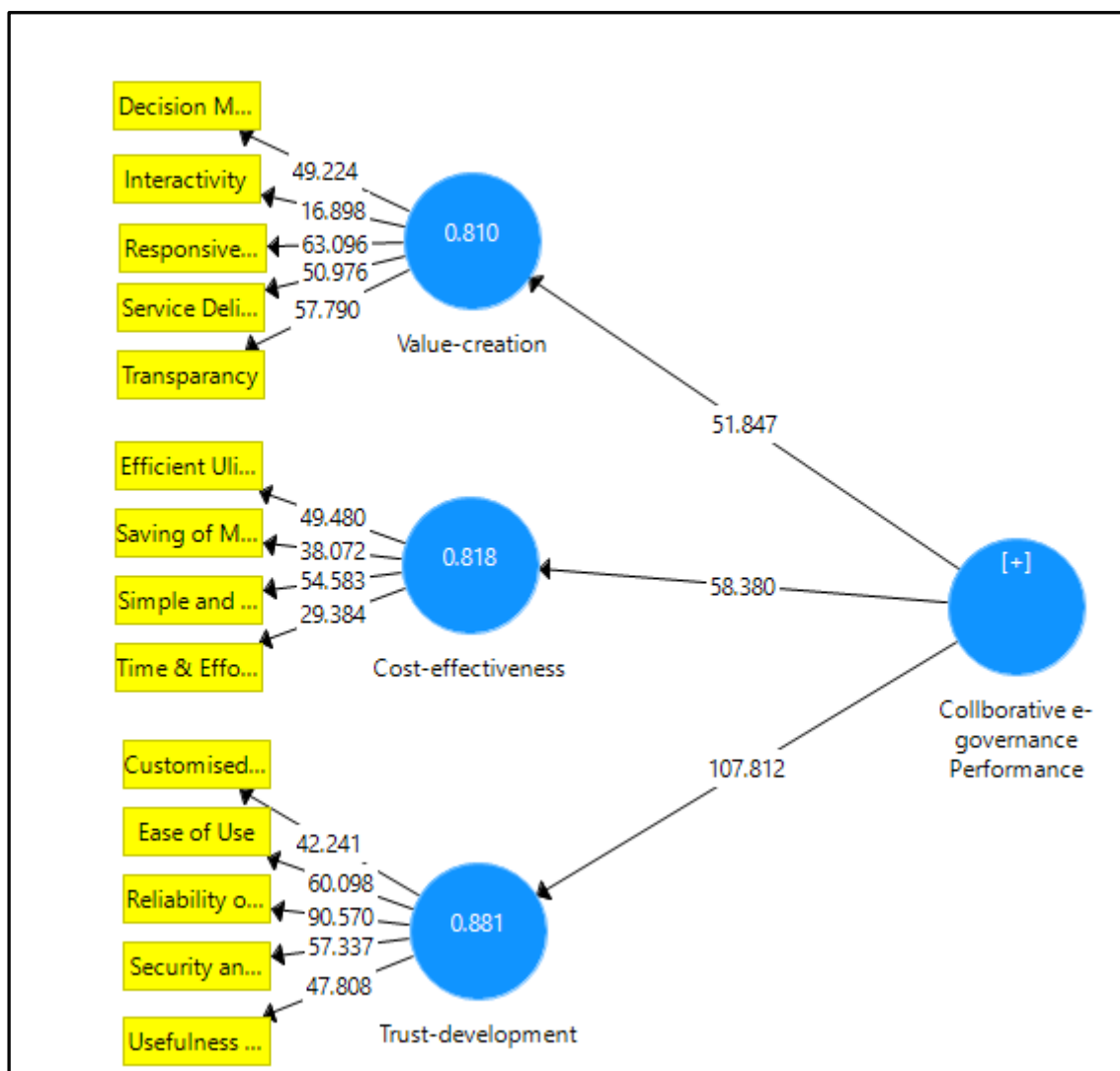
Figure: 6.9: Validated Structural Model for 'Collaborative e-governance performance'

All paths are found to be significant which has also got established by the t-statistic for the structural model obtained from bootstrapping process.

6.6.6 Summary of Hypotheses of Final Structural Model

Though the results of hypotheses of all latent variables are presented above. Tabulated below in Table 6.52 is the summary of the hypotheses test results of the final structural model of 'Collaborative e-governance performance'.

Table 6.52: Summary of the Hypotheses of Final Structural Model

Alternate Hypotheses	Structural Relationship	T-Values*	Critical Value	P-Values**	Critical Value	Statistically Significance?	Result of Hypotheses
HA1	CEGP -> CEEG	58.380	1.96	0.000	0.01	Yes	Supported
HA2	CEGP -> TDEG	107.812	1.96	0.000	0.01	Yes	Supported
HA3	CEGP -> VCEG	51.847	1.96	0.000	0.01	Yes	Supported
HA4	CEEG -> CEEU	47.910	1.96	0.000	0.01	Yes	Supported
HA5	CEEG -> CESF	53.931	1.96	0.000	0.01	Yes	Supported
HA6	CEEG -> CESM	38.005	1.96	0.000	0.01	Yes	Supported
HA7	CEEG -> CETE	30.556	1.96	0.000	0.01	Yes	Supported
HA8	TDEG -> TDCR	36.502	1.96	0.000	0.01	Yes	Supported
HA9	TDEG -> TDEU	61.994	1.96	0.000	0.01	Yes	Supported
HA10	TDEG -> TDRL	93.661	1.96	0.000	0.01	Yes	Supported
HA11	TDEG -> TDSP	66.225	1.96	0.000	0.01	Yes	Supported
HA12	TDEG -> TDUE	45.828	1.96	0.000	0.01	Yes	Supported
HA13	VCEG -> VCDM	41.255	1.96	0.000	0.01	Yes	Supported
HA14	VCEG -> VCIN	16.781	1.96	0.000	0.01	Yes	Supported
HA15	*VCEG -> VCPT*	'Participation' (VCPT) has been found insignificant. It has insufficient reliability and validity score					Not supported
HA16	VCEG -> VCRS	60.706	1.96	0.000	0.01	Yes	Supported
HA17	VCEG -> VCSD	47.872	1.96	0.000	0.01	Yes	Supported
HA18	VCEG -> VCTR	59.565	1.96	0.000	0.01	Yes	Supported

*Critical t-value for two-tailed test >1.96 (significant level = 5%) ; ** Critical p-value for two-tailed test <0.001 (significant level = 1%)*

6.7   Goodness of Fit Measures

The Goodness-Of-Fit (GOF) indices are measured to determine the fitness of the model. It shows the model performance obtained through measurement and structural models. A good-fitting model shows that it is reasonably consistent with the data and hence does not necessarily require re-specification. It is calculated by combining the coefficient of determination (R^2) with convergent validity (AVE) (Tenenhaus et al., 2005). GOF is obtained by calculating the value of Sqrt of AVE which is multiplied by the Value of R^2, i.e., ($\sqrt{}$(Communality (AVE)×R^2)). The value of GOF indices should be between 0 to 1. However, a cut off value of 0.36 is recommended by Akter et al., (2011). The GOF values obtained as shown in Table 6.53 are within the range of 0-1 and above cut off value of 0.36, which confirms the overall fitness of the model.

Table 6.53: Structural Model Fit Indices for 'Collaborative e-governance performance'

	AVE	R^2	GOF (0-1)	Result
'Cost-effectiveness' by collaborative e-governance	0.764	0.818	0.624	Model fit
'Trust-development' by collaborative e-governance	0.806	0.881	0.710	Model fit
'Value-creation' by collaborative e-governance	0.736	0.810	0.596	Model fit

Henseler et al. (2014) introduced standardized root means square residual (SRMR) as a GOF measure for PLS-SEM. SRMR facilitates measuring the average magnitude of the differences between observed correlation and predicted correlation. A value < 0.08 and of 0.10 are considered a good fit. SRMR values for GOF for the saturated and estimated model are found to be 0.77 and 0.088 respectively.

6.8   Findings of the Empirical Survey

Based on the validation of the conceptual research framework of 'Collaborative e-governance performance' through measurement and structural model. Following important findings have emerged.

➢ All the three macro variables, viz. 'Value-creation' (VCEG), 'Cost-effectiveness' (CEEG) and 'Trust-development' (TDEG) by collaborative e-governance considered for the study of outcome variable 'Collaborative e-governance performance' (CEGP) have been validated empirically.

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- There are fifteen micro variables constituted for three macro variables. Fourteen of them are validated through empirical analysis. One micro variable, i.e., 'Participation' (VCPT) has been found insignificant due to having lesser factor loading (0.507) from the recommended threshold and has not been assessed further.

- Five out of six formulated alternate hypotheses for 'Value-creation' by collaborative e-governance are found statistically supported. 'Responsiveness' (VCRP) followed by 'Transparency' (VCTP) emerged as the most significant factors. Citizen 'Participation' (VCPT) has emerged as the least significant factor indicating that citizens' participation in government organisations is to be given adequate focus for enhancing collaborative governance performance.

- All four formulated alternate hypotheses for 'Cost-effectiveness' by collaborative e-governance are also found to be supported statistically. 'Efficient Utilisation of Resources' (CEEU) followed by 'Savings of Money Paid to Middlemen' (CESM) have emerged as dominating among all constructs. 'Simple and Faster Execution of Processes' (CESF) has emerged as the least significant factor indicating that government processes require more simplification and faster execution of processes.

- All formulated alternate hypotheses for 'Trust-development' by collaborative e-governance are also supported statistically. However, 'Usefulness of Services' (TDUS) followed by 'Reliability of Services' (TDRL) have emerged as dominating among all six constructs. 'Customised Services Response' (TDCR) has emerged as the least significant factor indicating citizens require an appropriate response for their query/complaints/suggestions.

6.9 Concluding Remarks

The proposed research framework has been empirically validated in this chapter. To assess the measurement model reliability and validity of the construct are measured with the recommended statistical tools with the prescribed values. For checking the internal consistency of constructs, the value of Cronbach's alpha and the composite

reliability have been computed and all results are found within the prescribed thresholds. To establish the validity of the construct, convergent validity and discriminant validity have been computed and are also found to be within the recommended thresholds. All macro variables included in the study have been validated through empirical analysis. Out of fifteen micro variables, fourteen could be validated and one variable 'Participation' was dropped due to having lesser factor loadings. It was analyzed and found that the data item of 'Participation' was taken care of by the 'Interactivity'.

The structural relationship of the model has been tested for variance, error probability, path-relationship, determinant of coefficient, effect size, and predictive relevance. Statistical tools comprised of VIF, t-value, path coefficient, R^2, f^2 and Q^2 for testing have been used. All values are found to be within the prescribed ranges. The hypotheses based on the structural model have also been tested. The respective t-values and p-values are found to be within the recommended threshold resulting in support of hypotheses.

Out of six, formulated alternate hypotheses for 'Value-creation' (VCEG) by collaborative e-governance, five are supported statistically as 'Participation' (VCPT) was dropped at the measurement level due to having fewer factor loadings. 'Responsiveness' (VCRP) followed by 'Transparency' (VCTP) have emerged as dominating among all constructs of VCEG. Similarly, all four formulated alternate hypotheses for 'Cost-effectiveness' (CEEG) by collaborative e-governance have been tested statistically and all stand accepted. Moreover, 'Efficient Utilisation of Resources' (CEEU) followed by 'Time and Efforts Savings' (CETE) have emerged dominating among all constructs. Alternate hypotheses for 'Trust-development' (TDEG) by collaborative e-governance are also tested statistically and stand accepted. 'Usefulness of Services' (TDUS) followed by 'Reliability of Services' (TDRL) have emerged as dominating among all six constructs.

Chapter 7
Synthesis of Learnings

7.1 Introduction

The present study is an endeavour to develop a validated framework for analyzing the 'Collaborative e-governance performance'. For this, a mixed-method research approach has been followed applying both qualitative as well as quantitative methodology. In this chapter, the key learnings from both qualitative study and quantitative study are presented. For the qualitative study, the TISM method has been used. For the quantitative study, PLS-SEM has been used to analyze the data and present the results. Later in the subsequent section, the key learnings have been synthesized to suggest a validated framework for assessing the 'strategic collaboration and e-governance performance' projects in India.

7.2 Key Learnings from the Qualitative Study

Three macro variables and fifteen micro variables of 'Collaborative e-governance performance' have been identified based on the literature review. These identified dimensions were then modelled into a hierarchical level using the Total Interpretive Structural Modeling (TISM). Four separate TISM models were developed to have deeper insights into the interrelationships.

TISM-I depicts the relationship between 'Collaborative e-governance performance' (the outcome variable) with its three main constructs, i.e., 'Value-creation' (VCEG),' Cost-effectiveness' (CEEG) and 'Trust-development' (TDEG) by collaborative e-governance. Further, three TISM models (TISM-II, TISM-III and TISM-IV) were developed for macro variables. These TISM models reflect the hierarchical relationships among the outcome variable and its three constituents.

The key learnings from the TISM models are as follows:

All the four variables in the TISM-I model were hierarchically structured into four levels with 'Collaborative e-governance performance' placed at top of the model having interrelations with other variables. A construct placed on top of the model reflects that

it is a dependent variable and represents the main outcome variable. Learnings from each of the TISM model is given below.

- ➤ The TISM-I model shows the relationship between 'Collaborative e-governance performance' with its three macro variables, i.e., 'Value-creation' (VCEG), 'Cost-effectiveness' (CEEG) and 'Trust-development' (TDEG) by collaborative e-governance. 'Collaborative e-governance performance' has emerged as the outcome variable as it is placed at the first level of the model. 'Trust-development' has emerged as the most important variable of 'Collaborative e-governance performance' (CEGP) as placed at the bottom. The variable at the top of the model have higher dependence and those at the bottom have a high driving capability.

  TISM-II model represents the relationship with macro variable, 'Value-creation' by collaborative e-governance with all its micro variables, i.e., 'Decision-making and Control' (VCDM), 'Service Delivery' (VCSD), 'Responsiveness' (VCRP), 'Transparency' (VCTP), 'Participation' (VCPT) and 'Interactivity' (VCIN). All the constructs are hierarchically positioned into five levels and 'Value-creation' (VCEG) is placed at the top level reflecting it as the main construct. Among all constructs of 'Value-creation', 'Participation' and 'Interactivity' has emerged as the key elements placed at the bottom level that shows the maximum driving power. 'Interactivity' and 'Participation', and 'Participation' and 'Interactivity' are interrelated and influence each other. It reflects that interactions within and across organizations help in enhanced citizen participation in the government organisation and similarly, improved citizen participation influences interactivity within and across organisations.

- ➤ TISM-III model shows the relationship between 'Cost-effectiveness' by collaborative e-governance and its four micro variables, i.e., 'Time and Efforts Savings' (CETS), 'Efficient Utilization of Resources' (CEEU), 'Savings of Money Paid to Middlemen' (CESM) and 'Simplification and Faster Execution of Processes' (CESF). All the constructs are hierarchically positioned into five levels with 'Cost-effectiveness' (CEEG) by collaborative e-governance placed at the top level reflecting it as the main construct. Among all the constructs of 'Cost-

effectiveness', 'Efficient Utilization of Resources' (CEEU) has emerged as the key construct.

➢ TISM-IV model shows the relationship with 'Trust-development' by collaborative e-governance and among its five micro variables, viz. 'Usefulness of Services' (TDUS), 'Security and Privacy' (TDSP), 'Reliability of Services' (TDRL), 'Ease of Use of Services' (TDEU) and 'Customized Services Response' (TDCR). All the constructs are hierarchically positioned into five levels with 'Trust-development' placed at the top level, reflecting it as the main construct. 'Customized Services Response' (TDCR) has emerged as the key construct.

➢ All the TISM models, i.e., TISM-I to IV were separately analyzed and accepted based on the expert's feedback under the majority criteria approach (Sushil, 2018). According to the majority criteria approach, at least 2/3 of experts must agree through their opinions for providing input for the logic database that generates the outcome of the result for the model assessment

7.3   Key Learnings from the Quantitative Study

PLS-SEM has been used to validate the structural model. The smart PLS software was used to test the research hypotheses. 300 respondents were the target for the response through online and offline modes. However, 250 responses were received of which 210 responses were found valid for analysis. Other data were discarded due to their spurious nature or missing input values for the variable indicators. Based on the reliability and validity assessment of all the constructs and matching with all the recommended threshold/criteria, all constructs are included for assessment and except 'Participation' no other construct has been dropped. The key learnings are summarized below:

➢ All the three macro variables namely 'Value-creation', 'Cost-effectiveness' and 'Trust-development' by collaborative e-governance of the outcome variable 'Collaborative e-governance performance' adopted from the literature review and domain experts were also validated through the empirical assessment.

➢ There are fifteen micro variables taken for the study, six for 'Value-creation' ('Decision-making and Control', 'Interactivity', 'Participation', 'Responsiveness', 'Service Delivery' and 'Transparency'), four for 'Cost-effectiveness' ('Efficient Utilisation of Resources', 'Savings of Money Paid to Middlemen', 'Simplification and Faster Execution of Processes' and 'Time and Efforts Savings') and five for 'Trust-development' ('Customized Services Response', 'Ease of Use of Services', 'Reliability of Services', 'Security and Privacy' and 'Usefulness of Services'). However, due to fewer factor loadings, 'Participation' has been dropped and the remaining fourteen got validated by empirical assessment through measurement and structural model.

➢ Out of six formulated alternate hypotheses of 'Value-creation' by collaborative e-governance, five are tested for their positivity and found statistically supported. Moreover, 'Responsiveness' (VCRP) followed by 'Transparency' (VCTP) emerged as the most significant factor. Citizen 'Participation' (VCPT) has emerged as the least significant factor and therefore dropped from the study *(Chapter 6, Figure: 6.8)*.

➢ All four formulated alternate hypotheses for 'Cost-effectiveness' also tested positive and found statistically supported. Moreover, 'Efficient Utilisation of Resources' (CEEU) followed by 'Savings of Money Paid to Middlemen' (CESM) have emerged as dominating among all constructs. 'Simple and Faster Execution of Processes' (CESF) has emerged as the least significant factor (*Chapter 6, Figure: 6.9*).

➢ All formulated alternate hypotheses for 'Trust-development' are also tested positive and found statistically supported. However, 'Usefulness of Services' (TDUS), followed by 'Reliability of Services' (TDRL) emerged as the significant factors, whereas, 'Customized Services Response' (TDCR) emerged as the least significant factor (*Chapter 6, Figure: 6.11*).

7.4   Triangulation: Qualitative and Quantitative Methods

The triangulation method is applied through the mixing of data or methods so that diverse viewpoints can shed light on the research topic. The mixing of data types, known as data triangulation, is often thought to help in validating the claims that might arise from an initial pilot study. The mixing of methodologies, e.g., mixing the use of survey data with interviews, is a more profound form of triangulation (Jick, 1979; Olsen, 2004; Fielding, 2012). Table 7.1 show the triangulation results of the survey conducted through a qualitative and quantitative approach. Some of the key highlights of the triangulation approach are listed below:

- Initially, research variables (three macro and fifteen micro variables) have been identified through an extensive literature review and included in the study.

- A comparison of research assessment through the triangulation method, i.e., qualitative, by using TISM and quantitative by using PLS-SEM showed that results from both approaches are reliable.

- All the resultant hypotheses are supported by both studies. And thus, cross-validation of the conceptual research framework has got validated.

Table 7.1: Triangulation Method: 'Collaborative e-governance performance' (CEGP)

Outcome/Macro Variables	Macro/Micro Variables	Initial phase (Literature Review)	Qualitative Method (TISM)	Quantitative Method (PLS-SEM)
Collaborative e-governance performance (CEGP)	• Value-creation (VCEG) by collaborative e-governance • Cost-effectiveness (CEEG) by collaborative e-governance • Trust-development (TDEG) by collaborative e-governance	One outcome and three macro variables were identified from the literature review	All macro variables identified from the literature review have also been confirmed by the experts. ➢ Trust development has emerged as the most significant factor of Collaborative e-governance performance.	All macro variables confirmed by the experts have also emerged as significant constituents of Collaborative e-governance performance. ➢ Trust development has emerged as the most significant factor of Collaborative e-governance performance.
Value-creation (VCEG) by collaborative e-governance	• Decision-making and Control (VCDM) • Interactivity (VCIT) • Participation (VCPT) • Responsiveness (VCRP) • Service Delivery (VCSD) • Transparency (VCTP)	One macro and six micro variables were identified from the literature review	All micro variables for 'Value-creation' identified from the literature review were also confirmed by the experts. ➢ Participation and Interactivity have emerged as the most significant element of Value-creation.	All the micro variables confirmed by experts except Participation have also emerged as significant elements of Value-creation. ➢ Responsiveness emerged as the most significant factor for Value-creation.

Cost-effectiveness (CEEG) by collaborative e-governance	• Efficient Utilization of Resources (CEEU) • Savings of Money Paid to Middlemen (CESM) • Simplification and Faster Execution of Processes (CESF) • Time and Efforts Savings (CETE)	One macro and four micro variables were identified from the literature review	All micro variables identified from the literature review were also confirmed by the experts. ➢ Efficient Utilization of Resources has emerged as the most significant factor of Cost-effectiveness.	All the macro variables confirmed by the experts are also found to be significant elements of Cost-effectiveness. ➢ Efficient Utilization of Resources emerged as the most significant factor of Cost-effectiveness.
Trust-development (TDEG) by collaborative e-governance	• Customized Services Response (TDCR) • Ease of Use of Services (TDEU) • Reliability of Services (TDRL) • Security and Privacy (TDRL) • Usefulness of Services (TDUE)	One macro and five micro variables were identified from the literature review	All micro variables identified from the literature review were also confirmed by the experts. ➢ The Customized Services Response followed by the Usefulness of Services has emerged as the most significant variable for Trust-development.	All the macro variables confirmed by the experts are also found to be significant elements of Trust-development. ➢ The Usefulness of Services has emerged as the most significant factor of Trust-development by collaborative e-governance

7.5   Concluding Remarks

This study is conducted by adopting a mixed-method approach. An overview of the triangulation method approach for the research work has been attempted in this chapter. Later, findings based on assessment through the triangulation approach, i.e., the qualitative method in which TISM is used as a tool for validation is summarized and subsequently, findings based on assessment through the quantitative method, in which PLS-SEM has been used, are also summarized. Findings show that the result through both approaches is at par as 'Trust-development' has emerged as the most significant macro variable for 'Collaborative e-governance performance'. Similarly, 'Efficient Utilization of Resources' has emerged as the most significant factor of 'Cost-effectiveness' by 'Collaborative e-governance performance' from both the analysis. Micro variables of 'Value-creation', 'Cost-effectiveness' and 'Trust-development' in TISM and PLS-SEM assessment were differed to some extent and presented in Chapter 5 and Chapter 6 in detail. Based on the findings synthesized learnings, conclusions, recommendations and future scope for the study are presented in the next chapter.

Chapter 8

Conclusions, Recommendations
and Scope for Future Research

8.1 Introduction

The proposed conceptual research framework (Chapter 4, Figure: 4.1) has been validated and the results are presented in the previous chapters (Chapter 5 and Chapter 6). Further, learnings based on the finding were synthesized in the previous chapter. The following section presents the gist of the research work starting from the research objectives and its achievement along with broad conclusions, significant research contributions, implications for researchers and practitioners, limitations of the study and possible directions for future research work.

8.2 Recapitulating Research Objectives

Before concluding the study and final remarks, it becomes imperative to revisit the research objectives which were set to be achieved at the beginning of the study. In the forthcoming section recapitulation of the research objectives with the findings is presented.

Research objective 1: To understand the concept of strategic collaboration and its relevance to the e-governance domain through literature support.

At the outset, to attain the objectives of the study, the first key question was put forward about the basic concept of strategic collaboration and its relevance to the context of e-governance. The answer to it was formulated as the first objective of the study, i.e., "To understand the concept of strategic collaboration and its relevance to the e-governance through literature support".

Through literature review, four drivers of strategic collaboration in the e-governance context in terms of value-driven, cost-driven, technology-driven and citizen-centricity were identified. Value-driven factors were included in the study to understand better decision making and control, improved service delivery and better security/safety, etc. Similarly, cost-driven factors were included in the study to

understand cost impacts, obtaining resource/process efficiency, time and effort savings, etc. Citizen-driven factors were included in the study to understand the impact of transparency, citizen participation, shared governance, etc. Technology-driven factors were included in the study to understand the appropriate use of technological tools and platforms for e-governance. Finally, to suit the objectives of this study three key factors termed as macro variables as 'Value-creation' with its six constituents, 'Cost-effectiveness' with four constituents and 'Trust-development' with five constituents were adopted.

Research objective 2: To clarify and analyze the interrelationship among the constituents of the strategic collaboration for e-governance performance in India.

To achieve the second research objective for understanding the interplay of all the constituents of 'Collaborative e-governance performance' apart from three macro variables, fifteen micro variables were adopted for the study. Six micro variables, 'Decision-making and Control', 'Service Delivery', 'Responsiveness', 'Participation', 'Interactivity' and 'Transparency' were identified under 'Value-creation'. Four micro variables, 'Time and Efforts Savings', 'Efficient Utilisation of Resources', 'Savings of Money Paid to Middlemen' and 'Simple and Faster Execution of Process' were identified for the macro variable 'Cost-effectiveness'. Five micro variables, 'Ease of Use of Service', 'Usefulness of Service', 'Reliability of Service', 'Security and Privacy' and 'Customized Services Response' were identified for the macro variable, 'Trust-development' by collaborative e-governance (*Chapter 4*). To analyze the interplay among selected variables, apart from the literature source, recommendations of domain experts were also obtained. A conceptual research framework is thereby prepared which was assessed through the qualitative research technique, TISM. Domain experts' opinions in the form of responses to the questionnaire were obtained and a logic-knowledge base was prepared. By following the set procedure of evaluating a model through nine steps of TISM, four TISM models- one for the outcome variable and three for its macro variable were developed. The result of the TISM analysis revealed that all the variables adopted for the study have a sound relationship among them (*Chapter 5*).

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Research Objective 3: To suggest an empirically validated research framework for evaluating the strategic collaboration for e-governance performance in India.

The proposed conceptual research framework was empirically validated by using both qualitative and quantitative approaches. Validation through the qualitative method was done through TISM whereas, PLS-SEM was used to validate the model statistically. Empirical validation was done through the measurement and structural model. Smart PLS version 3.0 software has been used to run the model for validation.

To assess the measurement model, reliability and validity tests for constructs taken for the study were conducted. All the necessary statistical values in terms of Cronbach's alpha, Rho, and Composite Reliability for reliability checks were obtained. Similarly, for the construct validity check, the recommended threshold value for convergent validity and discriminant validity was computed. All values obtained for the assessment of the measurement model are found to be within the recommended thresholds. To assess the structural model, all formulated hypotheses were tested through appropriate statistical tools for variance, path significance, error probability, coefficients of determination, effect size and predictive relevance. The required statistical values such as VIF, path-coefficients, t-statistic, the value of R^2, value of f^2 and value of Q^2 were computed. All the hypotheses except for 'Participation' was found to be statistically supported and accepted (Chapter 6).

8.3   Conclusions

Strategic collaboration is majorly practised in the context of the corporate sector and is generally not prevalent among government organisations. This is due to their siloed nature of functioning. Government organisations function with their traditional control and command structure and generally lack the shared view for attaining the objectives. The strategic collaboration needs extensive flexibility in terms of robust technical infrastructure (resource utilization) and adequately trained manpower (technical skills) for e-governance projects, which government organisation generally lacks.

Through literature review, issues of strategic collaboration in the context of e-governance have been studied and research gaps identified. Accordingly, constructs were identified and a research framework was conceptualized for empirical validation. The findings of the study are summarized as follows:

➢ The outcome variable and all the macro and micro variables identified through the literature review were also confirmed by the experts.

➢ Interrelationships among the outcome variable and macro and micro variables were brought out using Total Interpretive Structural Modeling (Chapter 5).

➢ The proposed conceptual research framework was validated through the measurement and structural model empirically. PLS-SEM has been applied for validating the model. All the recommended thresholds for the statistical measures were fulfilled (Chapter 6).

➢ All the formulated hypotheses except 'Participation' were tested and supported statistically.

➢ 'Trust-development' by collaborative e-governance has emerged as the key macro variable for the 'Collaborative e-governance performance' from both research techniques adopted for the study, i.e., the qualitative (TISM) and quantitative (PLS-SEM).

➢ For 'Cost-effectiveness' by collaborative e-governance, 'Efficient Utilization of Resources' has emerged as the key factor from both the research techniques, i.e., TISM and PLS-SEM.

➢ For 'Value-creation' by collaborative e-governance, 'Interactivity' and 'Participation' has emerged as the key factor as per the TISM technique. Both of these two are placed at the same level and 'Responsiveness' has the maximum number of links among all the constructs and has emerged as another significant factor. As per PLS-SEM based analysis 'Responsiveness' has emerged as the most significant factor. 'Participation' was found insignificant due to having lesser

factor loadings (0.507) from the recommended threshold (0.708) and, therefore, not assessed further. Experts opinionated that interactions within and across government organisations and beneficiaries, and citizens' participation are the essential requirement for improving collaborative e-governance performance.

➤ The 'Customized Services Response' has emerged as the most significant factor for 'Trust-development' by collaborative e-governance as per the TISM whereas, 'Reliability of Services' has emerged as the most significant factor as per PLS-SEM analysis.

8.4   Recommendations

Key factors identified from the literature review and endorsed by the experts for 'Collaborative e-governance performance' are also validated through both the qualitative and quantitative research methods. This reveals that all the findings of the research outcome are relevant. Government organisations offering citizen-centric services through e-governance/service websites should, therefore, focus on 'Value-creation', 'Cost-effectiveness' and 'Trust-development' approaches to enhance their performance. Key recommendations based on the validation of the model are presented below.

➤ Citizen 'Participation' in the government organisations and better 'Interactivity' within and across government organisations has emerged as the key factors as per the domain expert opinions in the TISM assessment. This is also substantiated through statistical analysis. For improving 'Value-creation', adequate attention is to be given to citizen participation in the government organisation. Valuable complaints/suggestions offered by the citizen should thereby be recorded in the system and duly addressed. The study also revealed that interactivity among various stakeholders is required to be enhanced.

➤ 'Efficient Utilization of Resources' has emerged as the key factor for economic/cost-effectiveness for e-governance. There are improvements in terms of saving time and efforts, savings of money paid to the middlemen and

imposing curbs on corruption by offering the government services through the web portal. However, simplification and faster execution of government processes are required to be further streamlined. Processes should be made more efficient in order to further reduce the cost of searching for relevant documents and in disposing of records.

➢ The study has shown improvement in terms of 'Usefulness of Services' as achieved through e-governance. Improvement through e-governance is also observed in terms of 'Reliability of Services', 'Security and Privacy' and 'Ease of Use of Services'. However, there is still a lack of customized response to the citizens for their queries and complaints. The study revealed that in most cases, citizens are served with system generated automated replies which do not address the citizens' specific problems. Therefore, for trust-building among the citizens, government organisations should put more focus on customized services response having better clarity for the issues faced by the citizens. The usability of the e-governance services also needs to be improved by serving the needs of disabled and deprived persons.

8.5 Research Implications

This research work has major implications for several stakeholders as policymakers in government organizations, e-governance service providers, beneficiaries and researchers.

8.5.1 Implication for Policymakers

Policymakers generally belong to the senior cadre of a government organization. These members plan and formulate the policies for implementation through various channels. The inclusion of experts from diverse domains comprising of senior officers, academicians, and managers with their valuable inputs is expected to bring due improvement in the planning and policy formulation for improving 'Collaborative e-governance performance'. The outcome of the study particularly for citizen 'Participation' which has been found insignificant due to insufficient factor loadings and 'Interactivity' which got the lowest path coefficients and t-statistic value among all constructs of 'Value-creation' shall attract the attention of policymakers to emphasize the mechanism to encourage citizen participation in the government

organization. A healthy environment for hassle-free interactions across the platforms needs to be created.

8.5.2 Implication for Beneficiaries

Target beneficiaries play an important role in enhancing the e-governance service delivery system. An awakened citizen keeps government awaken and constantly presses for improved services. Citizens with their valuable suggestions/feedback can help collaborative e-governance to improve its performance. Citizens requesting government organisations for their participation in various decisions making and asking for a customized response for their issues shall trigger synergetic relationships among concerned government organisations and shall help in improving collaborative e-governance performance.

8.5.3 Implication for Researchers

There are several studies conducted on the evaluation of e-governance. Most of these studies are focused primarily on the issue of evaluating e-governance in terms of service delivery, service adoption, performance, etc. There is a dearth of research conducted on collaborative aspects of e-governance. This study shall help researchers to further investigate the issue of 'Collaborative e-governance performance'. Researchers are also expected to recognize the benefits of a mixed method of validation by adopting both qualitative and quantitative techniques in evaluating their proposed model taken for research.

8.6 Research Contributions

This study has several research contributions both from theoretical and practical points of view. Some of them are outlined below.

➢ Theoretically, collaboration covers a vast area and is mainly studied as part of core management. However, this study has identified 'Collaborative e-governance performance' by combining 'strategic collaboration and e-governance performance' based on ICT supported collaborative government.

> From a practical point of view, the outcome of this research should help the key stakeholders to draw a lesson for improvising their work performance areas.

> The research has used the triangulation method of research methodology by using both qualitative and quantitative approaches for validating the research model. The use of a mixed-method approach can also be adopted by prospective researchers in the field of collaborative e-governance.

8.7 Limitations of the Study

An attempt has been made to validate the proposed conceptualized research framework by applying the mixed-method research approach. Despite the efforts put into establishing the validity, the study is not free from limitations. Some of the limitations are listed below.

> Collaborative e-governance might have more linkages with other parameters apart from the constructs chosen for this study, i.e., 'Value-creation', 'Cost-effectiveness' and 'Trust- development'.

> The study is based on a few projects in 'Government-to-Citizen (G2C) category. Projects belonging to 'Government-to-Business' (G2B) and 'Government-to-Government' (G2G) could not be covered.

> The snowball sampling technique used for this study is a non-probability sampling technique which has limitations in terms of model generalisation.

8.8 Directions for Future Research

E-governance being an interdisciplinary area has a wider scope for research. Though sincere efforts have been made to cover the relevant and related areas of strategic collaboration and e-governance assessment. However, there are still some areas that remained untouched, therefore, a possible direction for future scope of research would be as follows.

➢ Through suitable modifications, this study can be further conducted for Government-to-Business (G2B) and Government-to-Government (G2G) interfaces.

➢ This study can also be conducted on a content-based collaborative approach where the focus is on sharing of information, knowledge, resources, government policies, know-how, etc.

➢ The study has been conducted in an Indian context with a limited scope and as such the research findings are specific to the context of the study. The scope can be extended to other developing countries for generalized findings.

8.9   Concluding Remarks

The primary objective of this study was to empirically test and validate conceptualized research framework for 'Collaborative e-governance performance' through a study of select projects in India. A mixed-method approach has been adopted for the study to validate the framework qualitatively and statistically. For qualitative research, TISM has been used to validate the conceptual research framework. The framework has been further validated statistically through PLS-SEM. The validated framework is expected to serve for the collaborative e-governance performance in India. The research may be viewed as a modest step forward in methodologically building collaborative linkages among related government organisations for effective e-governance.

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TISM for 'Value-creation' (VCEG) by collaborative e-governance
Table A: Interpretive Logic-Knowledge Base for VCEG

S.No.	Element code	Paired Comparisons of an element of 'Value-creation' (VCEG) by collaborative e-governance	Y/N	How or in what way does a variable influence/enhance the other variable ? Give reason in brief.
VCDM: Decision-making and Control				
1	VCDM-VCSD	Decision-making and control will influence or enhance Service delivery	Y	Appropriate decision making and control enhance e-governance service delivery
2	VCSD-VCDM	Service delivery will influence or enhance Decision-making, and control	N	
3	VCDM-VCRP	Decision-making and control will influence or enhance Responsiveness	Y	Better monitoring and control at an appropriate level helps in improvising the responsiveness of the e-governance systems
4	VCRP-VCDM	Responsiveness will influence or enhance Decision-making and control	N	
5	VCDM-VCTP	Decision-making and control will influence or enhance Transparency	Y	Decision making, monitoring and control enhance transparency and visibility in the e-governance system
6	VCTP-VCDM	Transparency will influence or enhance Decision-making and control	N	
7	VCDM-VCPT	Decision-making and control will influence or enhance Participation	N	
8	VCPT-VCDM	Participation will influence or enhance Decision-making and control	Y	Citizen participation in the government organization influences decisions making
9	VCDM-VCIT	Decision-making and control will influence or enhance Interactivity	N	
10	VCIT-VCDM	Interactivity will influence or enhance Decision-making and control	Y	Facilitating hassle-free interactions within and across government organisations and citizens shall help in enhancing decision making, monitoring and control
11	VCDM-VCEG	Decision-making and control will influence or enhance Value-creation	Y	Better decision making and control help in value-creation in the organisation

12	VCEG-VCDM	Value-creation will influence or enhance Decision-making and control	N	
VCSD: Service Delivery				
13	VCSD-VCRP	Service delivery will influence or enhance Responsiveness	N	
14	VCRP-VCSD	Responsiveness will influence or enhance Service delivery	Y	Timely and appropriate replies to queries and complaints help to enhance e-governance service delivery
15	VCSD-VCTP	Service delivery will influence or enhance Transparency	N	
16	VCTP-VCSD	Transparency will influence or enhance Service delivery	Y	Transparency in the process and procedures enhances service delivery
17	VCSD-VCPT	Service delivery will influence or enhance Participation	N	
18	VCPT-VCSD	Participation will influence or enhance Service delivery	N	Citizen participation with their suggestions/complaints shall help the organisation to improve the quality of service delivery
19	VCSD-VCIT	Service delivery will influence or enhance Interactivity	N	
20	VCIT-VCSD	Interactivity will influence or enhance Service delivery	Y	Inter- and Intra- organisational Interactivity shall help in enhancing e-governance service delivery
21	VCSD-VCEG	Service delivery will influence or enhance Value-creation	Y	Appropriate and timely delivery of online government services and providing accessibility for the deprived and disabled person shall help to enhance the value-creation of an organisation
22	VCEG-VCSD	Value-creation will influence or enhance Service delivery	N	
VCRP: Responsiveness				
23	VCRP-VCTP	Responsiveness will influence or enhance Transparency	N	
24	VCTP-VCRP	Transparency will influence or enhance Responsiveness	Y	A transparent process and procedure enhances responsiveness through a timely reply to the queries /complaints of the citizen
25	VCRP-VCPT	Responsiveness will influence or enhance Participation	Y	Good responsive practices of the organisation shall encourage citizens to participate in the government organisation

26	VCPT-VCRP	Participation will influence or enhance Responsiveness	Y	Citizen participation with their complaints/suggestions shall improve responsiveness
27	VCRP-VCIT	Responsiveness will influence or enhance Interactivity	N	
28	VCIT-VCRP	Interactivity will influence or enhance Responsiveness	Y	Interactions among the employees shall help in improving the reply systems of the organisation
29	VCRP-VCEG	Responsiveness will influence or enhance Value-creation	Y	Appropriate and timely replies to the citizens for their queries/complaints/suggestions shall enhance the value creation of an organisation
30	VCEG-VCRP	Value-creation will influence or enhance Responsiveness	N	
VCTP: Transparency				
31	VCTP-VCPT	Transparency will influence or enhance Participation	N	
32	VCPT-VCTP	Participation will influence or enhance Transparency	Y	Citizen participation in government organisations by giving their valuable suggestions shall help improve transparency
33	VCTP-VCIT	Transparency will influence or enhance Interactivity	N	
34	VCIT-VCTP	Interactivity will influence or enhance Transparency	Y	Hassle-free interactions among inter-and intra-organisational staff shall help in enhancing transparency
35	VCTP-VCEG	Transparency will influence or enhance Value-creation	Y	Transparency enhances the value creation of government organisation
36	VCEG-VCTP	Value-creation will influence or enhance Transparency	N	
VCPT: Participation				
37	VCPT-VCIT	Participation will influence or enhance Interactivity	Y	Citizen participation in government organizations improves Interactivity within and across the organisation
38	VCIT-VCPT	Interactivity will influence or enhance Participation	Y	Interaction shall encourage citizens to participate in government organisation
39	VCPT-VCEG	Participation will influence or enhance Value-creation	Y	Citizen participation and acceptance of their valuable inputs for e-governance services shall enhance value creation
40	VCEG-VCPT	Value-creation will influence or enhance Participation	N	

VCIT: Interactivity				
41	VCIT-VCEG	Interactivity will influence or enhance Value-creation	Y	Interactivity across different stakeholders enhances the value creation of the organisation
42	VCEG-VCIT	Value-creation will influence or enhance Interactivity	N	

Table A.1: Reachability Matrix of VCEG

	VCDM	VCSD	VCRP	VCTP	VCPT	VCIT	VCEG
VCDM	1	1	1	1	0	0	1
VCSD	0	1	0	0	0	0	1
VCRP	0	1	1	0	1	0	1
VCTP	0	1	1	1	0	0	1
VCPT	1	0	1	1	1	1	1
VCIT	1	1	1	1	1	1	1
VCEG	0	0	0	0	0	0	1

Table A.2: Reachability Matrix of VCEG
(with transitivity check)

	VCDM	VCSD	VCRP	VCTP	VCPT	VCIT	VCEG
VCDM	1	1	1	1	*1**	*1**	1
VCSD	0	1	0	0	0	0	1
VCRP	*1**	1	1	*1**	1	*1**	1
VCTP	*1**	1	1	1	*1**	*1**	1
VCPT	1	*1**	1	1	1	1	1
VCIT	1	1	1	1	1	1	1
VCEG	0	0	0	0	0	0	1

Table A.3: Reachability Partitioning of VCEG
(Iteration-1)

Element	Reach ability set	Antecedent Set	Intersection Set	Level
VCDM	1,2,3,4,7	1,5,6	1	
VCSD	2,7	1,2,3,4,6	2	
VCRP	2,3,5,7	1,3,4,5,6	3,5	
VCTP	2,3,4,7	1,4,5,6	4	

VCPT	1,3,4,5,6	3,5,6	3,5,6	
VCIT	1,2,3,4,5,6,7	5,6	5,6	
VCEG	7	1,2,3,4,5,6,7	7	**I**

Table A.4: Reachability Partitioning of VCEG
(Iteration-2)

Element	Reach ability set	Antecedent Set	Intersection Set	Level
VCDM	1,2,3,4	1,5,6	1	
VCSD	2	1,2,3,4,6	2	**II**
VCRP	2,3,5	1,3,4,5,6	3,5	
VCTP	2,3,4	1,4,5,6	4	
VCPT	1,3,4,5,6	1,3,5,6	1,3,5,6	
VCIT	1,2,3,4,5,6	5,6	5,6	

Table A.5: Reachability Partitioning of VCEG
(Iteration-3)

Element	Reach ability set	Antecedent Set	Intersection Set	Level
VCDM	1,3,4	1,5,6	1	
VCRP	3,5	1,3,4,5,6	3,5	**III**
VCTP	3,4	1,4,5,6	4	
VCPT	1,3,4,5,6	1,3,5,6	1,3,5,6	
VCIT	1,3,4,5,6	5,6	5,6	

Table A.6: Reachability Partitioning of VCEG
(Iteration-4)

Element	Reach ability set	Antecedent Set	Intersection Set	Level
VCDM	1,4	1,5,6	1	
VCTP	4	1,4,5,6	4	**IV**
VCPT	1,4,6	1,3,5,6	1,6	
VCIT	1,4,6	5,6	6	

Table A.7: Reachability Partitioning of VCEG
(Iteration-5)

Element	Reach ability set	Antecedent Set	Intersection Set	Level
VCDM	1	1,5,6	1	**V**

Table A.8: Reachability Partitioning of VCEG
(Iteration-6)

Element	Reach ability set	Antecedent Set	Intersection Set	Level
VCPT	6	1,3,5,6	6	**VI**
VCIT	6	5,6	6	**VI**

Table A.9: Partitioning the Reachability Matrix into different levels (Iteration 1-6)

Iteration	Element	Reach ability set	Antecedent Set	Intersection Set	Level
1	**VCEG**	7	1,2,3,4,5,6,7	7	**I**
2	**VCSD**	2	1,2,3,4,6	2	**II**
3	**VCRP**	3,5	1,3,4,5,6	3,5	**III**
4	**VCTP**	4	3,4	4	**IV**
5	**VCDM**	1	1,5,6	1	**V**
5	**VCPT**	6	1,3,5,6	6	**VI**
6	**VCIT**	6	5,6	6	**VI**

Table A.10: List of VCEG Variables and their levels in TISM

Element Code	Variables	Level in the TISM
VCEG	Value-creation	**I**
VCSD	Service Delivery	**II**
VCRP	Responsiveness	**III**
VCTP	Transparency	**IV**
VCDM	Decision-making and Control	**V**
VCPT	Participation	**VI**
VCIT	Interactivity	**VI**

Table A.11: Direct Interactivity Matrix (Binary Matrix)

	VCDM	VCSD	VCRP	VCTP	VCPT	VCIT	VCEG
VCDM	-	1	1	1	0	0	1
VCSD	0	-	0	0	0	0	1
VCRP	0	1	-	0	1	0	1
VCTP	0	1	1	-	0	0	1
VCPT	1	0	1	1	-	1	1
VCIT	1	1	1	1	1	-	1
VCEG	0	0	0	0	0	0	-

Figure A.1: Diagraph for VCEG

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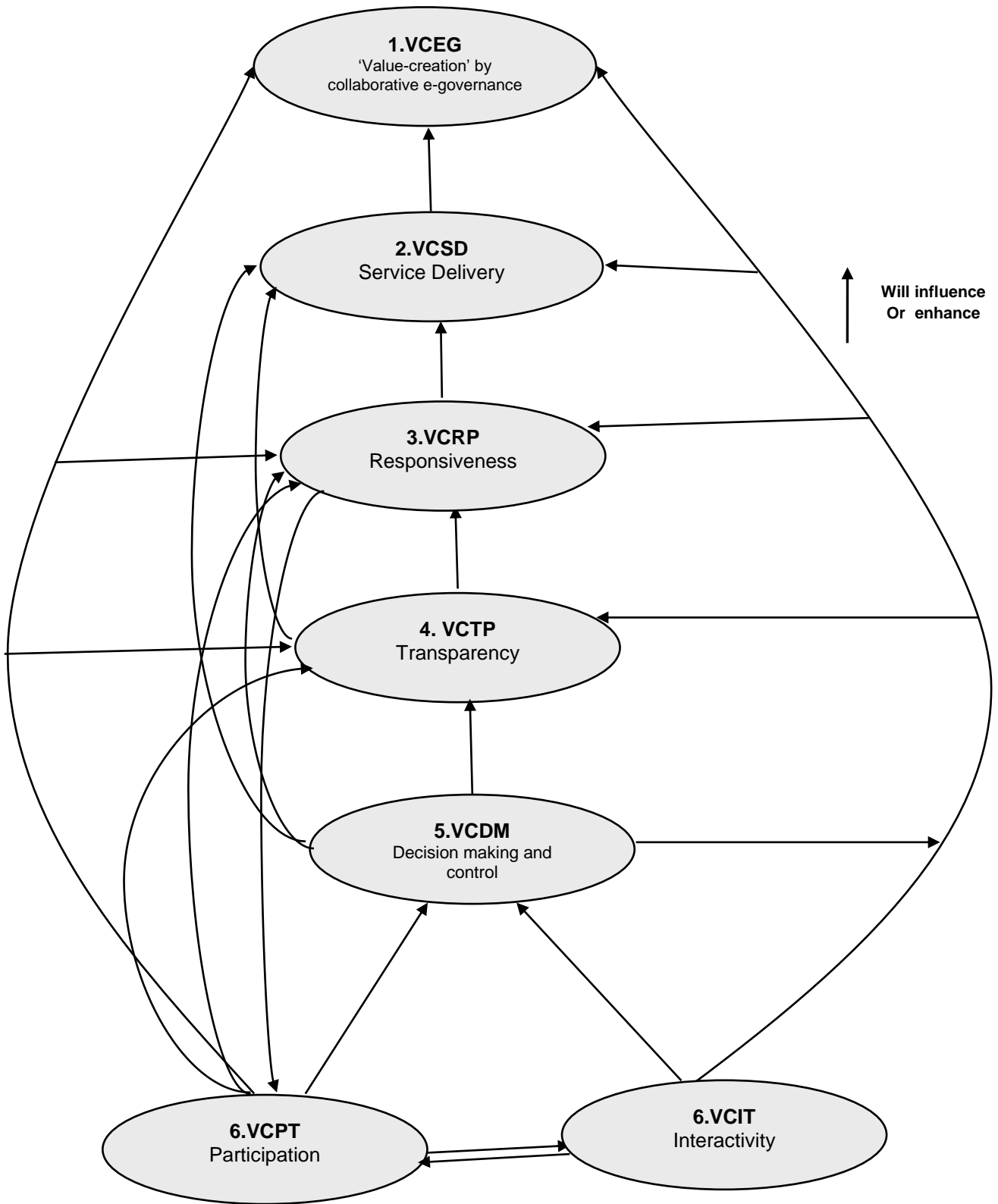
Table A.12: Direct Interaction Matrix (Interpretive Matrix) of VCEG

	VCDM	VCSD	VCRP	VCTP	VCPT	VCIT	VCEG
VCDM	-	Appropriate decision-making and control enhance e-governance service delivery	Better monitoring and control help in improvising responsiveness	Decision making and control enhance transparency	0	0	Better decision making and control help in the value-creation of the organization
VCSD	0	-	0	0	0	0	Better delivery of services and providing accessibility for the deprived and disabled person help in enhancing value-creation
VCRP	0	Adequate reply for queries and complaints enhances e-governance service delivery	-	0	A good response system shall encourage citizen participation in the organization	0	Responsiveness enhances value creation by the organization
VCTP	0	Transparency in the process and procedures enhances service delivery	Transparency influences the responsiveness of the organization	-	0	0	Transparency enhances the value creation of an organization
VCPT	Citizen participation influences decisions making	0	Citizen participation with their complaints/suggestions shall improve responsiveness	Citizen participation help improve transparency	-	Citizen participation improves Interactivity within and across organizations	Citizen participation and acceptance of their valuable inputs enhance value-creation by government organisation
VCIT	Interactivity within and across government organizations influence decision making and control	Interactivity plays an important role in enhancing the e-governance service delivery	Interactivity enhances the responsiveness of the organization	Interactivity shall help in enhancing transparency	Interactivity shall encourage citizen participation in the government organization	-	Interactivity across different stakeholders enhances value creation in the organization
VCEG	0	0	0	0	0	0	-

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Table A.13: TISM-II Assessment for VCEG

Sno.	Dimension linked	Reasons Quoted by Domain experts	E1	E2	E3	E4	E5	E6	E7	E8	E9	E10	Avg score for link	Avg score for model
1	Decision-making and control will influence or enhance Service delivery (VCDM - VCSD)	Appropriate decision-making and control enhances e-governance service delivery	4	4	3	4	4	5	4	5	4	4	4.1	3.9 Accept the model
2	Decision-making and control will influence or enhance Responsiveness (VCDM - VCRP)	Monitoring and control at an appropriate level helps in improvising the responsiveness of the e-governance systems	4	4	4	3	4	5	4	5	4	5	4.2	
3	Decision-making and control will influence or enhance Transparency (VCDM - VCTP)	Monitoring and control enhances transparency and visibility in the e-governance system	4	4	5	4	4	4	5	4	4	3	4.2	
4	Participation will influence or enhance Decision-making and control (VCPT - VCDM)	Citizen participation in the government organization enhances decisions making	4	5	4	5	4	5	4	4	4	4	4.3	
5	Interactivity will influence or enhance Decision-making and control (VCIT - VCDM)	Better interaction within and across government organisations and with citizens influence decision making, monitoring and control	4	4	4	3	4	3	4	3	4	3	3.6	
6	Decision-making and control will influence or enhance Value-creation (VCDM - VCEG)	Better decision and control mechanism helps in value-creation	5	4	4	4	5	4	4	3	4	4	4.1	
7	Responsiveness will influence or enhance Service delivery (VCRP - VCSD)	Appropriate reply of queries and complaints enhance e-governance service delivery	4	4	4	5	4	4	3	4	3	4	3.9	

8	Transparency will influence or enhance Service delivery (VCTP - VCSD)	Transparency in the process and procedures influence service delivery	4	4	5	4	4	3	4	3	4	3	3.8	
9	Participation will influence or enhance Service delivery (VCPT - VCSD)	Citizen participation in organisation influence the quality of service delivery	4	4	4	4	3	4	3	4	3	4	3.7	
10	Interactivity will influence or enhance service delivery (VCIT - VCSD)	Interaction within and across organisation impacts in better service delivery	4	4	4	5	4	5	4	4	4	3	4.1	
11	Service delivery will influence or enhance Value-creation (VCSD - VCEG)	Better service delivery at the doorstep of citizens and providing accessibility for the deprived and disabled person enhance the value-creation of an organisation	4	4	4	3	4	3	4	3	4	3	3.6	
12	Transparency will influence or enhance Responsiveness (VCTP - VCRP)	Transparency in the process and procedures enhances quick to reply to the queries/complaints of the citizen	4	4	5	4	4	4	3	4	3	4	3.9	
13	Responsiveness will influence or enhance Participation (VCRP - VCPT)	Good responsive practices by the organisation shall encourage citizens to participate in it	5	4	4	3	4	3	4	3	4	3	3.7	
14	Participation will influence or enhance Responsiveness (VCPT - VCRP)	Citizen participation with their complaints/suggestions shall improve responsiveness	4	4	4	4	4	3	4	3	4	4	3.8	
15	Interactivity will influence or enhance Responsiveness (VCIT - VCRP)	Interaction within and across organisations enhances responsiveness	4	4	3	4	3	4	3	4	4	4	3.7	
16	Responsiveness will influence or enhance Value-creation (VCRP - VCEG)	An adequate response to the citizen for their queries/suggestions /complaints shall help in the value creation by organisation	4	4	4	3	4	3	4	3	4	4	3.7	

#	Hypothesis	Description											Mean	
17	Participation will influence or enhance Transparency (VCPT - VCTP)	Citizen participation in government organisations for giving their valuable inputs shall help improving transparency	5	4	4	3	4	4	4	3	4	4	3.9	
18	Interactivity will influence or enhance Transparency (VCIT - VCTP)	Better interaction in and across organisaiton help in enhancing transparency	4	4	4	3	4	3	4	3	4	4	3.7	
19	Transparency will influence or enhance Value-creation (VCTP - VCEG)	Better transparency helps in the value creation of government organisation	4	4	4	4	4	4	3	4	3	4	3.5	
20	Participation will influence or enhance Interactivity (VCPT - VCIT)	Citizen participation improves Interactivity within and across organisation	4	4	4	4	4	3	4	3	4	4	3.8	
21	Interactivity will influence or enhance Participation (VCIT - VCPT)	Interactivity shall encourage citizen participation in the government organisation	4	3	4	4	3	4	3	4	3	4	3.6	
22	Participation will influence or enhance Value-creation (VCPT - VCEG)	Inviting citizens to participate with their valuable inputs shall help in value-creation by the organisation	4	4	5	4	3	4	4	4	4	4	4.0	
23	Interactivity will influence or enhance Value-creation (VCIT - VCEG)	Interactions across different stakeholders enhance value-creation in the organisation	4	4	4	3	4	4	3	4	4	3	3.7	

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TISM for 'Cost-effectiveness' (CEEG) by collaborative e-governance
Table B: Interpretive Logic-Knowledge Base for CEEG

S.No.	Element code	Paired comparisons of the element of 'Cost-effectiveness' (CEEG) by collaborative e-governance	Y/N	How or in what way does a variable influence/enhance the other variable ? Give reason in brief.
CETS: Time and Efforts Savings				
1	CETS-CEEU	Time and efforts savings will influence or enhance the Efficient utilization of resources	N	
2	CEEU-CETS	Efficient utilisation of resources will influence or enhance Time and efforts savings	Y	The utilisation of resources in an efficient manner helps cost reduction in terms of minimizing waiting for time, least frequent visits to offices
3	CETS-CESM	Time and efforts savings will influence or enhance the Savings of money paid to the middleman	Y	Less time consumed and fewer efforts deployed in availing e-governance services results in the avoidance of middlemen
4	CESM-CETS	Savings of money paid to middlemen will influence or enhance Time and efforts savings	N	
5	CETS-CESF	Time and efforts savings will influence or enhance Simplification and faster execution of processes	N	
6	CESF-CETS	Simplification and faster execution of processes will influence or enhance Time and efforts savings	Y	Simplification of processes and their faster execution will help in savings of time and efforts deployed
7	CETS-CEEG	Time and efforts savings will influence or enhance Cost-effectiveness	Y	Reduction in time and efforts for availing e-governance services influences Cost-effectiveness
8	CEEG-CETS	Cost-effectiveness will influence or enhance Time and efforts savings	N	
CEEU : Efficient Utilisation of Resources				
9	CEEU-CESM	Efficient utilisation of resources will influence or enhance Savings of money paid to middlemen	Y	Reduction in paperwork, minimization in duplication of efforts and online being cheaper services doesn't

				require the involvement of middlemen
10	CESM-CEEU	Savings of money paid to middlemen will influence or enhance the Efficient utilisation of resources	N	
11	CEEU-CESF	Efficient utilisation of resources will influence or enhance Simplification and faster execution of processes	Y	Efficient utilisation of resources such as saving of paperwork, minimization in duplication of efforts will help in simplification of process and its faster execution
12	CESF-CEEU	Simplification and faster execution of processes will influence or enhance the Efficient utilisation of resources	N	
13	CEEU-CEEG	Efficient utilisation of resources will influence or enhance Cost-effectiveness	Y	Savings of paperwork and other resources, minimization of duplication of efforts enhances Cost-effectiveness
14	CEEG-CEEU	Cost-effectiveness will influence or enhance the Efficient utilisation of resources	N	
CESM: Savings of Money Paid to Middlemen				
15	CESM-CESF	Savings of money paid to middlemen will influence or enhance Simplification and faster execution of processes	N	
16	CESF-CESM	Simplification and faster execution of processes will influence or enhance Savings of money paid to the middleman	Y	A simpler and faster-executed e-governance process helps to avoid middlemen
17	CESM-CEEG	Savings of money paid to middlemen will influence or enhance Cost-effectiveness	Y	Avoidance of middlemen (availing direct services) enhances economic parameters in terms of cost reduction and process efficiency
18	CEEG-CESM	Cost-effectiveness will influence or enhance Savings of money paid to middlemen	N	
CESF: Simplification and Faster Execution of Processes				
19	CESF-CEEG	Simplification and faster execution of processes will influence or enhance Cost-effectiveness	Y	A simple process minimizes interdependence and also enhances process efficiency that resulting in enhancing cost-effectiveness

20	CEEG-CESF	Cost-effectiveness will influence or enhance Simplification and faster execution of processes	N	

Table B.1: Reachability Matrix for CEEG

	CETS	CEEU	CESM	CESF	CEEG
CETS	1	0	1	0	1
CEEU	1	1	1	1	1
CESM	0	0	1	0	1
CESF	1	0	1	1	1
CEEG	0	0	0	0	1

Table B.2: Reachability Matrix (with transitivity) for CEEG)
(No transitivity)

	CETS	CEEU	CESM	CESF	CEEG
CETS	1	0	1	0	1
CEEU	1	1	1	1	1
CESM	0	0	1	0	1
CESF	1	0	1	1	1
CEEG	0	0	0	0	1

Table B.3: Reachability Partitioning of CEEG
(Iteration-1)

Element	Reach ability set	Antecedent Set	Intersection Set	Level
CETS	1,3,5	1,2,4	1	
CEEU	1,2,3,4,5	2	2	
CESM	3,5	1,2,3,4	3	
CESF	1,3,4,5	2,4	4	
CEEG	5	1,2,3,4,5	5	I

Table B.4: Reachability Partitioning of CEEG
(Iteration-2)

Element	Reach ability set	Antecedent Set	Intersection Set	Level
CETS	1,3	1,2,4	1	
CEEU	1,2,3,4	2	2	
CESM	3	1,2,3,4	3	II
CESF	1,3,4,	2,4	4	

Table B.5: Reachability Partitioning of CEEG
(Iteration-3)

Element	Reach ability set	Antecedent Set	Intersection Set	Level
CETS	1	1,2,4	1	III
CEEU	1,2,4	2	2	
CESF	1,4	2,4	4	

Table B.6: Reachability Partitioning of CEEG
(Iteration-4)

Element	Reach ability set	Antecedent Set	Intersection Set	Level
CEEU	2,4	2	2	
CESF	4	2,4	4	IV

Table B.7: Reachability Partitioning of CEEG
(Iteration-5)

Element	Reach ability set	Antecedent Set	Intersection Set	Level
CEEU	2	2	2	V

Table B.8: Partitioning the reachability matrix into different levels (Iteration 1-5)

Iteration	Element	Reach ability set	Antecedent Set	Intersection Set	Level
1	CEEG	5	1,2,3,4,5	5	I
2	CESM	3	1,2,3,4	3	II
3	CETS	1	1,2,4	1	III
4	CESF	4	2,4	4	IV
5	CEEU	2	2	2	V

Table B.9: List of CEEG Variables and their Levels in TISM

S. No.	Element Code	Variables	Level in the TISM
1	CEEG	Cost-effectiveness by collaborative e-governance	I
2	CESM	Savings of Money Paid to Middlemen	II
3	CETS	Time and Efforts Savings	III
4	CESF	Simplification and Faster Execution of Processes	IV
2	CEEU	Efficient Utilisation of Resources	V

Figure B.1: Diagraph of CEEG
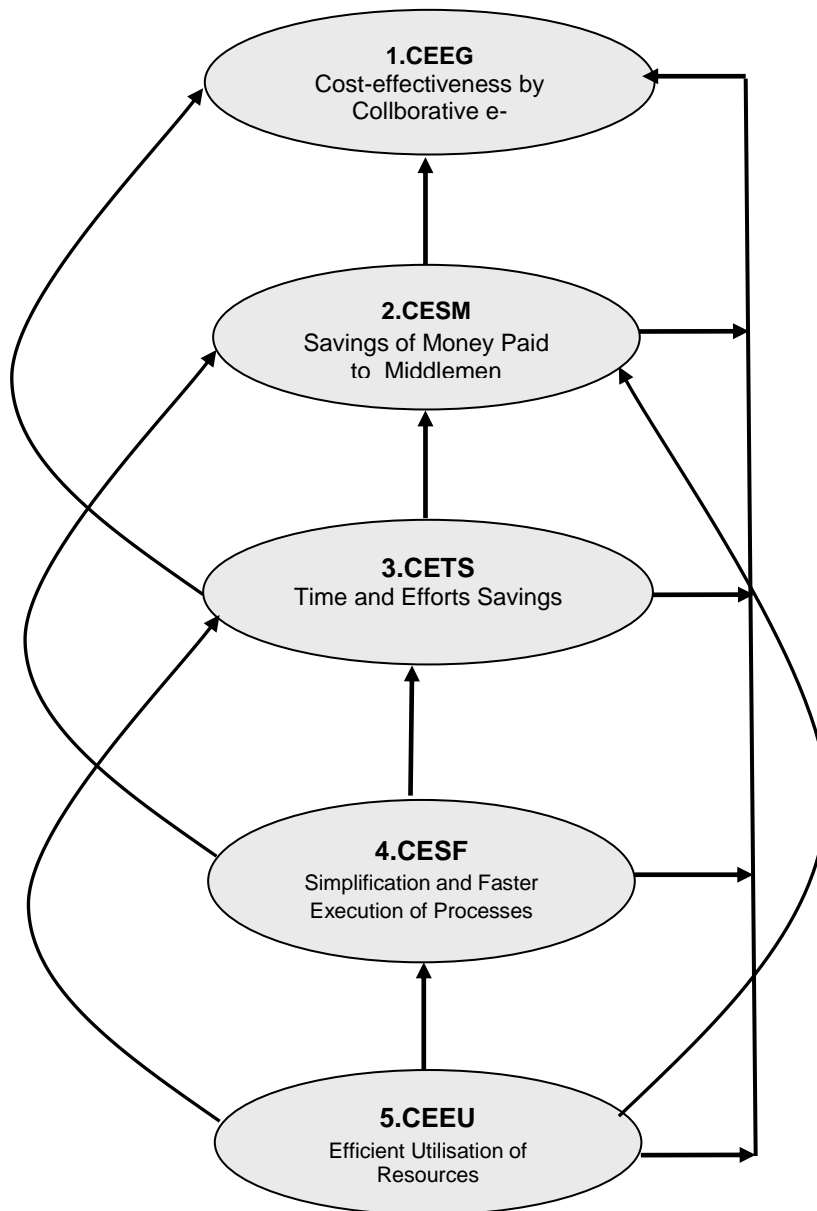
Table B.10: Direct Interaction Matrix (Binary Matrix)

	CETS	CEEU	CESM	CESF	CEEG
CETS	-	0	1	0	1
CEEU	1	-	1	1	1
CESM	0	0	-	0	1
CESF	1	0	1	-	1
CEEG	0	0	0	0	-

Table B.11: Direct Interaction Matrix (Interpretive Matrix) of CEEG

	CETS	CEEU	CESM	CESF	CEEG
CETS	-	0	Less time consumed and fewer efforts deployed in availing e-governance services results in the avoidance of middlemen	0	Reduction in time and efforts for availing e-governance services influence Cost-effectiveness
CEEU	Efficient utilisation and sharing of resources influence time and efforts savings for availing e-governance services	-	Reduction in paperwork, minimization in duplication of efforts and online being cheaper services doesn't require the involvement of middlemen	Efficient utilisation of resources such as saving of paperwork, minimization in duplication of efforts will help in simplification and faster execution of processes	Savings of paperwork and other resources and minimization in duplication of efforts enhances Cost-effectiveness
CESM	0	0	-	0	Avoidance of middlemen (availing direct services) influences economic parameters in terms of cost reduction and process efficiency
CESF	Simplification of processes and their faster execution will help in savings of time and efforts deployed	0	A simpler and faster-executed e-governance process shall help to avoid middlemen	-	Simple process, minimizing interdependence and faster executions of processes influence Cost-effectiveness
CEEG	0	0	0	0	-

Table B.12: TISM-III Assessment for CEEG

Sno.	Dimension linked	Reasons Quoted by Domain experts	E1	E2	E3	E4	E5	E6	E7	E8	E9	E10	Avg score for link	Avg score for model
1	Efficient utilisation of resources will influence or enhance Time and efforts savings (CEEU - CETS)	Efficient utilisation and sharing of resources influence time and efforts savings for availing e-governance services	4	3	4	5	4	3	4	4	4	3	3.8	3.82 accept the model
2	Time and efforts savings will influence or enhance Savings of money paid to middlemen (CETS - CESM)	Less time consumed and fewer efforts deployed in availing e-governance services results in the avoidance of middlemen	5	4	4	4	5	4	4	4	3	4	4.1	
3	Simplification and faster execution of processes will influence or enhance Time and efforts savings (CESF- CETS)	Simplification of processes and their faster execution will help in savings of time and efforts deployed	4	3	5	4	4	4	4	3	4	4	3.9	
4	Efficient utilisation of resources will influence or enhance Savings of money paid to middlemen (CEEU - CESM)	Reduction in paperwork, minimization in duplication of efforts and online being cheaper services doesn't require the involvement of middlemen	4	5	4	3	4	4	4	4	3	4	3.9	

#	Hypothesis	Justification											Avg	
5	Efficient utilisation of resources will influence or enhance Simplification and faster execution of processes (CESM - CEEU)	Efficient utilisation of resources such as saving of paperwork, and reduction in duplication of efforts will help in simplification of process and its faster execution	4	5	4	4	4	3	4	4	3	4	3.9	
6	Efficient utilisation of resources will influence or enhance Cost-effectiveness (CEEU - CEEG)	Savings of paperwork and other resources, minimization in duplication of efforts enhances Cost-effectiveness	4	4	4	4	3	4	3	4	3	4	3.7	
7	Simplification and faster execution of processes will influence or enhance Savings of money paid to the middleman (CESF - CESM)	A simpler and faster-executed e-governance process helps in avoiding taking services of middlemen	4	3	4	3	4	4	4	3	4	3	3.6	
8	Savings of money paid to the middleman will influence or enhance Cost-effectiveness (CESM - CEEG)	Avoidance of middlemen (availing direct services) enhances economic parameters in terms of cost reduction and process efficiency	4	4	4	4	4	4	3	3	4	4	3.8	
9	Simplification and faster execution of processes will influence or enhance Cost-effectiveness (CESF - CEEG)	Simple process, minimizing interdependence and efficient execution of processes help to enhance Cost-effectiveness	4	4	3	4	4	3	4	4	3	4	3.7	

TISM for 'Trust-development' (TDEG) by collaborative e-governance
Table C: Interpretive Logic-Knowledge Base for TDEG

Sno.	Element code	Paired comparisons of an element of 'Trust-development' (TDEG) by collaborative e-governance	Y/N	How or in what way does a variable influence/enhance the other variable? Give reason in brief.
TDUS: Usefulness of Services				
1	TDUS - TDSP	The usefulness of e-governance services will influence or enhance the security and privacy	N	
2	TDSP-TDUS	Security and privacy of data will influence or enhance the Usefulness of services	Y	Security and privacy of user data is the critical factor for the adoption of e-governance services
3	TDUS-TDRL	The usefulness of services will influence or enhance the Reliability of services	N	
4	TDRL-TDUS	Reliability of services will influence or enhance the Usefulness of services	Y	A reliable service that does not too often fail enhances its useability
5	TDUS-TDEU	The usefulness of services will influence or enhance the Ease of use of services	N	
6	TDEU-TDUS-	Ease of use of services will influence or enhance the Usefulness of services	Y	Ease of use of services enhances the usability of the service website
7	TDUS-TDCR	The usefulness of services will influence or enhance Customized services response	N	
8	TDCR-TDUS-	Customized services response will influence or enhance the Usefulness of services	Y	Customized e-governance services response shall enhance its usefulness
9	TDUS-TDEG	The usefulness of services will influence or enhance Trust-development	Y	The usefulness of services enhances trust among the beneficiaries
10	TDEG-TDUS	Trust development will influence or enhance the Usefulness of services	N	
TDSP: Security and Privacy				
11	TDSP-TDRL	Security and privacy will influence or enhance the Reliability of services	Y	Protection against loss and misuse of data influence the reliability of services

12	TDRL-TDSP	The reliability of services will influence or enhance the Security and privacy	N	
13	TDSP-TDEU	Security and privacy will influence or enhance the Ease of use of services	N	
14	TDEU-TDSP	Ease of use of services will influence or enhance the security and privacy	N	
15	TDSP-TDCR	Security and privacy of data will influence or enhance Customized services response	N	
16	TDCR-TDSP	Customized services response will influence or enhance the security and privacy of data	Y	A customized response to citizens shall imbibe security and privacy
17	TDSP-TDEG	Security and privacy of data will influence or enhance Trust-development	Y	Ensuring security and privacy of user's data develop trust among them
18	TDEG-TDRL	Trust development will influence or enhance the security and privacy of data	N	
TDRL: Reliability of Services				
19	TDRL-TDEU	Reliability of services will influence or enhance the Ease of use of services	N	
20	TDEU-TDRL	Ease of use of services will influence or enhance the Reliability of services	N	
21	TDRL-TDCR	Reliability of services will influence or enhance Customized services response	N	
22	TDCR-TDRL	Customized services response will influence or enhance the Reliability of services	Y	Customized response to the citizen enhances their perceived reliability towards services
23	TDRL-TDEG	Reliability of services will influence or enhance Trust-development	Y	Reliability of service website enhances trust-building for e-governance
24	TDEG-TDRL	Trust development will influence or enhance the Reliability of services	N	
TDEU: Ease of Use of Services				
25	TDEU-TDCR	Ease of use of services will influence or enhance Customized services response	N	

26	TDCR-TDEU	Customized services response will influence or enhance the Ease of use of services	N	
27	TDEU-TDEG	Ease of use of services will influence or enhance Trust-development	Y	A service website featured with menu-driven, tooltips enabled enhances trust development
28	TDEG-TDEU	Trust development will influence or enhance the Ease of use of services	N	
TDCR: Customized Services Response				
29	TDCR-TDEG	The customized response will influence or enhance Trust-development	Y	Customized response to the citizen is a constituent of Trust development
	TDEG-TDCR	Trust development will influence or enhance customized response	N	

Table C.1: Reachability Matrix of TDEG

	TDUS	TDSP	TDRL	TDEU	TDCR	TDEG
TDUS	1	0	0	0	0	1
TDSP	1	1	1	0	0	1
TDRL	1	0	1	0	0	1
TDEU	1	0	0	1	0	1
TDCR	1	1	1	0	1	1
TDEG	0	0	0	0	0	1

Table C.2: Reachability Matrix (with transitivity) of TDEG
(No transitivity)

	TDUS	TDSP	TDRL	TDEU	TDCR	TDEG
TDUS	1	0	0	0	0	1
TDSP	1	1	1	0	0	1
TDRL	1	0	1	0	0	1
TDEU	1	0	0	1	0	1
TDCR	1	1	1	0	1	1
TDEG	0	0	0	0	0	1

Table C.3: Reachability Partitioning of TDEG
(Iteration-1)

Element	Reach ability set	Antecedent Set	Intersection Set	Level
TDUS	1,6	1,2,3,4,5	1	
TDSP	1,2,3,6	2,5	2	
TDRL	1,3,6	2,3,5	3	
TDEU	1,4,6	4,6	4,6	
TDCR	1,2,3,5,6	5,6	5,6	
TDEG	6	1,2,3,4,5,6	6	I

Table C.4: Reachability Partitioning of TDEG
(Iteration-2)

Element	Reach ability set	Antecedent Set	Intersection Set	Level
TDUS	1	1,2,3,4,5	1	II
TDSP	1,2,3	2,5	2	
TDRL	1,3	2,3,5	3	
TDEU	1,4	4,6	4	
TDCR	1,2,3,5	5,6	5	

Table C.5: Reachability Partitioning of TDEG
(Iteration-3)

Element	Reach ability set	Antecedent Set	Intersection Set	Level
TDSP	2,3	2,5	2	
TDRL	3	2,3,5	3	III
TDEU	4	4,6	4	III
TDCR	2,3,5	5,6	5	

Table C.6: Reachability Partitioning of TDEG
(Iteration-4)

Element	Reach ability set	Antecedent Set	Intersection Set	Level
TDSP	2	2,5	2	IV
TDCR	2,5	5,6	5	

Table C.7: Reachability Partitioning of TDEG
(Iteration-5)

Element	Reach ability set	Antecedent Set	Intersection Set	Level
TDCR	5	5,6	5	V

Table C.8: Partitioning the Reachability matrix into different levels (Iteration 1-5)

Iteration	Element	Reach ability set	Antecedent Set	Intersection Set	Level
1	TDEG	6	1,2,3,4,5,6	6	I
2	TDUS	1	1,2,3,4,5	1	II
3	TDRL	3	2,3,5	3	III
4	TDEU	4	4,6	4	III
4	TDSP	2	2,5	2	IV
5	TDCR	5	5,6	5	V

Table C.9: List of TDEG Variables and their levels in TISM

Element Code	Variables	Level in the TISM
TDEG	'Trust-development' by collaborative e-governance	I
TDUS	Usefulness of Services	II
TDRL	Reliability of Services	III
TDEU	Ease of Use of Services	III
TDSP	Security and Privacy	IV
TDCR	Customized Services Response	V

Figure C.1: Diagraph of TDEG
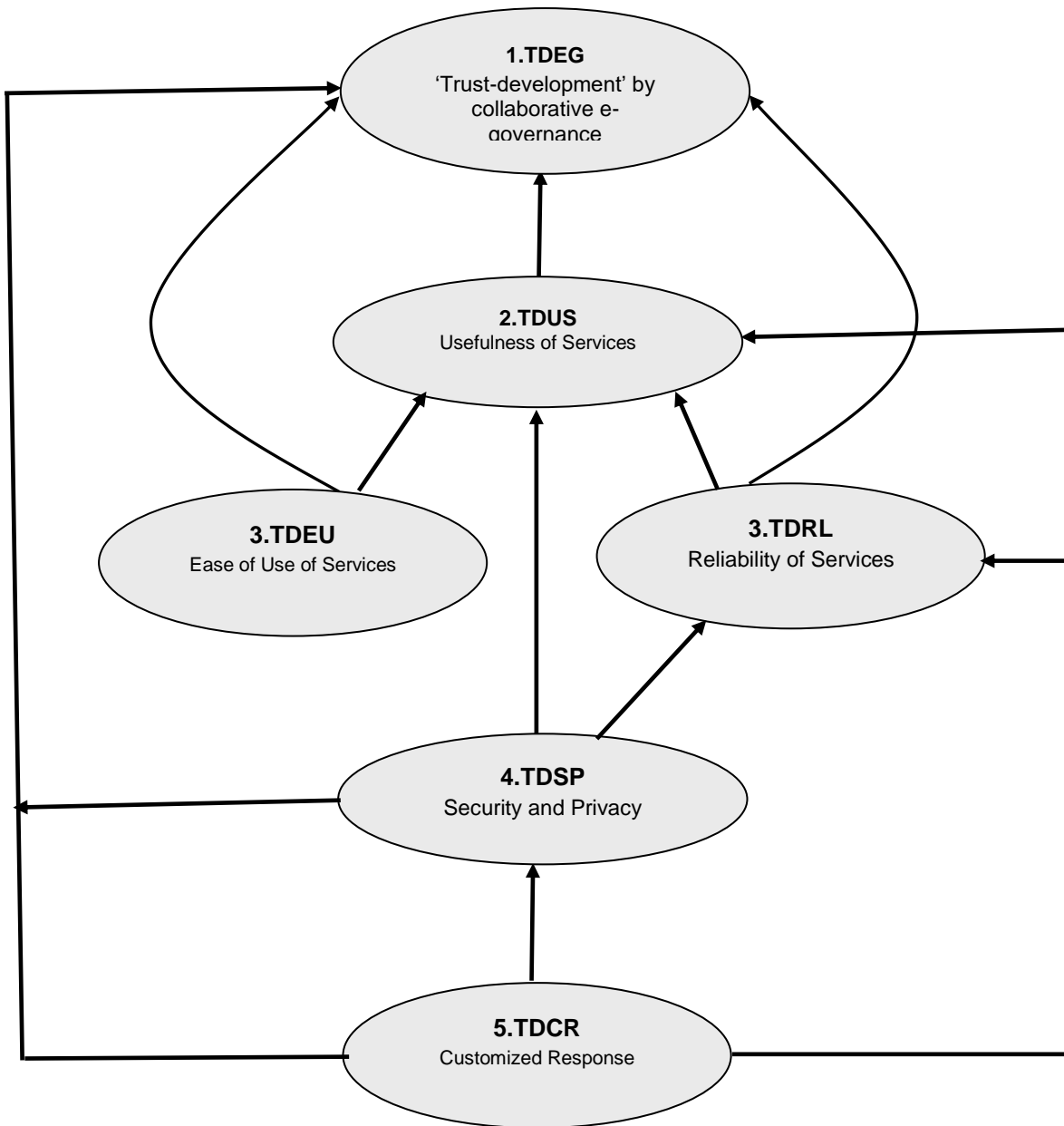
Table C.10: Direct Interaction Matrix (Binary Matrix) for 'Trust-development'
by collaborative e-governance

	TDUS	TDSP	TDRL	TDEU	TDCR	TDEG
TDUS	-	0	0	0	0	1
TDSP	1	-	1	0	0	1
TDRL	1	0	-	0	0	1
TDEU	1	0	0	-	0	1
TDCR	1	1	1	0	-	1
TDEG	0	0	0	0	0	-

Table C.11: Direct Interaction Matrix (Interpretive Matrix) of TDEG

	TDUS	TDSP	TDRL	TDEU	TDCR	TDEG
TDUS	-					
TDSP	Security and privacy of data is the critical factor for the adoption of e-governance services	-	Protection against loss and misuse of data influence the reliability of e-governance services			
TDRL	A reliable service that does not too often fail enhances its usefulness		-			
TDEU	Ease of use enhances the usability of the service website			-		
TDCR	Customized services response shall enhance its usefulness	A customized response to citizens shall imbibe security and privacy of their data	Customized services response to the citizen enhances their perceived reliability towards services		-	
TDEG	The usefulness of services enhance trust among the beneficiaries	Ensuring security and privacy of users' data develop trust among them	Reliability of service website enhances trust-building for e-governance	A service website featured with menu-driven, tooltips enabled enhances trust development	Customized response to the citizen is a constituent of Trust development	-

Table C.12: TISM-IV Assessment of TDEG

Sno.	Dimension linked	Reasons Quoted by Domain experts	E1	E2	E3	E4	E5	E6	E7	E8	E9	E10	Avg score for link	Avg score for model
1	Security and privacy of data will influence or enhance the Usefulness of services (TDSP - TDUS)	Security and privacy of data is the critical factor for the adoption of e-governance services	4	3	4	5	4	3	4	4	4	3	3.9	3.48 Accept the model
2	Reliability of e-governance services will influence or enhance the Usefulness of services (TDRL - TDUS)	A reliable service that does not too often fail enhances its usability	5	4	4	3	4	4	3	3	4	3	3.7	
3	Ease of use of services will influence or enhance the Usefulness of services (TDEU - TDUS)	Ease of use enhances the usability of the service website	4	5	4	5	4	4	4	4	4	4	4.2	
4	Customized services response will influence or enhance the Usefulness of services (TDCR - TDUS)	Customized e-governance services response shall enhance its usefulness	5	4	4	3	4	3	4	4	5	4	3.7	
5	The usefulness of services will influence or enhance Trust-development (TDUS - TDEG)	The usefulness of services enhance trust among the beneficiaries	4	3	4	5	4	3	4	3	4	5	3.9	
6	Security and privacy of data will influence or enhance the Reliability of services (TDSP - TDRL)	Protection against loss and misuse of data influence the reliability of e-governance services	4	4	4	5	4	4	3	4	3	4	3.9	
7	Customized services response will influence or enhance the security and privacy (TDCR - TDSP)	A customized response to citizens shall imbibe security and privacy of their data	4	4	3	4	3	4	4	3	4	4	3.7	
8	Security and privacy of data will influence or enhance Trust development	Ensuring security and privacy of user data	3	4	3	4	3	4	4	3	4	5	3.7	

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	(TDSP - TDEG)	develop trust among them												
9	Customized e-governance services response will influence or enhance the Reliability of services (TDCR - TDRL)	Customized services response to the citizen enhances their perceived reliability towards services	4	3	4	4	3	4	3	4	3	4	3.6	
10	Reliability of services will influence or enhance Trust development (TDRL - TDEG)	Reliability of service website influences trust-development for e-governance project	4	4	3	4	3	4	3	4	3	4	3.6	
11	Ease of use of services will influence or enhance Trust-development (TDEU - TDEG)	A service website featured with menu-driven, tooltips enabled enhance trust development	4	3	4	3	4	3	4	3	4	4	3.6	
12	Customized response will influence or enhance Trust-development (TDCR - TDEG)	Customized response to the citizen is a constituent of Trust development	4	4	3	4	3	4	4	5	4	5	4.0	

Smart PLS-SEM Report
Base Data: 'Collaborative e-governance performance' (CEGP)

Data file Settings	
Data file	CEGP Thesis [210 records]
Missing value marker	None
Data Setup Settings	
Algorithm to handle missing data	None
PLS Algorithm Settings	
Data metric	Mean 0, Var 1
Initial Weights	1.0
Max. number of iterations	300
Stop Criterion (10^-X):	7
Use Lohmoeller settings?	No
Weighting scheme	Factor
Construct Outer Weighting Mode Settings	
Collaborative E-Governance Performance	Automatic
Cost-effectiveness	Automatic
Trust development	Automatic
Value-creation	Automatic

Path Coefficients: 'Collaborative e-governance performance' (CEGP)
(Mean, STDEV, T-Values, P-Values)

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Collaborative e-governance performance -> Cost-effectiveness	0.606	0.609	0.040	15.075	0.000
Collaborative e-governance performance -> Trust development	0.685	0.691	0.040	17.213	0.000
Collaborative e-governance performance -> Value-creation	0.542	0.549	0.047	11.548	0.000

Confidence intervals of 'Collaborative e-governance performance' (CEGP)

	Original Sample (O)	Sample Mean (M)	2.5%	97.5%
Collaborative e-governance performance -> Cost-effectiveness	0.606	0.609	0.531	0.685
Collaborative e-governance performance -> Trust development	0.685	0.691	0.612	0.761
Collaborative e-governance performance -> Value-creation	0.542	0.549	0.451	0.633

Confidence Intervals Bias Corrected of 'Collaborative e-governance performance' (CEGP)

	Original Sample (O)	Sample Mean (M)	Bias	2.5%	97.5%
Collaborative e-governance performance -> Cost-effectiveness	0.606	0.609	0.003	0.521	0.682
Collaborative e-governance performance -> Trust development	0.685	0.691	0.006	0.598	0.753
Collaborative e-governance performance -> Value-creation	0.542	0.549	0.007	0.419	0.619

Base Data: 'Value-creation' (VCEG) by collaborative e-governance

Data file Settings	
Data file	CEGP thesis coding [210 records]
Missing value marker	None
Data Setup Settings	
Algorithm to handle missing data	None
Weighting Vector	-
PLS Algorithm Settings	
Data metric	Mean 0, Var 1
Initial Weights	1.0
Max. number of iterations	300
Stop Criterion (10^-X):	7
Use Lohmoeller settings?	No
Weighting scheme	Path
Bootstrapping Settings	
Complexity	Complete Bootstrapping
Confidence interval method	Bias-Corrected and Accelerated (BCa) Bootstrap
Parallel processing	Yes
Samples	500
Significance level	0.05
Test type	Two-Tailed
Construct Outer Weighting Mode Settings	
Decision-making and Control	Automatic
Interactivity	Automatic
Participation	Automatic
Responsiveness	Automatic
Service Delivery	Automatic
Transparency	Automatic

Path Coefficients: 'Value-creation' (VCEG) by collaborative e-governance (Mean, STDEV, T-Values, P-Values)

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Value-creation -> Decision-making and Control	0.773	0.773	0.031	25.342	0.000
Value-creation -> Interactivity	0.744	0.743	0.040	18.468	0.000
Value-creation -> Participation	0.631	0.629	0.058	10.976	0.000
Value-creation ->Responsiveness	0.837	0.839	0.017	48.119	0.000

Value-creation -> Service Delivery	0.816	0.817	0.027	30.289	0.000
Value-creation -> Transparency	0.844	0.844	0.019	45.477	0.000

Confidence intervals of 'Value-creation' (VCEG) by collaborative e-governance performance

	Original Sample (O)	Sample Mean (M)	2.5%	97.5%
Value-creation -> Decision-making and Control	0.773	0.773	0.708	0.824
Value-creation -> Interactivity	0.744	0.743	0.651	0.808
Value-creation -> Participation	0.631	0.629	0.508	0.730
Value-creation -> Responsiveness	0.837	0.839	0.800	0.869
Value-creation -> Service Delivery	0.816	0.817	0.753	0.863
Value-creation -> Transparency	0.844	0.844	0.799	0.877

Confidence Intervals Bias Corrected of 'Value-creation' (VCEG) by collaborative e-governance

	Original Sample (O)	Sample Mean (M)	Bias	2.5%	97.5%
Value-creation -> Decision-making and Control	0.773	0.773	0.000	0.703	0.822
Value-creation -> Interactivity	0.744	0.743	0.000	0.641	0.805
Value-creation -> Participation	0.631	0.629	-0.002	0.503	0.730
Value-creation -> Responsiveness	0.837	0.839	0.002	0.794	0.865
Value-creation -> Service Delivery	0.816	0.817	0.001	0.745	0.856
Value-creation -> Transparency	0.844	0.844	0.000	0.793	0.873

Base Data: 'Cost-effectiveness' (CEEG) by collaborative e-governance

Data file Settings	
Data file	CEGP thesis coding [210 records]
Missing value marker	None
Data Setup Settings	
Algorithm to handle missing data	None
Weighting Vector	-
PLS Algorithm Settings	
Data metric	Mean 0, Var 1
Initial Weights	1.0
Max. number of iterations	300
Stop Criterion (10^-X):	7
Use Lohmoeller settings?	No
Weighting scheme	Path
Bootstrapping Settings	
Complexity	Complete Bootstrapping
Confidence interval method	Bias-Corrected and Accelerated (BCa) Bootstrap
Parallel processing	Yes
Samples	500
Significance level	0.05
Test type	Two-Tailed
Construct Outer Weighting Mode Settings	
Efficient Utilization of Resources	Automatic
Savings of Money Paid to Middlemen	Automatic
Simple and Faster Execution of Processes	Automatic
Time and Effort Savings	Automatic

Path Coefficients: 'Cost-effectiveness' (CEEG) by collaborative e-governance (Mean, STDEV, T-Values, P-Values)

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Cost-effectiveness -> Efficient Utilization of Resources	0.875	0.876	0.017	52.096	0.000
Cost-effectiveness -> Savings of Money Paid to Middlemen	0.835	0.836	0.026	32.498	0.000
Cost-effectiveness -> Simple and Faster Execution of Process	0.741	0.743	0.034	21.589	0.000
Cost-effectiveness -> Time and Effort Savings	0.812	0.812	0.030	27.270	0.000

Confidence level: 'Cost-effectiveness' (CEEG) by collaborative e-governance (CEEG)

	Original Sample (O)	Sample Mean (M)	2.5%	97.5%
Cost-effectiveness -> Efficient Utilization of Resources	0.875	0.876	0.841	0.906
Cost-effectiveness -> Savings of Money Paid to Middlemen	0.835	0.836	0.778	0.877
Cost-effectiveness -> Simple and Faster Execution of Process	0.741	0.743	0.670	0.802
Cost-effectiveness -> Time and Effort Saving	0.812	0.812	0.747	0.863

Confidence level bias-corrected: 'Cost-effectiveness' (CEEG) by collaborative e-governance

	Original Sample (O)	Sample Mean (M)	Bias	2.5%	97.5%
Cost-effectiveness -> Efficient Utilization of Resources	0.875	0.876	0.000	0.839	0.903
Cost-effectiveness -> Savings of Money Paid to Middlemen	0.835	0.836	0.001	0.768	0.873
Cost-effectiveness -> Simple and Faster Execution of Process	0.741	0.743	0.002	0.662	0.798
Cost-effectiveness -> Time and Effort Savings	0.812	0.812	0.000	0.745	0.862

Base Data: 'Trust-development' (TDEG) by collaborative e-governance

Data file Settings	
Data file	CEGP thesis coding [210 records]
Missing value marker	none
Data Setup Settings	
Algorithm to handle missing data	None
Weighting Vector	-
PLS Algorithm Settings	
Data metric	Mean 0, Var 1
Initial Weights	1.0
Max. number of iterations	300
Stop Criterion (10^-X):	7
Use Lohmoeller settings?	No
Weighting scheme	Path
Bootstrapping Settings	
Complexity	Complete Bootstrapping
Confidence interval method	Bias-Corrected and Accelerated (BCa) Bootstrap
Parallel processing	Yes
Samples	500
Significance level	0.05
Test type	Two-Tailed
Construct Outer Weighting Mode Settings	
Customised Services Response	Automatic
Ease of Use of Services	Automatic
Reliability of Services	Automatic
Security and Privacy	Automatic
Usefulness of Services	Automatic

Path Coefficients: 'Trust-development' by collaborative e-governance (Mean, STDEV, T-Values, P-Values)

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Trust-development -> Customised Services Response	0.822	0.823	0.026	31.079	0.000
Trust-development -> Ease of Use of Services	0.854	0.856	0.022	39.436	0.000
Trust-development -> Reliability of Services	0.865	0.866	0.021	41.057	0.000
Trust-development -> Security and Privacy	0.848	0.849	0.022	38.785	0.000
Trust-development -> Usefulness of Services	0.836	0.839	0.020	41.710	0.000

Confidence intervals of 'Trust-development' (TDEG) by collaborative e-governance

	Original Sample (O)	Sample Mean (M)	2.5%	97.5%
Trust-development -> Customised Services Response	0.822	0.823	0.770	0.867
Trust-development -> Ease of Use of Services	0.854	0.856	0.809	0.893
Trust-development -> Reliability of Services	0.865	0.866	0.820	0.903
Trust-development -> Security and Privacy	0.848	0.849	0.804	0.886
Trust-development -> Usefulness of Services	0.836	0.839	0.797	0.875

Confidence Intervals Bias Corrected of 'Trust-development' (TDEG) by collaborative e-governance

	Original Sample (O)	Sample Mean (M)	Bias	2.5%	97.5%
Trust-development -> Customised Services Response	0.822	0.823	0.001	0.760	0.864
Trust-development -> Ease of Use of Services	0.854	0.856	0.001	0.806	0.891
Trust-development -> Reliability of Services	0.865	0.866	0.002	0.812	0.900
Trust-development -> Security and Privacy	0.848	0.849	0.001	0.801	0.884
Trust-development -> Usefulness of Services	0.836	0.839	0.002	0.786	0.870

Survey Questionnaire of Main Study

Strategic Collaboration and E-governance Performance:
A Study of Select Projects in India

This research aims to investigate your perception of 'Collaborative E-governance Performance' in India.

This questionnaire contains two parts. **Part I** is about the demographic profile and **Part II** is about Collaborative e-government performance.

Part I- Demographic information

1. Please select your gender
(a) Male   (b) Female

2. Please select your age group
(a) 18-24 (b) 25-35 (c)36-45 (d)46-55 (d)56 or above

3. Please select your highest qualification level
(a) Secondary/10th (b) Higher Secondary/12th (c) Graduate (d)Post Graduate (e) Professional Education (please mention)

4. Please select your profession
(a) Government Employee (b) Private Job (c) Self Employee (d)House Wife (d) Student

5. Please select the e-governance services you have used
(a) Passport Sewa Project (b) DDA's Leased hold to Freehold Conversion of Properties (c) DDA's Online Booking of Community Hall and Open Spaces (d) Driving License Project

Part II- Collaborative e-governance performance in India

Please rate your level of agreement on the following scale.
(1)   N: Nil, (2) S: To a small extent, (3) M: To a medium extent, (4) L: To a large extent,
(5)VL: To a very large extent

Aspects	N (1)	S (2)	M (3)	L (4)	VL (5)
The extent to which…					
6	the decision by the government for your application has been taken appropriately.					
7	the service website has a monitoring and control mechanism in respect of your application.					
8	the service website meets the prescribed service timelines in respect of your application.					
9	your queries and complaints are resolved through the e-governance service.					
10	the service website is well-structured and covers all aspects of your application.					
11	current and relevant information is delivered systematically.					
12	information about processes, procedures and required documents for transactions are available on the e-government website.					
13	the service website delivers information in multiple languages.					
14	the service website is accessible through Common Services Centers/Citizen Facilitation Centers.					
15	the e-government website has features with accessibility support to disabled persons such as the hearing impaired and visually challenged.					
16	the service website displays public policy, rules and regulations, etc.					
17	the service website displays an organizational chart, contact details, duties and responsibilities of staff.					
18	the service website provides the status of your applications and allows tracking.					
19	the government keeps you informed about upcoming policies that affect you through the website (ex. online newsletters, bulletin boards).					
20	online government service responds to an application form submission by providing confirmation, receipts, token numbers, etc.					
21	the government website responds to your queries and complaints.					
22	you receive automatic responses to online submissions and emails.					
23	the service website has a provision for citizens to request any help.					
24	you are allowed to participate in government discussion and policymaking.					
25	the government invites your opinion for decision making.					

26	your comments and valuable inputs are accepted by the government organisation.					
27	the government organisation shares updated policies and procedures online with citizens.					
28	Multiple options for interactions like telephone, face-to-face, e-mail, etc. for e-government projects are provided.					
29	assistance through call centres is provided for interactions.					
30	programmes/events are organized for spreading awareness of government schemes.					
31	videos/presentations are made available for better understanding.					
32	the inconvenience of travelling for availing of e-governance services is reduced.					
33	the time spent waiting in queue for availing of e-governance services is reduced.					
34	only limited visits are required for availing of government service.					
35	lesser efforts are required for availing of government service.					
36	online transaction saves paperwork and other resources.					
37	the e-government applications help to limit duplication of efforts and resources.					
38	online government services are cheaper as compared to physical modes of services.					
39	online government services are simple having full information and you need not take the help of middlemen.					
40	role of agent between the user and the government has been removed.					
41	e-government has reduced corruption by creating fear of exposure.					
42	the address of the e-government website is simple.					
43	the online government services are simple compared to physical modes of availing services.					
44	the online government services are faster as compared to physical modes of availing services.					
45	information provided by the service website is relevant.					
46	information provided by the service website is up-to-date.					
47	Frequently Asked Questions (FAQs) are given on the service website.					
48	the service website has links to other useful e-governance websites.					
49	the service website has adequate security features.					
50	online transactions for payment are secure and organisations take full responsibility for any privacy breach.					
51	the e-government website does not share my personal information with other sites.					
52	you feel confident that encryption and other technological advancements on the Internet make it safe for me to transact.					
53	the service website remains fully functional and generates no errors.					

54	the service website is reliable in terms of accuracy of service delivery and information.					
55	online filing of forms and making the payment is trustworthy.					
56	you can rely on the government organisation to comply with the information given on the service website.					
57	the service website is simple and user-friendly.					
58	the service website is easy to browse and navigate.					
59	the service website works properly with your default browser.					
60	the service website is menu-driven, tooltips enabled, and the search engine helps to find the correct pages.					
61	you receive the relevant and accurate response for your query and complaint.					
62	you are given pick and choose options to submit your query.					
63	Response systems of e-government are comprehensive and beneficial.					

TEMPLATE FOR TISM
(Domain Expert Survey)

Part A

Please fill in your details below:

Your good name:…………………………………………………………………………...
Name of the organisation in which you work: …………………………………………
Your Designation/Position in the organisation ………………………………………..
Your email id: ……………………………………………………………………………
Contact no.: ..………………………………………………………………………………

Part B

Please indicate your response to the relationship between the various types of forces/enablers of 'Collaborative e-governance performance' in India. Please indicate if you agree or disagree by indicating 'Y' for 'Yes' and 'N' for 'No' for the following statements and also cite the reason for the same, in brief specifically when you agree i.e. your response is 'Y'.

S.no.	Element Code	Paired Comparisons of an element of 'Value-creation' (VCEG) by collaborative e-governance	Y/N	How or in what way does a variable influence/enhance the other variable ? Give reason in brief.
VCDM: Decision-making and Control				
1	VCDM-VCSD	Decision making and control will influence or enhance Service delivery		
2	VCSD-VCDM	Service delivery will influence or enhance Decision-making and control		
3	VCDM-VCRP	Decision-making and control will influence or enhance Responsiveness		
4	VCRP-VCDM	Responsiveness will influence or enhance Decision-making and control		
5	VCDM-VCTP	Decision-making and control will influence or enhance Transparency		
6	VCTP-VCDM	Transparency will influence or enhance Decision-making and control		
7	VCDM-VCPT	Decision-making and control will influence or enhance Participation		
8	VCPT-VCDM	Participation will influence or enhance Decision-making and control		
9	VCDM-VCIT	Decision-making and control will influence or enhance Interactivity		

10	VCIT-VCDM	Interactivity will influence or enhance Decision-making and control		
11	VCDM-VCEG	Decision-making and control will influence or enhance Value-creation		
12	VCEG-VCDM	Value-creation will influence or enhance Decision-making and control		
VCSD: Service Delivery				
13	VCSD-VCRP	Service delivery will influence or enhance Responsiveness		
14	VCRP-VCSD	Responsiveness will influence or enhance Service delivery		
15	VCSD-VCTP	Service delivery will influence or enhance Transparency		
16	VCTP-VCSD	Transparency will influence or enhance Service delivery		
17	VCSD-VCPT	Service delivery will influence or enhance Participation		
18	VCPT-VCSD	Participation will influence or enhance Service delivery		
19	VCSD-VCIT	Service delivery will influence or enhance Interactivity		
20	VCIT-VCSD	Interactivity will influence or enhance Service delivery		
21	VCSD-VCEG	Service Delivery will influence or enhance Value-creation		
22	VCEG-VCSD	Value-creation will influence or enhance Service delivery		
VCRP: Responsiveness				
23	VCRP-VCTP	Responsiveness will influence or enhance Transparency		
24	VCTP-VCRP	Transparency will influence or enhance Responsiveness		
25	VCRP-VCPT	Responsiveness will influence or enhance Participation		
26	VCPT-VCRP	Participation will influence or enhance Responsiveness		
27	VCRP-VCIT	Responsiveness will influence or enhance Interactivity		
28	VCIT-VCRP	Interactivity will influence or enhance Responsiveness		
29	VCRP-VCEG	Responsiveness will influence or enhance Value-creation		
30	VCEG-VCRP	Value-creation will influence or enhance Responsiveness		
VCTP: Transparency				
31	VCTP-VCPT	Transparency will influence or enhance Participation		
32	VCPT-VCTP	Participation will influence or enhance Transparency		
33	VCTP-VCIT	Transparency will influence or enhance Interactivity		

34	VCIT-VCTP	Interactivity will influence or enhance Transparency		
35	VCTP-VCEG	Transparency will influence or enhance Value-creation		
36	VCEG-VCTP	Value-creation will influence or enhance Transparency		
VCPT: Participation				
37	VCPT-VCIT	Participation will influence or enhance Interactivity		
38	VCIT-VCPT	Interactivity will influence or enhance Participation		
39	VCPT-VCEG	Participation will influence or enhance Value-creation		
40	VCEG-VCPT	Value-creation will influence or enhance Participation		
VCIT: Interactivity				
41	VCIT-VCEG	Interactivity will influence or enhance Value-creation		
42	VCEG-VCIT	Value-creation will influence or enhance Interactivity		
Paired Comparisons of an element of 'Cost-effectiveness' (CEEG) by collaborative e-governance				
CETS: Time and Efforts Savings				
1	CETS-CEEU	Time and efforts savings will influence or enhance the Efficient utilization of resources		
2	CEEU-CETS	Efficient utilisation of resources will influence or enhance Time and efforts savings		
3	CETS-CESM	Time and efforts savings will influence or enhance the Savings of money paid to the middleman		
4	CESM-CETS	Savings of money paid to the middleman will influence or enhance Time and efforts savings		
5	CETS-CESF	Time and efforts savings will influence or enhance Simplification and faster execution of processes		
6	CESF-CETS	Simplification and faster execution of processes will influence or enhance Time and efforts savings		
7	CETS-CEEG	Time and efforts savings will influence or enhance Cost-effectiveness		
8	CEEG-CETS	Cost-effectiveness will influence or enhance Time and efforts savings		
CEEU: Efficient Utilisation of Resources				
9	CEEU-CESM	Efficient utilisation of resources will influence or enhance Savings of money paid to the middleman		

10	CESM-CEEU	Savings of money paid to the middleman will influence or enhance the Efficient utilisation of resources		
11	CEEU-CESF	Efficient utilisation of resources will influence or enhance Simplification and faster execution of processes		
12	CESF-CEEU	Simplification and faster execution of processes will influence or enhance Efficient utilisation of resources		
13	CEEU-CEEG	Efficient utilisation of resources will influence or enhance Cost-effectiveness		
14	CEEG-CEEU	Cost-effectiveness will influence or enhance Efficient utilisation of resources		
CESM: Savings of Money Paid to Middlemen				
15	CESM-CESF	Savings of money paid to the middleman will influence or enhance Simplification and faster execution of processes		
16	CESF-CESM	Simplification and faster execution of processes will influence or enhance Savings of money paid to the middleman		
17	CESM-CEEG	Savings of money paid to the middleman will influence or enhance Cost-effectiveness		
18	CEEG-CESM	Cost-effectiveness will influence or enhance Savings of money paid to the middleman		
CESF: Simplification and Faster Execution of Processes				
19	CESF-CEEG	Simplification and faster execution of processes will influence or enhance Cost-effectiveness		
20	CEEG-CESF	Cost-effectiveness will influence or enhance Simplification and faster execution of processes		
Paired Comparisons of an element of 'Trust-development' (TDEG) by collaborative e-governance				
TDUS: Usefulness of Services				
1	TDUS-TDSP	The usefulness of services will influence or enhance the security and privacy of data		
2	TDSP-TDUS	Security and privacy of data will influence or enhance the Usefulness of services		
3	TDUS-TDRL	The usefulness of services will influence or enhance the Reliability of services		

4	TDRL-TDUS	Reliability of services will influence or enhance the Usefulness of services		
5	TDUS-TDEU	The usefulness of services will influence or enhance the Ease of use of services		
6	TDEU-TDUS-	Ease of use of services will influence or enhance the Usefulness of services		
7	TDUS-TDCR	The usefulness of services will influence or enhance Customized services response		
8	TDCR-TDUS-	Customized services response will influence or enhance the Usefulness of services		
9	TDUS-TDEG	The usefulness of services will influence or enhance Trust-development		
10	TDEG-TDUS	Trust development will influence or enhance the Usefulness of services		
TDSP: Security and privacy of data				
11	TDSP-TDRL	Security and privacy of data will influence or enhance the Reliability of services		
12	TDRL-TDSP	The reliability of services will influence or enhance the security and privacy of data		
13	TDSP-TDEU	Security and privacy of data will influence or enhance the Ease of use of services		
14	TDEU-TDSP	Ease of use of services will influence or enhance the security and privacy of data		
15	TDSP-TDCR	Security and privacy of data will influence or enhance Customized services response		
16	TDCR-TDSP	Customized services response will influence or enhance the security and privacy of data		
17	TDSP-TDEG	Security and privacy of data will influence or enhance Trust-development		
18	TDEG-TDSP	Trust development will influence or enhance the security and privacy of data		
TDRL: Security and Privacy				
19	TDRL-TDEU	The reliability of services will influence or enhance the Ease of use of services		
20	TDEU-TDRL	Ease of use of e-governance services will influence or enhance the Reliability of services		

21	TDRL-TDCR	Reliability of services will influence or enhance Customized services response		
22	TDCR-TDRL	Customized services response will influence or enhance the Reliability of services		
23	TDRL-TDEG	Reliability of services will influence or enhance Trust-development		
24	TDEG-TDRL	Trust development will influence or enhance the Reliability of services		
TDEU: Ease of Use of Services				
25	TDEU-TDCR	Ease of use of services will influence or enhance Customized services response		
26	TDCR-TDEU	Customized services response will influence or enhance the Ease of use of services		
27	TDEU-TDEG	Ease of use of services will influence or enhance Trust-development		
28	TDEG-TDEU	Trust development will influence or enhance the Ease of use of services		
TDCR: Customized Services Response				
29	TDCR-TDEG	Customized services will influence or enhance Trust-development		
	TDEG-TDCR	Trust development will influence or enhance the Ease of use of services		

'Collaborative e-governance performance' (CEGP) – Indicators.

Indicators	Statements
DMC1	The government decision on my application has been taken favourably
DMC2	Application status is displayed on the website
DMC3	Service timelines for my work appropriately followed
DMC4	Queries and complaints are resolved
DMC5	The service website is well-structured and widely informative
ITN1	Interactions via telephone, face-to-face, e-mail, etc. are provided
ITN2	Call centres are there for live interactions
ITN3	Campaigning is done for government programs/events
ITN4	A live webcast is done for a better understanding
PTN1	Citizens can participate in government meetings
PTN2	Government invites citizen's opinions for decision making
PTN3	Government accepts comments and valuable inputs
PTN4	Government shares updated policies and procedures for citizens
RSP1	Response in the form of text messages, receipts, token numbers, etc. are given
RSP2	Queries and complaints are responded
RSP3	Automatic responses to submission and emails are there
RSP4	The website has a provision for citizens to request any help
SDL1	Relevant and up-to-date information is delivered
SDL2	Full disclosure about processes and procedures are given
SDL3	Content is delivered in multiple languages
SDL4	The website is accessible through Common Services Centers
SDL5	*A disabled person too can access the website*
TRP1	Public policy, rules and regulations are available and displayed
TRP2	The organization chart, contact details, duties and responsibilities are displayed
TRP3	Application is trackable
TRP4	Upcoming information is published
EUR1	Online transaction saves paperwork and other resources
EUR2	Minimization of duplication of efforts and resources
EUR3	Online services are cheaper
SMP1	Online services enable the government availing services directly from the government
SMP2	The role of an agent between the citizen and the government removed
SMP3	Corruption is reduced by creating fear of exposure
SFE1	The service website is simple
SFE2	Online services are simple compared to physical modes of availing services
SFE3	Online services are faster
TES1	The inconvenience of travelling is reduced
TES2	Waiting in the queue for availing services is reduced
TES3	Only limited visits are required for service
TES4	Lesser efforts are required for service
UES1	Useful information provided
UES2	Updated information provided is there
UES3	Answer to FAQs is given
UES4	Other useful links are available
SPD1	Adequate data security features are available
SPD2	The organization take full responsibility for any loss and breach
SPD3	Personal information is not sharable

SPD4	Citizens are confident about the technological advancement that make transactions safe
RES1	The website is fully functional and generates no error
RES2	Website is reliable in terms of accuracy of information and service delivery
RES3	Making an online payment is trustworthy
RES4	The citizen can rely upon the information to comply with
EUS1	The website is easy to use and user-friendly
EUS2	The website is easy to browse and navigate
EUS3	The website supports multiple browsers
EUS4	The website is menu-driven and with search engine
CSR1	Relevant and accurate response to citizen queries and complaints
CSR2	Pre-listed options are available to submit the query
CSR3	Response systems are comprehensive and beneficial

Questionnaires for Pilot Study

(a) Strategic Collaboration

Aspects	N (1)	S (2)	M (3)	L (4)	VL (5)
Absorptive capacity (Acap)					
The extent to which you/your department for Lease-hold-to-Free-hold conversion of properties…					
Acap1: identified external information and knowledge from other departments/divisions					
Acap2: analyzed information and knowledge gained from other departments					
Acap3: integrated existing information with new knowledge acquired					
Acap4: exploited new integrated knowledge for online Lease-hold-to-Free-hold conversion					
Coordination capability (Ccap)					
Extent to which you/your department for Lease-hold-to-Free-hold conversion of properties…					
Ccap1: work output is synchronized with the work of other departments					
Ccap2: used appropriate resources like information, time, agenda etc., to communicate with concerned departments					
Ccap3: taken part in departments' decision-making process					
Ccap4: found that there is a compatibility between group member's expertise and online Lease-hold-to-Free-hold conversion processes					
Integrative capability (Icap)					
Extent to which you/your department for Lease-hold-to-Free-hold conversion of properties…					
Icap1: contributed individual input with departments					
Icap2: have an understanding of each other's (departments) tasks and responsibilities					
Icap3: are fully aware of specific skills and relevant knowledge of work					
Icap4: successfully interrelate actions with other departments to meet changing situations					

(N: Nil, S: To a small extent, M: To a medium extent, L: To a large extent, VL: To a very large extent)

(b) E-governance Performance

Aspects	N (1)	S (2)	M (3)	L (4)	VL (5)
Efficiency (Eff)					
Eff1: Extent to which Online Leased-hold-to-Free-hold conversion transaction is spontaneous					
Eff2: Extent to which the inconvenience of travelling and time spent waiting in line for Leased-hold-to-Free-hold conversion is removed					
Eff3: Extent to which Online Leased-hold-to-Free-hold conversion transaction saves paperwork and other resources					

		N	S	M	L	VL
Eff4:	Extent to which Online Leased-hold-to-Free-hold services are cheaper as compared to physical modes of services					
Transparency (Trp)						
Trp1:	Extent to which information about Leased-hold-to-Free-hold conversion processes, procedures and required documents for transactions are available on the website					
Trp2:	Extent to which Leased-hold-to-Free-hold service provides the status of online applications and allows tracking					
Trp3:	Extent to which Leased-hold-to-Free-hold services respond to online filling up forms by providing confirmations, receipts, etc					
Trp4:	Extent to which a wider choice of interactions like telephone, face-to-face interaction, etc. for Leased-hold-to-Free-hold conversion are provided					
Reliability (Rel)						
Rel1:	Extent to which online filing of forms and making payment for Leased-hold-to-Free-hold is trustworthy					
Rel2:	Extent to which Leased-hold-to-Free-hold transactions for payment are secure and organisations take full responsibility for any privacy breach					
Rel3:	Extent to which services are fully functional and generate no error					
Rel4:	Extent to which customer services are responsive					
Interactivity (Int)						
Int1:	Extent to which Online Leased-hold-to-Free-hold services are menu-driven, tooltips enabled, and search engine helps to find the correct pages					
Int2:	Extent to which current and relevant information are provided sequentially and systematically					
Int3:	Extent to which I learnt about policies and procedures that help in locating Leased-hold-to-Free-hold conversion services and post-service support					
Int4:	Extent to which feedback systems for Lease-hold-to-Free-hold are comprehensive and beneficial					

N: Nil, S: To a small extent, M: To a medium extent, L: To a large extent, VL: To a very large extent

Observed mean values of micro variables construct of the pilot study for
Strategic Collaboration

	N	Range	Minimum	Maximum	Mean	Mean
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
Acap1	40	1.00	.00	1.00	.56	.05
Acap2	40	1.00	.00	1.00	.53	.05
Acap3	40	1.00	.00	1.00	.56	.03
Acap4	40	1.00	.00	1.00	.56	.04
Ccap1	40	1.00	.00	1.00	.51	.03
Ccap2	40	.75	.25	1.00	.66	.03
Ccap3	40	1.00	.00	1.00	.54	.05
Ccap4	40	1.00	.00	1.00	.46	.03
ICap1	40	1.00	.00	1.00	.55	.05
ICap2	40	1.00	.00	1.00	.58	.05
ICap3	40	.75	.25	1.00	.55	.04
ICap4	40	1.00	.00	1.00	.58	.04
Valid N (listwise)	**40**					

Observed mean values of micro variables construct of the pilot study for E-governance
Performance

	N	Range	Minimum	Maximum	Mean	Mean
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
Eff1	40	1.00	.00	1.00	.62	.04
Eff1	40	.75	.25	1.00	.60	.04
Eff3	40	1.00	.00	1.00	.73	.04
Eff4	40	.75	.25	1.00	.66	.03
Trp1	40	1.00	.00	1.00	.64	.04
Trp2	40	.75	.25	1.00	.65	.04
Trp3	40	1.00	.00	1.00	.63	.04
Trp4	40	1.00	.00	1.00	.55	.03
Rel1	40	1.00	.00	1.00	.71	.03
Rel2	40	1.00	.00	1.00	.65	.04
Rel3	40	1.00	.00	1.00	.53	.04
Rel4	40	1.00	.00	1.00	.51	.04
Int1	40	1.00	.00	1.00	.58	.04
Int2	40	1.00	.00	1.00	.61	.04
Int3	40	1.00	.00	1.00	.52	.04
Int4	40	1.00	.00	1.00	.53	.03
Valid N (listwise)	**40**					