E-Government Services Effectiveness Evaluation Framework (E-GEEF) A Case Study of Indian E-tax Service

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by

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Ph.D. Thesis Abstract

Technological amplification has expended the involvement of information and communication technology in public sectors and enhanced governmental dependence on information systems which restrains the management attention towards improving the effectiveness of e-government services. Based on the analytical review of literature, it was found that most of the e-government evaluation models address the e-service dimensions that assess the quality of e-government websites. This gives a very constrict perspective to e-government and ignores the key dimensions. It becomes important to understand how citizens perceive and evaluate e-government services. This involves defining what e-government service is, identifying its underlying dimensions, and determining how it can be measured. Therefore, periodical evaluation of the effectiveness of e-government services becomes essential.

Foregoing discussion clearly indicates the necessity of developing a well founded e-government e-service effectiveness evaluation framework which not only evaluates the e-government service effectiveness but also evaluatesthe e-government service quality criteria and the citizens' perception in the form of citizens' trust in offered e-services. Thus, the objective of this study was to develop a framework (E-GEEF) "e-government service effectiveness evaluation framework" that assesses e-government service effectiveness from the citizens' (G2C) perspective. A systematic study of the existing e-government service assessment frameworks has been carried out to establish the basis for conceptualizing a theoretical framework called e-government service effectiveness evaluation framework (E-GEEF). In this research, the author attempts to explore the underlying dimensions and factors of e-government services, and has proposed an effectiveness evaluation framework (E-GEEF). Present empirical research adapted DeLone and McLean, (2003) IS success model as base model which is upgradable and extendable, hence additional dimensions were incorporated to develop a novel framework (E-GEEF) for evaluating the effectiveness of e-government service. The suggested framework has identified number of measuring dimensions and associated items within each dimension for (E-GEEF). System quality, information quality, and service quality dimensions were adopted from DeLone and McLean (2003) IS success model and "intension to use and user satisfaction" dimensions were re-specified in proposed framework (E-GEEF) as "citizens' use / usefulness" and "citizens' satisfaction".

Further, “citizens’ trust, perceived e-government service quality, and perceived effectiveness” were incorporated as new dimensions in the proposed framework (E-GEEF). Three new dimensions were identified and two existing dimensions were re-specified for evaluating the effectiveness of e-government service. Sixteen hypotheses were formulated from literature on existing e-government assessment frameworks to test the proposed framework (E-GEEF). In order to test the proposed framework and their associated dimensions, Indian e-tax service was consideredbecause e-tax service of Indian e-government is utilized by several Indian citizens for filing their taxes. Preliminary qualitative study was carried out carefully to ensure whether all important dimensions and measurement items were included in the proposed framework E-GEEF in the right research context or not.

Empirical research has used quantitative analysis for validating the proposed framework (E-GEEF). Data collection was done using survey which was conducted among citizens of India who have been utilizing e-tax service as users. Descriptive statistical analysis was performed to ensure the data normality by using SPSS 20. Structural equation modeling statistical technique was applied using AMOS 21 on the collected data for testing the hypotheses.

The empirical research findings have confirmed most of the hypothesized relationships within the validated framework (E-GEEF). Consequently, in terms of the theoretical implications, this study emphasizes the significance of such hypothesized relationships when performing empirical research in e-government context. Key findings demonstrated the strong relationships of perceived e-government service quality with system quality, information quality, service quality, and citizens’ satisfaction. Further, citizens’ trust exhibited direct relationships with perceived e-government service quality and perceived effectiveness of e-government service. Thus, as a major contribution to the proposed research, the identified new dimensions “perceived e-government service quality, citizens’ trust, perceived effectiveness” and re-specified dimensions “citizens’ use/usefulness and citizens’ satisfaction” have shown great significance in evaluating effectiveness of e-government e-tax service in Indian G2C context. The developed and validated framework (E-GEEF) provides government agencies with an appropriate approach and dimensions in order to evaluate the effectiveness of e-government services.

Key Words: E-government, e-service, system quality, information quality, service quality, citizens’ satisfaction, citizens’ trust, effectiveness, performance, framework, evaluation, ICT.

Dedication

"Praise to Allah the Almighty, Creator, and Sustainers of the Universe" My thesis is dedicated to my family, who's continuous moral support, affection, and never ended source of inspiration throughout the passage of the journey kept me motivated.

To my father, Late Mr. Syed Rehan Hussain Zaidi, the great source of motivation and inspiration that always motivated me to go for higher studies. Without his motivation this study couldn't possible to accomplish.

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Finally, I acknowledge the London Metropolitan University and associated staff which assisted me in conducting this research work.

Declaration

I hereby declare that the contents of this thesis are original and have not been submitted in whole or in part for the consideration of any other previously obtained degree at any other university. I followed academic rules and ethical conducts carefully while presenting the information in this thesis. I further declare that the ideas, results, findings and conclusions reported in this thesis are exclusively my own work. I have referenced and cited all material in this thesis appropriately. To the best of my understanding and belief, without proper citations, no material is included in this thesis that has been previously written and published by other authors.

Syed Faizan Hussain Zaidi

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List of Publications

1. Zaidi, S. F. H., Siva, S., and Marir, F. (2014), "Development and Validation of a Framework for Assessing the Performance and Trust in e-government Service", *International Journal of Applied Information Systems (IJAIS), Foundation of Computer Science, FCS,* vol. 7, no. 4, **New York, USA.**
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TABLE OF CONTENTS

ABSTRACT	i
DEDICATION	iii
ACKNOWLEDGEMENT	iv
DECLARATION	v
LIST OF PUBLICATIONS	vi
CITATIONS	vii
TABLE OF CONTENTS	xii
LIST OF TABLES	xviii
LIST OF FIGURES	xxi
LIST OF ABRREVIATIONS	xxiii
CHAPTER 1: Introduction	1
1.1 The Concept of E-government	2
1.2 E-government: An Introduction	3
1.2.1 E-government Evaluation	4
1.2.2 E-government Services and Quality	5
1.2.3 Citizen Satisfaction and Citizen Trust with E-government	6
1.3 Research Background	7
1.4 E-government Research in the Context of India	10
1.5 UK E-government Ranking	11
1.6 Research Problem	12
1.7 Statement of the Problem	14
1.8 Research Questions	15
1.9 Research Aim and Objectives	15
1.10 Overview of the Research Methodology	16
1.11 Scope of the Study	18

1.12 Limitations of the Research Work 18
1.13 Expected Contribution to the knowledge 19
1.14 Introduction to the Framework (E-GEEF) 21
1.15 Thesis Outline 23
1.16 Summary 24

CHAPTER 2: Literature Review 26
2.1 E-government: An Overview 27
2.2 E-government Definitions, Perspectives, and Taxonomy 28
2.2.1 E-government Definitions and Perspectives 28
2.2.2 Taxonomy of E-government 30
2.3 E-government Performance Assessment Frameworks 32
2.3.1 E-Government Evaluation Frameworks and their Context 33
2.3.2 Information Systems, E-Commerce and E-Government Success Evaluation Models 34
2.3.2.1 DeLone & McLean Information System Success (1992) 36
2.3.2.2 DeLone & McLean, (1992) IS Success Model's Extensions 37
2.3.2.3 Updated DeLone & McLean Model (2003) 40
2.3.2.4 E-government Success Models 41
2.4 E-Government E-Services 43
2.4.1 E-Service Quality Concepts 43
2.4.2 E-government Service Quality and Models 45
2.5 Trust in E-Government 49
2.5.1 Concept of Trust in E-Government 49
2.5.2 Citizens' Satisfaction and Trust Relationship in E-government 51
2.6 E-Government Assessment Frameworks with Reference to India 54
2.7 Findings and Limitations of Various E-government Assessment Frameworks 56
2.8 Summary 63

CHAPTER 3: Theoretical Development of Framework (E-GEEF) 64
3.1 Background and Framework (E-GEEF) Development Approach 65

3.2 Explanation of using DeLone and McLean (2003) IS Success Model 66
3.3 Proposed Theoretical Framework (E-GEEF) 69
3.4 Description of the Proposed Framework (E-GEEF) 72
3.4.1 System Quality 72
3.4.2 Information Quality 75
3.4.3 Service Quality 78
3.4.4 Citizen's Use / Usefulness 81
3.4.5 Citizens' Satisfaction 84
3.4.6. Citizens' Trust 86
3.4.7 Perceived E-government Service Quality 89
3.4.8 Perceived Effectiveness 90
3.5 E-GEEF Framework's Dimensions and Measurement Items 92
3.6 Hypotheses for Proposed Framework (E-GEEF) 93
3.7 Summary 94

CHAPTER 4: Research Methodologies 95
4.1 Research Methodology for Framework Validation 97
4.2 Research Approach and Rationale of Selection 99
4.2.1 Quantitative Research Approach 101
4.2.2 Qualitative Research Approach 103
4.3 Research Design 105
4.4 Research Strategy 106
4.5 Research Method 109
4.6 Survey Method 109
4.6.1 Questionnaire 110
4.6.2 Questionnaires Evaluation Scale 111
4.6.3 Sampling 112
4.6.3.1 Defining Target Population (Users of e-Tax Service in India) 113
4.6.3.2 Selection of Sample Frame 113
4.6.3.3 Selecting the Sampling Methods 114
4.6.3.4 Sampling Size 115

4.7 Data Collection 115
4.7.1 Developing the Measures for the Study 115
4.7.2 Specifying the Domain of the Construct 116
4.7.3 Generation of Item Scales 116
4.8 Data Analysis 116
4.8.1 Descriptive Statistics 117
4.8.2 Structural Equation Modeling 118
4.9 Measurement Model 119
4.9.1 Confirmatory Analysis 120
4.9.2 Measurements of Model Fit 121
4.9.3 Overall Model Fit 121
4.10 Instrument Validation 122
4.10.1 Instrument's Reliability Analysis 123
4.10.2 Instrument's Validity Analysis 124
4.10.2.1 Content Validity 124
4.10.2.2 Construct Validity 124
4.10.2.2.1 Discriminant Validity 125
4.10.2.2.2 Convergent Validity 125
4.11 Structural Model Assessment 126
4.12 Data Storage and Disposal 126
4.13 Summary 127

CHAPTER 5: Data Analysis **128**
5.1 Preliminary Qualitative Study 130
5.1.1 Interviews for Preliminary Study 130
5.1.2 Archival Records 135
5.2 Quantitative Data Analysis 137
5.3 Participants Profile 138
5.4 Data Cleaning and Preparation 139
5.5 Missing Values 140
5.6 Assessing Normality 140

5.6.1 System Quality 141
5.6.2 Information Quality 142
5.6.3 Service Quality 144
5.6.4 Citizens' Use /Usefulness 146
5.6.5 Citizens' Satisfaction 147
5.6.6 Citizens' Trust 149
5.6.7 Perceived E-government Service Quality 151
5.6.8 Perceived Effectiveness 152
5.6.9 Histogram for Data Normality 154
5.7 Exploratory Factor Analysis 155
5.8 Reliability of Measurements of the Constructs 158
5.9 Structural Equation Modeling 159
5.9.1 Confirmatory Factor Analysis (CFA) 159
5.9.1.1 CFA for System Quality 161
5.9.1.2 CFA for Information Quality 163
5.9.1.3 CFA for Service Quality 165
5.9.1.4 CFA for Citizens' Use 168
5.9.1.5 CFA for Citizens' Satisfaction 169
5.9.1.6 CFA for Citizens Trust 171
5.9.1.7 CFA for Perceived E-government Service Quality 173
5.9.1.8 CFA for Perceived Effectiveness 175
5.9.2 Measurement Model Fit (with all constructs) 176
5.9.2.1 Goodness-of-fit (GOF) indices of proposed model 176
5.9.2.1.1 First Round Simulation for Model Fit 179
5.9.2.1.2 Second Round Simulation for Model Fit 183
5.9.2.1.3 Third Round Simulation for Model Fit 187
5.9.2.1.4 Fourth Round Simulation for Model Fit 190
5.9.2.1.5 Fifth Round Simulation for Model Fit 194
5.9.2.1.6 Proposed Revised Measurement Model Overall Fit 198
5.10 Reliability and Validity Analysis of Measurement Model 202
5.10.1 Constructs' Reliability 202

5.10.2 Constructs' Validity 204
5.10.2.1 Convergent Validity 204
5.10.2.2 Dicriminanat Validity 206
5.11 Structural Model and Hypotheses Testing 207
5.12 Proposed Modified Framework E-GEEF 213
5.13 Summary 216

CHAPTER 6: Results and Discussion **218**
6.1 Introduction 219
6.2 Overview of the Study 220
6.3 Discussion on Main Findings 221
6.4 Discussion on Hypotheses Testing 222
6.5 Discussion on Theoretical Implications 245
6.6 Discussion on Practical Implications 246
6.7 How to use Framework E-GEEF 248
6.8 Summary 249

CHAPTER 7: Conclusions **251**
7.1 Overview of the Research 252
7.2 Research Aim and Answering Research Questions 254
7.3 Contribution to Knowledge and Research Novelty 256
7.4 Research Limitations 260
7.5 Direction for Future Work 262
7.6 Research Conclusion 264
References 265
Appendix A 294
Appendix B 298

List of Tables

Table 2.1: Definitions according to different e-government perspectives 29
Table 2.2: E-government performance evaluation frameworks: key findings and limitations 58
Table 3.1: System quality and identified attributes 74
Table 3.2: Hypotheses related to system quality 75
Table 3.3: Information quality and identified attributes 77
Table 3.4: Hypotheses related to information quality 78
Table 3.5: Service quality and identified attributes 79
Table 3.6: Hypotheses related to service quality 80
Table 3.7: Citizens' use /usefulness and identified attributes 83
Table 3.8: Hypotheses related to use / usefulness 84
Table 3.9: Citizens' satisfaction and identified attributes 85
Table 3.10: Hypotheses related to citizens' satisfaction 86
Table 3.11: Citizens' trust and identified attributes 87
Table 3.12: Hypotheses related to citizens' trust 88
Table 3.13: Hypotheses related to perceived e-government service quality 90
Table 3.14: Dimensions and list of items in proposed E-GEEF framework 92
Table 4.1: Epistemology, theoretical perspectives, methodology and Research methods relationships 100
Table 4.2: Methodological and paradigmatic diversity in IS research 100
Table 4.3: Quantitative approach (comparison Strengths Vs Weaknesses) & relationship to the present study 102
Table 4.4: Qualitative approach (Comparison Strengths Vs Weaknesses) & relationship to the present study 104
Table 4.5: Comparison table between various research designs 105
Table 4.6: Research strategies and research questions 107
Table 4.7: Model fit indices for Goodness of Fit 122
Table 4.8: Cronbach's Coefficient (α) for internal consistency 123
Table 4.9: Criteria for convergent validity 126

Table 5.1: Preliminary qualitative study and results mapping with E-GEEF 131
Table 5.2: Summary of archival records of e-tax filing statistics in India 136
Table 5.3: Respondents gender ratio 138
Table 5.4: Descriptive statistics for system quality items 141
Table 5.5: Summated system quality 142
Table 5.6: Descriptive statistics for information quality items 143
Table 5.7: Summated information quality 143
Table 5.8: Descriptive statistics for service quality items 145
Table 5.9: Summated service quality 145
Table 5.10: Descriptive statistics for citizens' use items 146
Table 5.11: Summated citizens' use 147
Table 5.12: Descriptive statistics for citizens' satisfaction items 148
Table 5.13: Summated citizens' satisfaction 148
Table 5.14: Descriptive statistics for citizens' trust items 149
Table 5.15: Summated citizens' trust 150
Table 5.16: Descriptive statistics for perceived e-governments service quality items 151
Table 5.17: Summated perceived e-government service quality 152
Table 5.18: Descriptive statistics for perceived effectiveness items 153
Table 5.19: Summated perceived effectiveness 153
Table 5.20: Exploratory factor analysis 157
Table 5.21: Cronbach's alpha values for the dimensions/constructs 158
Table 5.22: Identified dimensions/constructs and associated items for analysis 160
Table 5.23: Fit indices values for system quality 162
Table 5.24: MLE for system quality (II – time CFA) 163
Table 5.25: Fit indices values for information quality 164
Table 5.26: MLE for information quality (II time CFA) 165
Table 5.27: Fit indices values for service quality 167
Table 5.28: MLE for service quality (II time CFA) 167
Table 5.29: Fit indices values for citizens' use 169
Table 5.30: MLE for citizens' use (II time CFA) 169
Table 5.31: Fit indices values for citizens' satisfaction 171

Table 5.32: MLE for citizens' satisfaction (II time CFA) 171
Table 5.33: Fit indices values for citizens' trust 172
Table 5.34: MLE for citizens' trust (II time CFA) 173
Table 5.35: Fit indices values for perceived e-government service quality 174
Table 5.36: MLE for perceived e-government service quality (I time CFA) 174
Table 5.37: Fit indices values for perceived effectiveness 175
Table 5.38: MLE for perceived effectiveness (I time CFA) 176
Table 5.39: Model Fit Indices after First Round Simulation
(With measurement model with all constructs) 180
Table 5.40: Other Estimates of Model Fit Indices 182
Table 5.41: Model Fit Indices after Second Round Simulation 185
Table 5.42: Other Estimates of Model Fit Indices in Second Round Simulation 185
Table 5.43: Model Fit Indices after Third Round Simulation 187
Table 5.44: Other Estimates of Model Fit Indices in Third Round Simulation 189
Table 5.45: Model Fit Indices after Fourth Round Simulation 191
Table 5.46: Other Estimates of Model Fit Indices in Fourth Round Simulation 193
Table 5.47: Model Fit Indices after Fifth Round Simulation 195
Table 5.48: Other Estimates of Model Fit Indices in Fifth Round Simulation 197
Table 5.49: Model Fit Indices of Proposed Revised Model 199
Table 5.50: Modification Indices of Revised Measurement Model after Items Deletions 201
Table 5.51: Constructs' reliability 203
Table 5.52: Criteria for convergent validity 204
Table 5.53: Obtained convergent validity 205
Table 5.54: Measurement of discriminant validity 207
Table 5.55: Results of Hypotheses Testing from Structural Model 210

List of Figures

Figure 1.1: Various Research Themes for Future e-Government 8
Figure 1.2: E-Government Effectiveness Evaluation Framework (E-GEEF) 22
Figure 1.3: Thesis Structure Outline 25
Figure 2.1: E-government A Cross Disciplinary Research Area (Codagnone and Wimmer, 2007) 29
Figure 2.2: E-Government Assessment Framework (EAM) (Esteves et al., 2008) 33
Figure 2.3: COBRA Model for User Satisfaction (Ibrahim et al., 2011) 34
Figure 2.4: Information System Success Model (DeLone and McLean, 1992) 37
Figure 2.5: Service Quality Model for IS Success Assessment (Pitt et al., 1995) 38
Figure 2.6: Information System Assessment Model (Myers et al., 1997) 38
Figure 2.7: E-Commerce Success Model (Molla and Licker, 2001) 39
Figure 2.8: Updated DeLone and McLean IS Success Model (DeLone and McLean, 2003) 41
Figure 2.9: E-government Success Model (Wang and Liao, (2008) 42
Figure 2.10: Three Aspects of E-Government Quality (Chutimaskul et al., 2008) 42
Figure 2.11: e-GovQual for Measuring E-government Service (Papadomichelaki et al., 2009) 46
Figure 2.12: Model for Assessing E-service Quality of Government Portals (Bhatacharya et al., 2012) 48
Figure 2.13: E-government Service Quality Model (Hien, 2014) 49
Figure 2.14: Model of e-Government and Trust (Welch et al., 2005) 52
Figure 2.15: A Citizen Trust Model for E-government (Liu and Zhou, 2010) 53
Figure 3.1: Information System Success Model (DeLone and McLean, 1992) 67
Figure 3.2: Updated DeLone and McLean IS Success Model, (2003) 68
Figure 3.3: Proposed Theoretical Framework (E-GEEF) 71
Figure 4.1: Deductive Reasoning Approach 108
Figure 4.2: Methodological Stages of SEM Analysis, (Roberts and Grover, 2009) 119
Figure 5.1: Schema of Quantitative Analysis 137
Figure 5.2: Respondents Gender Ratio 139

Figure 5.3: Frequency Distribution for System Quality 142
Figure 5.4: Frequency Distribution for Information Quality 144
Figure 5.5: Frequency Distribution for Service Quality 146
Figure 5.6: Frequency Distribution for Citizens' Use 147
Figure 5.7: Frequency Distribution for Citizens' Satisfaction 149
Figure 5.8: Frequency Distribution for Citizen's Trust 150
Figure 5.9: Frequency Distribution for Perceived E-government Service Quality 152
Figure 5.10: Frequency Distribution for Perceived Effectiveness 154
Figure 5.11: Data Normality Histogram 154
Figure 5.12: CFA for System Quality 161
Figure 5.13: CFA for Information Quality 164
Figure 5.14: CFA for Service Quality 166
Figure 5.15: CFA for Citizens' Use 168
Figure 5.16: CFA for Citizens' Satisfaction 170
Figure 5.17: CFA for Citizens' Trust 172
Figure 5.18: CFA for Perceived E-government Service Quality 174
Figure 5.19: CFA for Perceived Effectiveness 175
Figure 5.20 (a): Proposed Measurement Framework (E-GEEF) with all Dimensions & Hypotheses 178
Figure 5.20 (b): Measurement Model with All Constructs in AMOS 179
Figure 5.21: First Round Simulation for Proposed Measurements Model 181
Figure 5.22: Second Round Simulation for Measurement Model Fit 184
Figure 5.23: Third Round Simulation for Measurement Model Fit 188
Figure 5.24: Fourth Round Simulation for Measurement Model Fit 192
Figure 5.25: Fifth Round Simulation for Measurement Model Fit 196
Figure 5.26: Proposed Revised Measurement Model Fit 200
Figure 5.27: Structural Model with All Constructs 209
Figure 5.28: Modified Framework (E-GEEF) 215
Figure 6.1: Final Framework (E-GEEF) 244

List of Abbreviations

Acronym	Term
A.P.	Andhra Pradesh State
AMOS	Analysis of Moment Structures
CFA	Confirmatory Factor Analysis
CtS	Citizen’s Satisfaction
CtT	Citizen’s Trust
CtU	Citizen’s Use
D&M	DeLone and McLean
e-GEEF	Electronic Government Effectiveness Evaluation Framework
EGSQ	Electronic Government Service Quality
e-Services	Electronic Services
e-Tax	Electronic Tax
G2B	Government to Business
G2C	Government to Citizens
G2E	Government to Enterprise
G2G	Government to Government
ICT	Information and Communication Technology
InfQ	Information Quality
IS	Information Systems
M.P.	Madhya Pradesh State
MI	Modification Indices
NIC	National Information Technology
OECD	Organisation for Economic Co-operation and Development
PE	Perceived Effectiveness
SEM	Structural Equation Modeling
SerQ	Service Quality
SPSS	Statistical Product and Service Solutions
SysQ	System Quality
T.N.	Tamil Nadu State
TAM	Technology Acceptance Model
U.N.	Uttar Nations
EFA	Exploratory Factor Analysis
MIT	Ministry of Information Technology
CFI	Comparative Fit Index
GFI	Goodness-of-Fit Index
AGFI	Adjusted Goodness-of-Fit Index
RMR	Root Mean-square Residual
RMSEA	Root Mean Square Error of Approximation
C.R.	Critical Ratio
GOF	Goodness of Fit-index

CHAPTER – 1

Introduction

This chapter highlights the background of the proposed research area, which will be followed by various sections including introduction to an e-government, research background, research problem, research questions, research aim and objectives and research methodology. At the end of the chapter, scope and limitations of the proposed study and expected contribution to the knowledge will be discussed.

- **Section (1.1):** The Concept of E-government
- **Section (1.2):** E-government: An Introduction
    - 1.2.1: E-government Evaluation
    - 1.2.2: E-government Services and Quality
    - 1.2.3: Citizens' Satisfaction and Citizens' Trust in E-government
- **Section (1.3):** Research Background
- **Section(1.4):** E-government Research in the Context of India
- **Section (1.5):** UK E-government Ranking
- **Section (1.6):** Research Problem
- **Section(1.7):** Statement of the Problem
- **Section (1.8):** Research Questions
- **Section (1.9):** Research Aim and Objectives
- **Section (1.10):** Overview of the Research Methodology
- **Section (1.11):** Scope of the Study
- **Section (1.12):** Limitations of the Research Work
- **Section (1.13):** Expected Contributions to the Knowledge
- **Section (1.14):** Introduction to the Framework (E-GEEF)
- **Section (1.15):** Thesis Outline
- **Section (1.16):** Summary

1.1 The Concept of E-government

Concept of the electronic government is being defined by giving some definitions available in literature given by researchers in different research contexts.

DeBenedictis et al., (2002) defined e-government as:

"E-government can be defined as the use of Internet-based information technology to enhance the accountability and performance of government activities. These activities include government's activities execution, especially services delivery; access to government information and processes; and citizens' and organizations' participation in government".

Fang (2002) defined e-government as:

"*A way for governments to use the most innovative information and communication technologies, particularly web-based Internet applications, to provide citizens and businesses with more convenient access to government information and services, to improve the quality of the services, and to provide greater opportunities to participate in democratic institutions and processes*".

Further, Carter and Belanger (2005) defined "*e-government services as the use of ICT to enable and improve the efficiency of government services provided to citizens, employees, businesses, and agencies*".

Many governments in developed and developing countries are now developing, implementing, and improving their strategies to transform government services using information and communication technologies (ICTs) (Borras, 2004). This transformation of services is referred to as e-Government, e-Gov., digital government, online government, or transformational government (Gupta et al., 2007). E-government services increase the convenience and accessibility of government services and information to citizens (Carter and Belanger, 2005). From the above motioned definitions it is clear that the role of e-government is to enhance access to information, offer effective delivery of services, offer reduction in paper work, and offer transparency in service delivery to the citizens using advance ICT.

E-government has been classified in terms of activities and delivering models into four categories: Government to Business, (G2B), Government to Citizen (G2C), Government to Employee (G2E), and Government to Government (G2G) (Carter and Belanger, 2004).This classification of e-government is similar to Business to Business (B2B), Business to Consumer (B2C), and Consumer to Consumer (C2C) classification of e-commerce. Further, e-government phenomenon shares some common characteristics of private sector's e-commerce system, such as service delivery, applications, and their organizational impacts (Scholl, 2006).

1.2 E-government: An Introduction

Swift advances in Information and Communication Technology (ICT) have enabled the development of applications such as: e-commerce, e-learning, e-health, and e-government. One of the applications is e-government which was started in the late 1990s (Chan and Pan, 2008) and it simply described as the strategic use of Information and Communication Technology (ICT) to transform the public sector and its services to the citizens (Phang et al., 2008). Advances in Internet and communication technology have served as the foundation for the growth of e-commerce and e-business applications. The benefits perceived by electronic commercesuch as, convenient access to information, efficient customer service, ability to customize products and services, easy and fast transactions, cheaper products, and services have raised the level of expectations of citizens demanding faster, better and more access to government services (Krishnaswamy, 2005). Compared to other online service delivered by government, online tax filing is one of the most developed and widely used services. In the public sector with the move of online service, tax authorities tend to be at the leading edge of IT application (Connolly and Bannister, 2008).

ICT is seen as a powerful tool to improve the quality and efficiency of the services provided to citizens; therefore, governments are finding it necessary to update their administrative processes in order to facilitate interaction with citizens by using the Web. This is being done through the development of e-government transaction oriented application sites, and allow for interactions with the citizens (Elsas, 2003). By using e-government websites citizens can get better services in a convenient way which is also faster than traditional services. From anywhere and at any time, citizens can access cost effective government information and services (Wangpipatwong et al., 2008). It is believed that e-government has the potential to transform the fundamental relationship between government and citizen by encouraging citizen participation in the political process (Gupta and Jana, 2003). Therefore governments are finding better ways to efficiently deliver government service and transform from government centred service delivery to citizen centred service delivery (Al-Sobhi et al., 2010). According to Pardo (2000) the e-government initiatives constitute of citizen access to government information; facilitating compliance with rules; citizen access to personal benefits, procurement including bidding, purchasing, and payment; government-to-government information and service integration; and citizen participation and others. One of the most common e-government initiatives is to provide citizens access to government information. In order to create a citizen-centric government, most e-government initiatives are using the Internet and web technology such as online licensing, grants, tax transactions, financial aid, and electronic voting (DeBenedictis et al., 2002). Furthermore, e-government initiatives have the potential not only to transform the relationship between government and business, but also between government and citizens. E-government initiatives can enhance service delivery to citizens and businesses in many ways. However, West (2004) argues that e-government initiatives have fallen short of their potential to transform service delivery and improve public trust in government.

1.2.1 E-government Evaluation

Reliable and relevant e-government evaluation can offer decisive suggestion to point out policy makers and practitioners in the right direction. Recent studies give some approaches to e-government evaluation (Fitsilis et al., 2009). Understanding of citizens' needs and meet their expectations it is essential to the governments to offer effective and efficient public services. These can only be determined through the evaluation of government service effectiveness, where the objective of government is not just technological up-gradation, but rather to meet the practical expectations of delivering efficient and effective services that increase citizens' engagement in government. To achieve this, evaluation of e-government service effectiveness through a citizen centred approach is very essential (Jaeger and Bertot, 2010). The evaluationtechniques are diverse yet some common threads emerge. They all take into account the e-government complexity; define different perspectives and methods of assessment. Evaluation of the scope, utility of online services, web assessment, readiness assessment, and quality is one of the more straightforward aspects of e-government performance measurement, but in practice evaluation of online services is never that simple (UN, 2010). Assessment of information systems specifically in e-commerce is widely available in literature. These days assessment of government initiatives is in progress and has become an essential to know their e-government status for many governments. Various e-government evaluation models have been introduced by researchers including: A suggested framework for assessing e-government success (Wang and Liao, 2008); assessing electronic government readiness (Azab et al., 2009); assessment of the e-government projects (Fitsilis et al., 2009), strategic framework of e-government (Rabaiah and Vandijck, 2009); EAM, e-government assessment framework (Esteves and Joseph, 2009); e-GovQual: multiple item scale for evaluating e-service quality (Alanezi et al., 2010); a new COBRAS framework to evaluate e-government service (Ibrahim et al., 2011); and e-service quality model for Indian government portals: citizens' perspective (Bhattacharya et. al., 2012) etc.

These models indicate that assessment indicators vary according to the context of assessmentand no uniform criteria is presented for effective e-government assessment. Further, these evaluation models have not been tested yet empirically in developing countries like India. That is why it is argued that such e-government initiatives do not provide a comprehensive and unifying framework (Esteves and Joseph, 2008; Sharif et al., 2010; Zaidi et al., 2012; Zaidi et al., 2013). The evaluation of e-government service effectiveness from the citizens’ side is essential as it offers an understanding of citizens’ need about e-services. Similar to many other ICT based e-government projects, there has been no firm evaluation strategies designed for evaluating e-government service effectiveness (Sharif et al., 2010).

A coherent framework is required for the evaluation of effectiveness of e-government services for improving e-government practice. Present study also discusses the concepts of e-government service quality, citizens’ satisfaction and citizens’ trust in e-government services.

1.2.2 E-government Services and Quality

Quality is one of the important issues in industry and government during the last several years. The measurement of e-service quality in e-commerce domain has received the immense attention in the recent years (Alanezi et al., 2010). In order to offer better services, it is important to focus on the issue how to improve their quality. Quality has different meanings related to the different contexts and people. E-service quality (Lee and Lin, 2005) examines the relationship among e-service quality dimensions and overall service quality, customer satisfaction and purchase intentions, also service quality has been defined as the relationship between customers’ expectations for service performance prior to the service encounter and their perceptions of the service received. When performance does not meet expectations, quality is judged as low and when performance exceeds expectations, the evaluation of quality increases. Thus, in any evaluation of service quality, customers’ expectations are key criteria to that evaluation (Gouscos et al., 2007).

Service quality of e-government service context can play an important role in improving e-government efficiency as well as increase citizens' satisfactions. Research has often referred to e-government service quality as the degree to which an e-government web site facilitates the competent delivery of efficient e-services to help citizens, businesses and agencies in achieving their governmental transactions (Tan et al., 2008). Services in e-government play a vital role and considered as main way to support government in reaching citizens with specific, dynamic, explicit and implicit needs. In other words, digital government services encapsulate public administration functionalities and provide information to the citizens through digital interfaces.

Approaches commonly focus on the quality of theweb portal and the citizens' satisfaction for assessing e-government service quality. Citizens' satisfaction is affected both from service quality and from their expectations about the service. Many factors are taken into account for the satisfaction measurement and compose perceived e-government service quality (Halaris, et al., 2007). Some researchers express e-government service quality as users' overall assessment of quality in the virtual context and serves as one of the key factors in determining achievement or failure of e-government (Santos, 2003; Welch and Pandey, 2005; Gupta, et al., 2012).

In the context of present research, "*e-government service quality can be defined as efficient delivery of online public services to the citizens in timely and cost effective manner which enhances the citizens' trust and e-government service effectiveness*".

1.2.3 Citizen Satisfaction and Citizen Trust with E-government

Proper utilization of information and communication technology by the government may enhance citizens' satisfaction in their offered e-services. This improved channel of communication ensures the accessibility and completeness of government information, providing service delivery in a convenient way that reduces the information gap between citizen and government and improves citizens' trust in government activities. Citizens' satisfaction with e-government services is related to a citizens' perception and the use of government portal, also citizens' satisfaction is positively related with trust in government. As soon as the citizens are satisfied with the information quality that is presented in the e-government website, a trust-building will take place between citizens and the e-government system (Kumar et al., 2007).

Quality of service delivery increases citizens' satisfaction and hence citizens' satisfaction is strongly related to trust in government service delivery. Citizens who are dissatisfied with the services provided will perceive lower levels of trust in government services, and the opposite will be true when citizens are satisfied with the government services (Welch et al., 2005). Citizens' e-satisfaction can be determined by various factors, including the perceived level of competence, service convenience, effectiveness, information quality and quantity, ease of access, and interactive communication (Welch et al., 2005). In this context, citizens who use and are satisfied with e-government services like information or transaction services are more likely to build up institutional-based trust and process-based trust and view government websites trustworthy and reliable. The findings from previous studies show a positive and significant link between e-satisfaction and trust in government (Welch et al., 2005; Tolbert and Mossberger 2006). Thus, citizens' satisfaction is positively associated trust in government.

Several researchers (Irani et al., 2005; Alshawi and Alalwany, 2009; Sharif et al., 2010) highlight the necessity for evaluating e-government services specifically considering the citizens' perspective and expectations. The study focuses on investigating the key factors for evaluation of the effectiveness of e-government services while capturing the citizens' perspectives and levels of citizens' satisfaction.

1.3 Research Background

E-government is now attracting singinificant research interest and number of areas of research in e-government yet to be explored (Pudjianto and Hangjung, 2009). Studies related to e-government have focused some issues such as: e-government strategies, e-government program challenges; e-government technical issues; e-government usability websites; e-government adoption (Al-Jaghoub et al., 2010). According to (Codagnone and Wimmer (2007), the results from the EC-funded project "*Roadmap for future research and implementations in e-government eGovRTD2020*" identified 13 different research themes. Participants of the eGovRTD2020 stressed on these 13 research themes and suggested the great potential in them for future research in e-government. They also recommended those research themes to be worked out by 2020.

Figure 1.1 shows the priority level of each research theme.

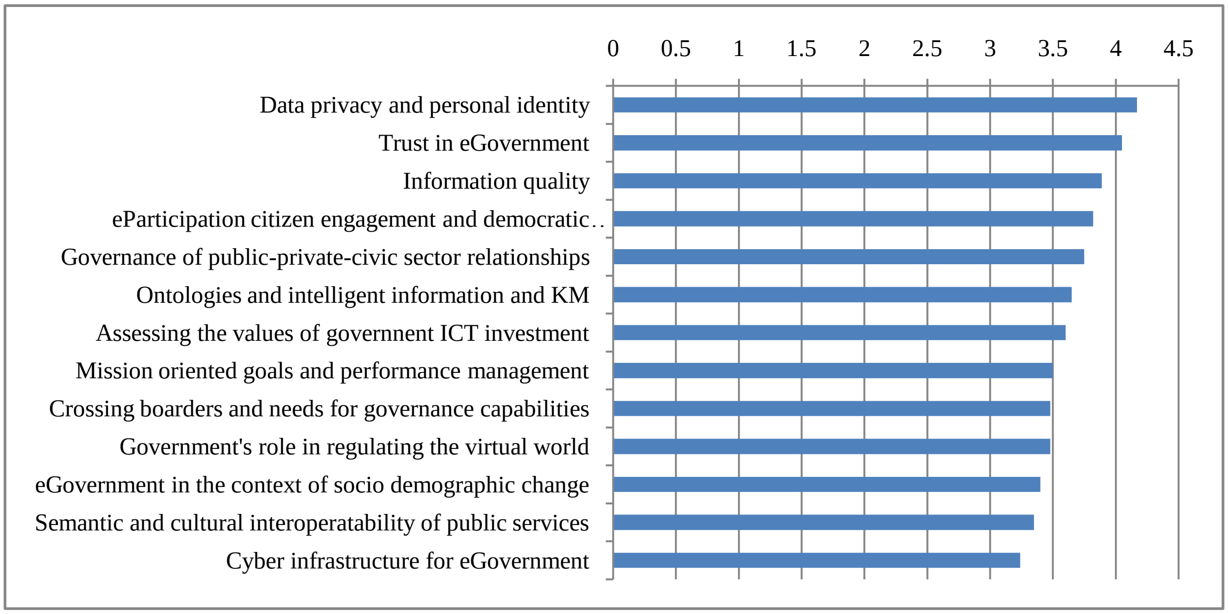


Figure 1.1: VariousResearch Themes for Future e-Government
(EU funded project eGovRTD2020 research themes)
(Source: Cristiano, Cand Wimmer, M 2007, http://www.egovrtd2020.org)

In absolute numbers, 88 experts from governments, 57 from ICT industry and consulting, and 233 from academia participated in the eGov-RTD2020 road-mapping workshops. 20 EU Member States and from 9 non-EU Member State countries were also the participants who participated in the assessment of each of the 13 research themes.

Identified 13 research themes include range of the topics in e-government to be researched. Here is the list: Data privacy and personal identity; Trust in e-Government, Information quality; e-Participation citizen engagement and democratic processes; Governance of public-private-civic sector relationships; Ontologies and intelligent information and KM; Assessing the values of government ICT investment; Mission oriented goals and performance management; Crossing borders and needs for governance capabilities; Government's role in regulating the virtual world; e-Government in the context of socio demographic change; Semantic and cultural interoperatability of public services, Cyber infrastructure for e-government. The themes assessed by the experts as being the most important are Data privacy and personal identity (importance score = 4.17), and Trust in e-Government (score = 4.05). E-government service consumption, transparency of data and how well technology can protect from data misuse and fraud are concerned with the data privacy. However in many researches it is evident that data privacy is one of the factors which build trust in e-government. Out of first three key themes trust is one of important themes which shows research gap. The theme ranked third is Information quality (score = 3.89). Figure 1.1 shows score 3.5 of the theme, whose score is equally closer to the “Trust in e-Government and e-Participation, citizen engagement and democratic process” themes.Trust in e-government service and trust in the reliability of the service delivery medium encourage citizens to engage more in online transactions (Van et al., 2005, Victor et. al., 2007, Barclay, C. 2008). Information quality has been mentioned several times in the gap analysis. The eGov-RTD2020 report clearly mentioned about the identified research themes that are not yet researched well, i.e. no or marginal current research is performed. The report also shows the examples of a research gap. Discussions in the road-mapping workshop brought up arguments that government service quality and effectiveness become more and more dependent on the quality of data and information available. The theme is also not yet researched actively in the context of effectiveness assessment of e-government.

There is sparse information about the quality and efficiency of e-government initiatives. Little is known about the quality and efficiency of e-government initiatives, because of a lack of effective measures to evaluate e-government services and quality (Gouscos et al., 2007). Many e-government studies focus on the development and evaluation of a website that interfaces between a government and its citizens (Kim et al., 2004). Evaluating e-government projects and services is an important issue (Jaeger and Thompson, 2003). There are some conceptual frameworks developed for establishing indicators in order to assess the performance of e-government service offerings together with a methodology for setting target values, performance assessments, analyzing, and alleviating the root causes of quality and performance shortcomings. Overall approach taken towards performance assessment and quality is that of assessing the final outcomes, rather than the interim process of service delivery workflows (Wang et al., 2005). E-services and its quality is a multidimensional construct although the content of what constitutes e-service quality varies across studies (Jaeger and Thompson, 2003). The reason is e-government is about an interactive collaboration among governments, citizens, businesses, public sector employees, and other governments.

Failure rates of e-government projects are estimated to be as high as 85% (Zeithaml et al., 2000). The literature suggests that many e-government initiatives have not been completed successfully, especially in the developing world. 60%-80% of e-government projects fail or do not achieve their goals (Heeks, 2003; UN, 2008). Given the amount of time and money being spent today on e-government, it becomes increasingly important for governments to identify measures of success and regularly monitor and evaluate performance (Irani et al., 2008).

With the above discussion, it is observed that there is great need of the effective evaluation of e-government efforts in the form of assessment. How to evaluate step by step e-government services and improve them becomes an important question for researchers. It is always found that there is a gap in between offered e-government services and citizens' trust.

1.4 E-government Research in the Context of India

The addition of Information and Communication Technologies (ICT) in Indian public sectors took place in early 1990s and the second phase of computerization started with the advent of the "internet era" in the late 1990s initiating pioneering efforts in e-government (Gupta, 2010). National Informatics Centre (NIC) in India is a formal Information Communication Technology (ICT) organization of government which played a significant role in providing e-government solutions of global standards. Role of NIC is to integrate service platforms in government sectors. The Department of Information Technology proposed a National e-Government Plan (NeGP) (Government of India, 2005) with a holistic approach of e-governance at federal, state and local level. The formulation of National e-Governance Plan (NeGP) by the Department of Electronics and Information Technology (DIT) and Department of Administrative Reforms and Public Grievances (DAR&PG) in 2006 has boosted the e-governance process. As a result, various e-government initiatives have been conducted across the country. India offers range of the services to their citizens including e-revenue, e-tax, land record, and e-auction service etc. Compared to other online services delivered by India e-government, online e-tax filing is one of the e-services widely accessible to the Indian citizens. Therefore, present study proposed e-government service effectiveness framework E-GEEF and is validated using Indian e-tax service. Section 1.14 gives introduction of the proposed framework E-GEEF and detailed description of E-GEEF is given in Chapter 3 "Theoretical Development of Framework E-GEEF".

As per United Nation's survey (2010), India was ranked at 113 in 2008 which was fallen down by 6 positions in 2010. According to the United Nation's E-government Survey Ranking in (2012) based on e-government development index, the key findings suggested that the India e-government development index was 0.3829; whereas the Republic of Korea is the world leader (0.9283) followed by the Netherlands (0.9125), the United Kingdom (0.8960) and Denmark (0.8889), with the United States, Canada, France, Norway, Singapore and Sweden close behind. On a regional level, Europe (0.7188) and Eastern Asia (0.6344) lead, followed by Northern America (0.8559), South Asia (0.3464) and Africa (0.2762). E-government development index considered India as poor performer in e-government development and e-service delivery to the citizens. Despite progress, there remains an imbalance in the digital divide between developed and the developing countries, especially in Africa and south Asia. The challenge of e-government in India lies in providing the service to about a billion people. There is a gap between e-service quality, e-service delivery to the citizens and reality in the country. This is why it was found worthwhile to assess Indian e-government services which it offers to the citizens.

1.5 UK E-government Ranking

United Nations e-government survey 2016 (UNPAN, 2016) reveals that United Kingdom was ranked first and has continued its development on e-government innovation. E-government in support of sustainable development survey was launched in July 2016 by the United Nations confirms that countries are making attempts to offer effective, accountable, and transparent services through e-government. Further, there has been reasonable expansion in the countries that are providing public services online through one stop-platform.

E-government development index (EDI) shows that UK has achieved high index (0.9193) and topped among 193 countries in providing e-government digital service. Australia’s EDI score was (0.9143) and has obtained second position. India achieved e-government development index (0.4638) and obtained rank 107 in United Nations survey (2016) which has shown slight improvement as compared to the previous United Nations survey held in (2010). E-participation index of UK reached to (1.000) which is again highest in the world and Japan was placed at second position with (0.9831) score whereas India ranked 27 in e-participation which was found better than e-government development index of 2016. Consequently, UK has appeared as the leader in the United Nations’ rankings for e-government survey published by the UN Department of Economic and Social Affairs. UN report says that there has been development towards offering more integrated online services through one-stop channel of which GOV.UK could be cited as an example.Governments are also paying plenty of attention to privacy and security issues of personal data.

Above survey confirms the importance of enhancing the efficiency, effectiveness, transparency, accountability, accessibility of digital government e-services which will further enhance the citizens' e-participation and citizens' trust.

1.6 Research Problem

In the last two decades, e-service quality has been discussed and researched extensively in the private sectors for measuring the performance of the offered services. Parasuraman et al. (2002, 2005) and other researchers developed service quality measurement models but these models have been developed for assessing private organization's service performance. It has been found that the area of service quality and measurement in the public sector has been less considered and the introduction of the service quality in the public sector is a more recent phenomenon. Despite the governments' growing investment in electronic services, e-government services do not always meet the expectations of citizens, and then citizens are still more likely to use traditional methods, e.g. in-person visits, or through agents than the online services with the government. Varieties of reasons are possible which do not allow citizens to access directly offered e-services.

- Citizens frequently reported some of the usability problems, for example, not being able to find the needed services and information; difficulty in using of e-services; need for better help regarding the e-services provided on the website; language understandability; etc.
- The major weakness that remains is the limited amount of assessment of e-government services (Jaeger et al., 2003). Measurement of perceived quality and satisfaction of multi-service organizations is complex (Jaeger and Thompson, 2003).
- It is difficult for governments to determine adequate measures for evaluating efficiency and effectiveness of the spending in their public services (Peters et al., 2004).
- There are significant gaps in terms of coverage of public services and the method of evaluation of service quality. Thus, it is necessary to explore a different method of service quality evaluation of public services in terms of e-government success measurement (Ray and Rao, 2004).
- The lack of formal methods for monitoring and assessing e-government initiatives has led to a significant slowdown of country-level e-government development (Kunstelj and Vintar, 2004; Peters et al., 2004).

- What will be monitored, evaluated, and benchmarked depends on the assessment criteria, so the government needs to formulate these criteria in order to do better comprehensive evaluation of e-government which can further help in making the appropriate decisions (Kunstelj and Vintar, 2004; Lihua and Zheng, 2005).
- Lihua and Zheng (2005) identified e-government performance as a dependent variable that includes service level to constituents and operational efficiency. They used five items to represent service level to constituents: improved quality of output in service delivery; increase client satisfaction; provide another means to access to the information collected; generated and disseminated by the government; and Improved communication with citizens about public issues.
- As compared to other online services, e-tax filing system is more complicated, so it must be clear and easy to be used by ordinary tax payers (Connolly and Bannister, 2008).
- Investigating citizens' responsiveness to e-government public services offerings is needed (Gil-Garcia and Martinez-Moyano, 2007; Verdegem and Verleye, 2009).
- ISO 9126 software engineering product quality documents (1998, 2001, 2003, and 2004) suggest about the standards of software product quality, internal metrics, external metrics, quality models and quality in use metrics. The above mentioned documents provide the detailed explanation of various metrics, measurement approach and quality evaluation approaches for the assessment of software product quality and performance. These standards will help in identifying and consolidating the dimensions and metrics for the researchers.

Review of literature shows that e-government evaluation has been done on the basis of few dimensions. Researchers perceived that the assessment of website quality is one of the major areas of evaluating e-services however it can be considered as one indicator. The key issue within the context of e-services is service deliverance, which is the process of making available the use of services for citizens in an efficient and convenient manner. Therefore, it is necessary to identify more e-government service assessment dimensions which can assess e-governmental services more effectively up to maximum level of citizens' satisfaction which will build citizens' trust. Hence, it is essential to develop a comprehensive effectiveness assessment framework to assess the effectiveness of e-government services and citizens' trust in offered e-services.

1.7 Statement of the Problem

Area of e-government has received increased attention over the last few years. In spite of the current developments, many avenues in the area of e-government remain unexplored. Some of the countries governments have achieved desired level of satisfaction in offering e-services to their citizens and at the same time some of the countries are still behind the required level. Hence great necessity arises to measure the government initiatives in the form of effectiveness assessment. The research problem in this study is identified along with the following sources:

1. The slow progress in e-government acceptance in developing countries compared to developed ones and in addition to the high failure rate (35%) of e-government in them also 50% incomplete initiated projects in developing countries (Heeks, 2003).
2. Literature review indicates that there is lack of effective measures to evaluate the quality of e-government services (Carbo and Williams, 2004). The recent available approaches to monitoring, evaluating, and benchmarking e-government development do not carry comprehensive e-government assessment. This have to be further improved in order to give policymakers better evaluation criteria for their decisions (Kunstelj and Vintar, 2004).
3. EC-funded Project eGovRTD2020 "Road-mapping eGovernment Research: Visions and Measures towards Innovative Governments in 2020", Consortium in 2007 published their results and identified the most important 13 research themes which include trust in e-government, information quality, performance assessment, e-government value assessment and cyber infrastructure of e-government (Codagnone and Wimmer, 2007).
4. Trust in the e-government services and trust in the reliability of the service delivery medium are key elements in the citizens' decision for utilizing online service transactions (Barclay, 2008).
5. Other than above mentioned sources the author did preliminary study in India at the beginning of the research in 2009. The researcher conducted set of the interviews with the e-tax service users to determine the motivation of citizens to use the offered e-government e-service and also discussed the citizens' trust in them.

Apart from the above problems, existing studies in e-government are conducted on developed countries without verifying their applicability on developing countries (Azab, et al., 2009). Means existing models might not be applicable for developing countries like India due to their different implementation requirements and context. Therefore, there is a necessity to develop a framework that can evaluate the effectiveness of e-government services and citizens' trust in country like India.

1.8 Research Questions

The previous section discussed the issues that were addressed in this thesis leading to the presentation of the research question. Reviewing studies on e-government, effectiveness assessment, e-service quality, and citizens' trust reveal the existence of a research gap when we assess the e-government service from citizens' perspective. Going through various articles, reports and research papers many issues and questions have aroused. There is a major research question:

"What is the framework that could best evaluate the effectiveness of e-government services"?

Apart from the major research question, three minor research questions were identified:

a. *What are the effectiveness assessment frameworks for e-government services existing and why would a new framework be evolved?*

b. *What are the dimensions contributing to effectiveness evaluation of e-government services?*

c. *What could be the relationship between various effectiveness evaluation dimensions?*

1.9 Research Aim and Objectives

Previous section highlighted the research questions which is the starting point that determines the research aim and objectives. Ultimate aim of this research is: "*To develop a framework for assessing the effectiveness of e-government service*".

Present study develops evaluation criteria for an effective and adaptable assessment of e-government services effectiveness from the citizens' perspective. Citizens of the developing countries suffer from deprived deployment of their e-government's initiatives. Embracing such criteria would positively contribute in enhancing government's understanding about the factors that influence the utilization of e-government services by their citizens also government will come to know how to improve e-services and gain citizens' confidence in them. Proposed framework E-GEEF will fill the research gap and assess the effectiveness of e-government services from the citizens' perspective.

To achieve this aim, the following objectives are set:

1. Investigate the concept of e-government and the diversified ways it is perceived.
2. To explore the previous studies in performance and effectiveness assessment of e-government particularly in the area of e-services and trust and identify their inadequacies.
3. To identify the dimensions and measures used in various frameworks for assessing the effectiveness of e-government services and citizens' trust.
4. To establish the quality criteria for effective deliverance of government e-service.
5. To investigate the citizens' trust elements in government e-services and to find out the degree to which the quality criteria of the e-government services build citizens' satisfaction and citizens' trust with the e-services (Indian e-tax service).
6. To develop and evaluate the framework E-GEEF and appraise its validity via case study of India's e-government e-tax services.

1.10 Overview of Research Methodology

Research methodology takes a major place in research development to ensure systematic and significant research into the phenomenon under examination (Hair et al., 2010). The articulated research objectives in the previous section directed the researcher to embrace appropriate step by step approach in order to reach them. These objectives were achieved through applying an appropriate research methodology. The current study is classified under the quantitative empirical approach which involves developing hypotheses based on theoretical statements and measures the variables. This research approach falls within the deductive positivist approach (Blaikie, 2007, Hair et al., 2010).

This section gives a brief overview of the main stages of the methodology used for development and validation of a framework E-GEEF. Detailed research methodology is discussed in Chapter 4.

- ***Stage 1:*** This phase established the research background and reviewed the literature analytically which helped to identify the research gap in literature. Analytical research method for literature review in Chapter 2 identified relevant literature and described the research objects in an analytical manner. This discussed the e-government concepts, theories, and various e-government effectiveness assessment frameworks. Number of dimensions in existing framework and their relationships were also explored in Chapter 2. Review of literature carried out critiques on e-government assessment models and highlighted their shortcomings in assessment. This section gives the reader a clear idea of the well known e-government assessment models and theories.

- ***Stage 2:*** After the analytical review of literature and from their findings, the initial conceptual framework E-GEEF was developed which is discussed in detail in Chapter 3. Based on the identified research problem and review of the literature, sixteen hypotheses were formulated and a framework E-GEEF was developed. The chapter extensively reviewed each of the identified dimensions associated to the framework E-GEEF. Conceptual development in this stage followed a constructive research approach allowing the development of conceptual artifacts for E-GEEF.
- ***Stage 3:*** Preliminary qualitative study was carried out by conducting 10 interviews with Indian e-tax paying citizens and archival records related to previous year's e-tax service status were studied carefully. Idea behind conducting the preliminary qualitative study was to ensure whether all important dimensions and measurement items were included in the proposed framework E-GEEF in the right researchcontext or not. Further, interviews and archival records helped in indentifying the citizens' view towards offered e-tax service. Chapter 4 and Chapter 5 give detailed description of preliminary qualitative analysis and obtained results.
- ***Stage 4:*** Quantitatve analysis technique was used for the validation of the developed framework E-GEEF using Indian e-government e-tax service. Empirical research method was applied for the validation of E-GEEF and confirmed its validity through quantitative data analysis in Chapter 5. Hence, questionnaires were distributed to the citizens of India who have been using e-tax service. Quantitative data analysiswas used as it provides betterstrengthto the results in information system evaluation (Johnson and Onwuegbuzi, 2004).
- ***Stage 5:*** Data analysis in Chapter 5 was performed using two software packages including Statistical Package for the Social Sciences (SPSS) 20.0 and Analysis of Moment Structures (AMOS) 21.0 for quantitative data analysis. Confirmatory Factor Analysis (CFA) was applied for confirming measurement model fit. Structural Equation Modeling (SEM) technique was chosen to test the hypotheses and to answer the research questions. Path analysis was performed between the identified dimensions of E-GEEF to confirm / reject the hypotheses.

- ***Stage 6:*** Results obtained from the empirical research served in evaluating them against the primary framework derived from the literature leading to a revised theoretical effectiveness assessment framework E-GEEF. Based on the empirical analysis data in Chapter 5 and discussed outcomes in Chapter 6, the final revision of the framework E-GEEF has accomplished. Consequently, this has directed towards the achievement of the research aim by proposing an e-government effectiveness evaluation framework validated using Indian e-tax service.

Figure 1.3 shows the overall research process that was adopted to reach the aim and objectives of the thesis.

1.11 Scope of the Study

It is difficult to study each aspect of e-government services within the scope of a single research. Therefore, it is essential that we have to limit the area where we can focus at a time. Accordingly, the identification of the factors responsible for e-government service quality and citizens ‘trust are the key areas where present study is focusing. This research will also focus on government e-tax services in India and aim is to identify the factors of e-government tax services. Online tax filing system is a type of government-to-citizen (G2C) electronic service which provides an opportunity of availing online tax services to taxpayers. Thus, this research is limited to evaluating (G2C) e-service as a part of e-government domain. Data collection is done using set of questionnaires and interviews of Indian taxpaying citizens. Since people from private and public sectors use online e-tax service for filing their taxes, so their opinion will play a significant role in judging the present status of e-government services and to which extent improvements are desired, can be determined. Quantitative data analysis is done for validating the framework E-GEEF.

1.12 Limitations of the Research Work

Every research has some limitations, and it is important to present the limitations of the present research to place the findings in right perspective. Some of the limitations are listed below:

1. Study considered evaluating the e-government services where interactions mode is government to citizens (G2C). The government to government (G2G) and government to employee (G2E) are beyond the scope of this research
2. Data collection was done only from e-tax service users; however, other e-services like revenue collection, e-tendering, land record managing service, and online passport services are also available which government of India offers.
3. For the data collection, only citizens were considered those who utilize the e-government service e-tax services. Strategic management group was not considered for the data collection. Due to their privacy issues, e-government officials were refused to discuss the internal issues. Also the employees are always reluctant to reveal any negative aspects when responding to surveys.

1.13 Expected Contribution to the Knowledge

The different stages of the research process led to the development of a systematic approach to assess e-government services and citizens' trust in e-government E-GEEF. Such aim definitely contributes to e-government as e-government is still immature field (Hu et al., 2005) lacking formal theory development and testing (Heeks and Bailur, 2007), and in which many areas and prospects are still unexplored (Esteves and Joseph, 2008). Further studies in this direction evidently enrich knowledge in such domain as it merges traditional modeling practices in more established fields (such as IS and e-commerce) in measuring indistinct notions, and provides conceptual models for them. The proposed framework E-GEEF is comprehensive in nature and includes the variety of constructs for the assessment of the effectiveness of e-government services and citizens' trust. The proposed framework inherits three constructs including system quality, information quality, and service quality from its base (DeLone and McLean, 2003) model and two constructs "intension to use and user satisfaction" respecified as citizens' use / usefulness and citizens' satisfaction. It has an adaptable structure that can be extended as new construct emerges. The framework E-GEEF presented in this thesis may provide the e-government authorities a well defined process to assess the e-government service effectiveness and citizens' trust in offered e-services. In addition, the framework is easy to understand and can be used by people with managerial responsibility toward the e-government service assessment.

The study developed framework E-GEEF for assessing the effectiveness of e-government service and it is believed that this study will help Indian e-government, as well as other countries in similar context. This will also play an important role in the process of planning and implementing the effective e-government services in their respective countries. This research is novel and demonstrates the following contributions to the knowledge:

1. Addition of new knowledge in the field of e-government through developing the framework E-GEEF.
2. The framework E-GEEF will assess e-government service effectiveness from the citizens' perspective.
3. The framework E-GEEF will assess e-government service quality and citizens' trust for assessing the e-government service effectiveness.
4. Study will identify the significant factors which influence the effectiveness of e-government service as well as factors constituting the citizens' trust in the e-government. The results would help authorities to understand the key issues that influence citizens' requirements and their satisfaction with the e-services.
5. The new framework E-GEEF referred as a comprehensive effectiveness evaluation framework includes the technological (system quality, information quality, service quality, perceived e-government service quality, and perceived effectiveness of e-government service) and citizens' behavioural (citizens' use, citizens'satisfaction, and citizens' trust) dimensions. It can be used asa checklist for what was implemented and what is to be implemented in the future plan tooffer quality e-services to their citizens and how to assess citizens' satisfaction in their offered e-services. Finally, it can be used as a strong awareness tool for government executives to give them a holistic view of all effective performance assessment aspects required in their organization.
6. Developed framework E-GEEF to evaluate the effectiveness of e-tax service of India as no such comprehensiveframework is developed for Indian context. It will certainly help governmental agencies to assess their e-government initiatives. The framework E-GEEF can be utilized for assessing other e-services e.g. e-revenue, e-excise, e-auction, etc.

1.14 Introduction to the Framework (E-GEEF)

After systematic literature review, "E-government Effectiveness Evaluation Framework" (E-GEEF) was developed and validated using Indian e-government e-tax service. Figure 1.2

presents a description of E-GEEF which includes number of dimensions along with their associated items, hypotheses, and distributed questionnaire. DeLone and McLean (2003) model was considered as base model for E-GEEF. Three new dimensions “citizens’ trust, perceived e-government service quality, and perceived effectiveness” were introduced in the framework E-GEEF. Two dimensions “Intention to use and user satisfaction” from the DeLone and McLean model were resepcified and used as “citizens’ use / usefulness and citizens’ satisfaction” in the context of e-government. System quality, information quality, and service quality dimensions were directly used from DeLone and McLean (2003) model for IS system success.

Chapter 3 presents the detailed development of the framework E-GEEF. Figure 3.3 “Proposed Theoretical Framework (E-GEEF)” on page 71 shows detailed diagram of the framework which includes association of various dimensions and the measurement items.

Chapter 5 presents data analysis which confirms the validation of the developed framework E-GEEF. On page 178, figure 5.20 (a) named “Proposed Measurement Framework (E-GEEF) with all Dimensions and Hypotheses” is designed. Same figure is reconstructed on page 179 as figure 5.20 (b) named “Measurement Model with all Constructs in AMOS” for statistical analysis and simulation purpose. After performing various rounds of simulation the modified framework E-GEEF is achieved. Figure 5.28 “Modified Framework (E-GEEF)” on page 215 shows the confirmation and rejection of the hypotheses which is presented in Chapter 3.

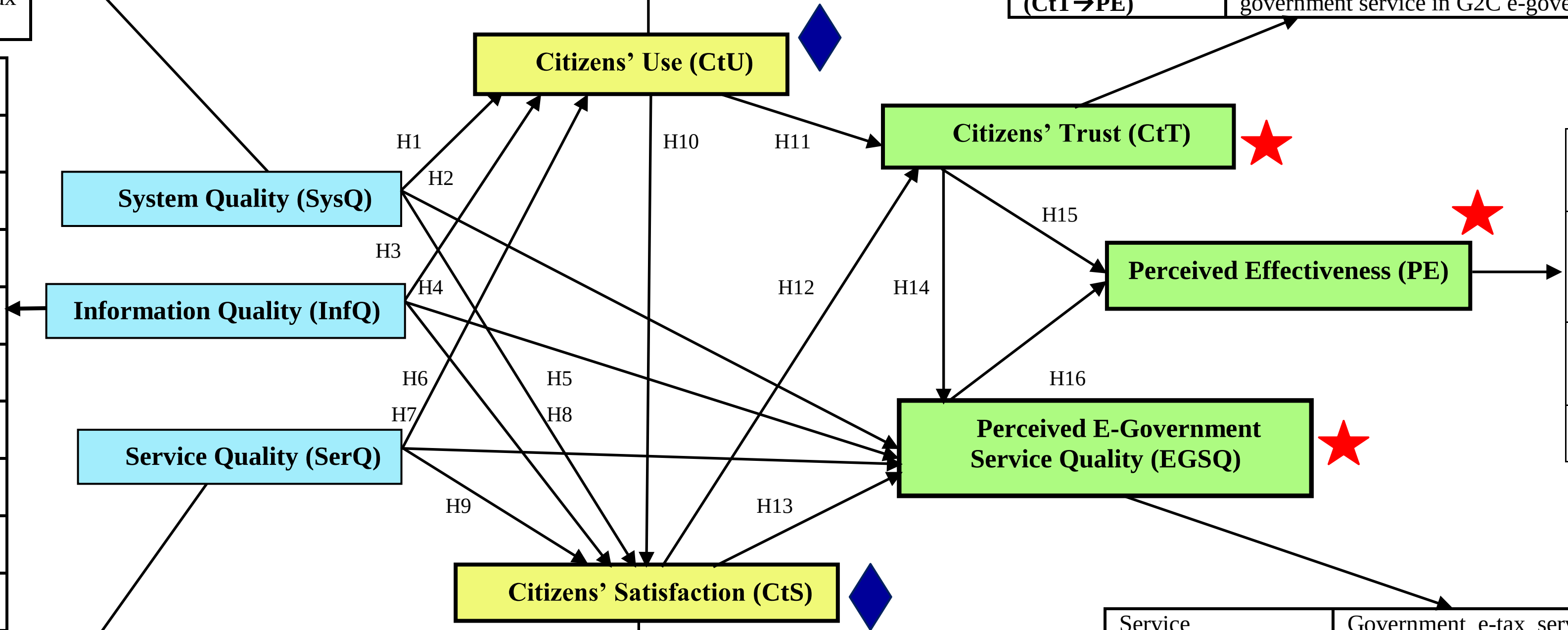
Chapter 6 “Results and Discussion” presents, the validated framework E-GEEF which is revised final framework.Figure 6.1 “Final Framework (E-GEEF)” is presented on page 244.

Accessibility	Government e-tax system is accessible 24 hours online every day whenever I need to access I can access it	SysQ1
Flexibility	E-tax website offers flexibility to use it anywhere	SysQ2
Functionality	E-tax website is easy in its functionality that allows user to browse different pages and does not stuck while using	SysQ3
Reliability	E-tax website is available all the time and quality of contents is appropriate, error free, precise and related to the subject according to the citizen's need	SysQ4
Easy to use	E-tax website allows citizens to use e-government system that enables citizen to accomplish tasks more easily and quickly	SysQ5
Integration	E-tax website provides integration to other website of ministries	SysQ6
Nevigation	It is easy to navigate within this website which allows citizen to go back and forth between pages	SysQ7
Hypothesis (H1) (SysQ →CtU)	System quality is positively related and affects the citizens' use / usefulness of e-tax service in the G2C e-government perspective	
Hypothesis (H2) (SysQ →EGSQ)	System quality is positively related and affects perceived e-government service quality in G2C e-government (e-tax service) perspective.	
Hypothesis (H3) (SysQ → CtS)	System quality is positively related and affects citizens' satisfaction with e-tax service in the G2C e-government perspective.	

Frequency of use	I regularly use government e-tax service and whenever I need to file my tax online I choose to file through e-tax website	CtU1
Intension to reuse	I have intension to use government e-tax service again in the future	CtU2
Natureof use	Effectively I can use and perform a variety of e-tax related operations and tasks using government e-tax service	CtU3
Interactivity	It is easy to intreract efficiently while navigating within the government e-tax website and use e-services	CtU4
Number of Transaction	Using the government e-tax service makes it easier to do my task and I can perform number of transactions	CtU5
Hypothesis (H10) (CtU→CtS)	Citizens' Use /Usefulness positively affect the citizens' satisfaction in G2C e-government (e-tax service) perspective	
Hypothesis (H11) (CtU→CtT)	Citizens' Use / Usefulness positively affect citizens' trust in G2C e-government (e-tax service) perspective.	

Usability	Based on my experience with e-tax service, I found that there is usable trustworthy e-tax service is being offered	CtT1
Privacy	Based on my experience I found that there is sufficient privacy given to my account and associated information	CtT2
Security	Based on my experience I found there is a sufficient security measure followed to protect my online information	CtT3
Transaction Transparency	I found that offered e-tax e-service is transparent in the transactions.	CtT4
Unambiguous	I found that offered e-tax service is transparent / unambiguous and provides appropriate transparent information to the citizens	CtT5
Responsiveness	Based on my experience with e-tax service, I found that my e-tax request processed in minimum amount of time	CtT6
Tangible	Based on my experience with e-tax service, I found that e-tax service system offers tangible service	CtT7
Hypothesis (H14) (CtT →EGSQ)	Citizens' trust positively affects the perceived e-government service quality in G2C e-government (e-tax service) perspective.	
Hypothesis (H15) (CtT→PE)	Citizens' trust positively affects the perceived effectiveness of e-government service in G2C e-government (e-tax service) perspective.	

Accuracy	Information on the government e-tax website is accurate and error free also, covers all information desired	InfQ1
Relevance	Information presented on the government e-tax website is comparative to the citizen's needs and subject matter	InfQ2
Completeness	Government e-tax service website provides up-to-date and sufficient information which enables citizens to complete their task	InfQ3
Truswórithiness	Information on the government e-tax website is trust worthy and consistent	InfQ4
Availability	Government e-tax service website provides precise information to the citizens	InfQ5
Timeliness	Government e-tax service website provides desired information at the right time or in timely manner to the citizens	InfQ6
Consistency	Information on this e-tax service website is consistently available for the citizens to complete their task	InfQ7
Hypothesis (H4) (InfQ →CtU)	Information quality is positively related and affects the citizens' use / usefulness in G2C e-government (e-tax service) perspective	
Hypothesis (H5) (InfQ →EGSQ)	Information quality is positively related and affects perceived e-government service quality in the G2C e-government (e-tax service) perspective	
Hypothesis (H5) (InfQ →CtS)	Information quality is positively related and affects the citizens' satisfaction in G2C e-government (e-tax service) perspective.	



Based on my experience I have full trust in offered government e-tax service.	PE1
Government e-tax service provides overall outstanding e-service quality to the citizens.	PE2
Government e-tax service offers risk free e-tax service to their citizens.	PE3
Government e-tax service is overall effective.	PE4

Assurance	Government e-tax service website assures citizens to provide necessary information and forms to be downloaded	SerQ1
Flexibility	E-tax service website provides citizens flexibility to continue and complete the remaining work at any time in next login and whenever citizen find comfortable	SerQ2
Reliability	Government e-tax service website provides reliable service to their citizens	SerQ3
Tangibility	Government e-tax service provides concrete and substantial or tangible services to their citizens	SerQ4
Transparent	Government e-tax service provides citizens transparent service. Nothing they keep hidden when services released to their citizens	SerQ5
Sufficiency	Government provides sufficient understanding and helpful instructions to the citizens to complete their task related to the e-tax	SerQ6
Responsiveness	Government online services loads all texts and graphics quickly and respond to the query made by citizens	SerQ7
Hypothesis (H7) (SerQ →CtU)	Service quality is positively related and affects the citizens' use / usefulness in G2C e-government (e-tax service) perspective	
Hypothesis (H8) (SerQ →EGSQ)	Service quality positively affects perceived e-government service quality in the G2C e-government (e-tax service) perspective.	
Hypothesis (H9) (SerQ →CtS)	Service quality is positively related and affects the citizens' satisfaction in G2C e-government (e-tax service) perspective.	

Efficiency	Based on my experience I found e-tax services are effective and efficient	CtS1
Valuable	Based on my experience I found e-tax service is valuable and the information includes all necessary values	CtS2
Adequacy	While using government e-tax service I found satisfactory use of it which provides full confidentiality to my information	CtS3
System Satisfaction	I found e-tax service system is competent and I am fully satisfied with e-tax service system of government	CtS4
Information Satisfaction	Based on my experience I found that overall I am satisfied by information provided by e-tax service	CtS5
Hypothesis (H12) (CtS →CtT)	Citizens' satisfaction positively affects and forms citizens' trust in e-government service in G2C e-government (e-tax service) perspective	
Hypothesis (H13) (CtS →EGSQ)	Citizens' satisfaction has positive effect on perceived e-government service quality in G2C e-government (e-tax service) perspective.	

Service Functionality	Government e-tax service provides interactive environment to the citizens along with effective functionality of e-tax service system	EGSQ1
Service Reliability	Government e-tax service provides reliable service to the citizens	EGSQ2
Citizens' support	Government e-tax service provides necessary user support on the website and gives special attention to every users individually	EGSQ3
Service Satisfaction	Government e-tax service website provides helpful instruction for performing my task	EGSQ4
Hypothesis (H16) (EGSQ→PE)	Overall perceived e-government service quality affects the e-government perceived effectiveness in G2C e-government (e-tax service) perspective.	

★ **New Dimensions**

♦ **Revised Dimensions**

Figure 1.2: E-Government Effectiveness Evaluation Framework (E-GEEF)

Base Model: DeLone & McLean, (2003)

1.15 Thesis Outline

The study presents a detailed examination of the subject background, research methodology, data analysis, findings and discussion of critical factors of effectiveness evaluation of e-government service; and the contribution to both knowledge and practice. The flow of the research is illustrated in figure 1.2. The next section summarizes the content of the chapters.

Chapter 1: Introduction

In chapter 1, an introduction of electronic government was given in order to provide the reader a good background e-government in general. Further the research background, overview of the research with clear statement of the research problem, aim, objectives and research questions were discussed. The chapter highlights the significance of the research and contribution to knowledge. Finally, the outline of this study is provided.

Chapter 2: Literature Review

Chapter 2 named as literature review discusses the concepts, theories, models and perspectives from the previous studies related to the research problem are presented. Various well known e-government effectiveness assessment frameworks, e-service quality models, and e-government trust models were taken into consideration. Number of dimensions in existing models and their relationships are also explored in this chapter. The chapter conducts a critique of all presented performance appraisal models along with e-government service quality and trust models pinpointing their shortcomings in assessment. This section gives the reader a good background of the well known e-government assessment models and theories. It also highlights the weaknesses of each model.

Chapter 3: Theoretical Development of Framework (E-GEEF)

Chapter 3 includes the development of proposed framework E-GEEF. The chapter discusses the available frameworks in the literature which were used as the basis and justifies the selection of the base model for the development of proposed framework. Based on the research problem identified in previous chapters, a number of hypotheses were formulated and a research framework was developed. The chapter intensively reviewed each of the identified critical factors associated to the E-GEEF framework.

Chapter 4: Research Methodologies

Chapter 4 discusses the methodology adopted for the execution of the current research. The discussion includes an overview of the various research designs available; their philosophical assumptions and the rationale behind the researcher's choices; the selection of the case study;

empirical data collection collected and analyzed; the adopted strategies of reliability and validity of the data.

Chapter 5: Data Analysis

Chapter 5 discusses how Analysis of the empirical data is presented in relation to the proposed conceptual framework. Empirical data analyzed through various stages including descriptive statistics, reliability analysis, measurement modeling, structural modeling, and validity analysis.

Chapter 6: Results and Discussion

Chapter 6 includes the findings and discussion from the analysis. The chapter shows how the research findings answered the main research question and achieved the aim and objectives of the research. The chapter also provides the author's views on the research findings.

Chapter 7: Conclusions

Chapter 7 includes a summary of the entire work. Some other important points such as the discussion on the novelty of the developed framework, identified critical factors, and contribution to knowledge in research and practice were presented. In addition, the author indicates how the presented research study can evolve to a further research. The author concludes with addressing the limitations of the research study conducted in this thesis.

1.16 Summary

This chapter highlighted the main points of the problem being addressed leading to the research questions. The aim and objectives capable of answering the research questions were defined. Also a brief introduction of the research methodology used to attain these objectives was presented explaining the overall research process. Contribution of the thesis to its relevant research area was discussed followed by an illustration of the organization of the thesis chapters. In the next chapter, a more-in-depth review of various e-government assessment frameworks, e-service quality issues, and citizens' trust related models will be undertaken, to pinpoint their inadequacy in solving the research problem. The chapter will also discuss the main factors that can be extracted from the criteria employed in the above assessments to help in developing an assessment framework E-GEEF for public organization.

Following figure presents various stages adopted in this research.

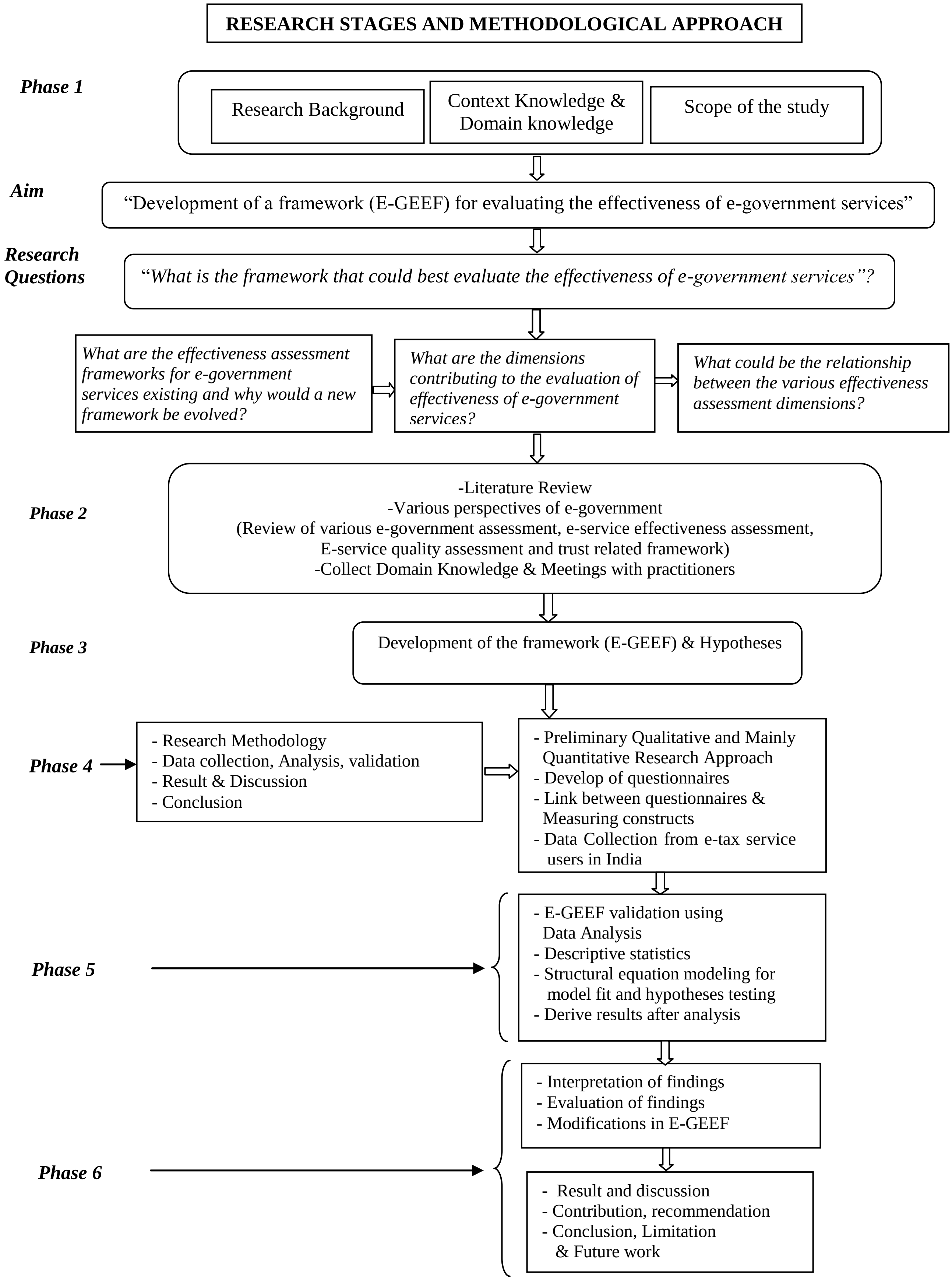


Figure 1.3: Thesis structure outline

CHAPTER– 2

Literature Review

The aim of this chapter is to review literature and models that are related to the research problem presented in the previous chapter. Further, this chapter focuses upon the detailed study of various existing e-government assessment frameworks, e-services quality assessment frameworks and citizens' trust related frameworks in offered e-government services. After conducting a critical analysis on the presented assessment models, finally, an overview on e-government in India was presented to conclude the chapter.

The chapter is presented in the following sections:

- **Section (2.1):** E-government: An overview
- **Section (2.2):** E-government Definitions, Perspectives, and Taxonomy
    - 2.2.1 E-government Definitions and Perspectives
    - 2.2.2 Taxonomy of e-government
- **Section (2.3):** E-government Performance Assessment Frameworks
    - 2.3.1 E-Government Evaluation Frameworks and their context
    - 2.3.2 Information Systems, E-Commerce and E-Government SuccessEvaluation Models
        - 2.3.2.1 DeLone & McLean Information System Success (1992)
        - 2.3.2.2 DeLone & McLean, (1992) IS success model's extensions
        - 2.3.2.3 Updated DeLone & McLean Model (2003)
        - 2.3.2.4 E-government Success Models
- **Section (2.4):** E-Government E-Services
    - 2.4.1 E-Service Quality Concepts
    - 2.4.2 E-government Service Quality and Models
- **Section (2.5):** Trust in E-Government
    - 2.5.1 Concept of Trust in E-government
    - 2.5.2 Citizens' Satisfaction and Trust Relationship in E-government
- **Section (2.6):** E-Government Assessment Frameworks with Reference to India
- **Section (2.7):** Findings and Limitations of Various E-government Assessment Frameworks
- **Section (2.8):** Summary

2.1 E-government: An overview

E-business and e-commerce are considered as ICT application in the private sector similarly e-government has become public sector's field of ICT applications (Eyob, 2004). Heeks, (2007) highlighted that the "electronic governments" phase first became prominent when in 1993 "National Performance Review" of United States federal government was undertaken and the "e-government appearance" gradually disseminated from 1997. This was also manifested by e-government projects collectively known as the government modernisation agenda undertaken by several governments around the world in the late 1990s, in order to provide seamless information and services to citizens and businesses (Irani et al., 2006).

According to United Nations, (2008) early 1990s, an e-commerce revolution started within private and multinational organizations. Present status of e-government clearly indicates that e-governments initiatives embrace the same principles of e-commerce. However, e-government and e-commerce may have certain differences particularly in process management. Citizens' acceptance of e-government depends on the public service accessibility, quality of service, time saving, efficiency of service, information access, social awareness, and trust. Similar may be found in several e-commerce (Scholl, 2010). E-government has been classified as one instance of e-commence (Schneider, 2003). Characteristics of private-sector e-commerce systems can be compared with the e-government systems as both share similar characteristics in terms of the use and implementation of the internet (Scholl, 2006; Tassabehji and Elliman, 2006). E-government is therefore to be seen as an evolutionary phenomenon (Gupta and Jana, 2003).

It is broadly acknowledged that the appearance of the e-government discipline has been due to the requirement of providing the efficient services and their accessibility to citizens and other stakeholders (Jones et al., 2007). E-government program seeks to achieve greater efficiency in government performance, through raising the performance of services (Middleton, 2007). These days, citizens have become more internet savvy and experience good electronic services from the private sector; therefore, they begin to expect the same standards from the government agencies (Al-shafi, 2008). Considering this fact, governments around the world are attempting to provide efficient and convenient ways for citizens and businesses to communicate with government in the attainment of services (Warkentin, 2002; Ebrahim et al., 2003; Kamal, 2008).

2.2 E-government Definitions, Perspectives, and Taxonomy

There are number of different definitions of e-government in the literature, ranging from being too narrow and specific to extremely general and broad, reflecting different meanings and definitions to different people in different perspectives.

2.2.1 E-government Definitions and Perspectives

The United Nations defines e-government as "*utilizing the Internet and the world-wide-web for delivering government information and services to citizens*" (UNPAN, 2005).

The concept is currently still without a universally agreed standard definition. E-government definitions vary according to different types of perspectives, such as technological, political, business, citizen, process, and government function (Tambouris, 2001; Seifert and Petersen, 2002; Jain, 2002; Weerakkody and Dhillon, 2008; Irani et al.,2006). E-government is relatively a new research field which is yet to be matured and be well defined (Young-Jin and Seang-Tae, 2007). E-government is an area causing debates for the researchers to define it as it does not have a common meaning for all researchers and stakeholders (Seifert and Relyea, 2004; Yildiz, 2007). Nonetheless, there are some commonly agreed notions including: government efficiency, effectiveness, empowering citizens, organization through access to information, strengthening levels of democracy, citizen-participation, and transparency (Oyomno, 2004). E-government is reforming the way governments provide services electronically, transforming, and revitalizing the relationship with citizens and business (OECD, 2003; Metaxiotis and Psarras, 2004). An e-government does not represent a political ideology; it aims to empower individuals through access to information and knowledge (Oyomno, 2004; Jain and Kesar, 2011).

E-government is a multidimensional, multidisciplinary, and still immature field (Jaeger, 2003) therefore it is becoming increasingly difficult to set a common definition (Roy, 2003). As e-government is a multidisciplinary field therefore this involves a number of disciplines; such as, Information Systems (IS), Computer Science, Public Administration, and Political Science (Heeks and Bailur, 2007). Lenk, (2000) identifies four different perspectives of e-government: citizen, process, cooperation and knowledge management. Thus, it is more appropriate to define e-government based on its stakeholders' perspective and their aims and objectives. Codagnone and Wimmer, (2007) suggested that due to the cross disciplinary nature, e-government involves other disciplines. The following diagram clearly indicates the cross disciplinary nature of e-government research.

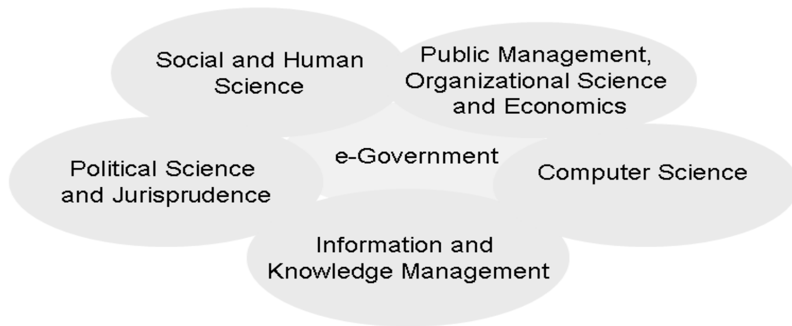


Figure 2.1: E-government A Cross Disciplinary Research Area

(Source: Codagnone and Wimmer, 2007)

Below table shows a number of different definitions of e-government based upon the perspective drawn from literature.

Table 2.1: E-government definitions in various perspectives

Perspectives	Definitions	References
Information Technology (Technical)	"E-government refers to the use of information and communication technologies (ICT) - such as Wide Area Networks, the Internet, and mobile computing - by government agencies."	(UNPAN, 2011)
	"Electronic government is the use of Information Technology to support government operations, engage citizens, and provide government services".	(Scholl, 2003)
Government Process	E-government "is a sophisticated process based on using information and communication technologies with different kind of services as result designated for satisfying stakeholders needs."	(Kasubien et al., 2007)
	"E-government refers to the use of ICT to improve efficiency, effectiveness, transparency, & accountability of governments."	(World Bank, 2010)
Government Benefits	"E-government involves access to government information and services 24 hours a day, 7 days a week, in a way that is focused on the needs of our citizens and businesses. E-government relies heavily on agency use of the internet and other emerging technologies to receive and deliver information and services easily, quickly, efficiently and inexpensively".	(Ke and Wei, 2004)

Perspectives	Definitions	References
Citizens' focus	"E-government as seamless service delivery to citizens or governments' efforts to provide citizens with the information and services they need by using a range of technological solutions".	(Burn and Robins, 2003)
Political	"To use technology to achieve levels of improvement in various areas of government, transforming the nature of politics and relations between the government and citizens."	(Dada, 2006)

World Bank, (2010) definition about e-government which is, "*E-government refers to the use of ICT to improve efficiency, effectiveness, transparency, & accountability of governments*" is found close to the context of present study.

Literature emphasizes that the interpretation of e-government is based on different factors including technology, process, organizational, political, economical, cultural, citizen focus, and single point access further these factors greatly influence the various sectors and stages of e-government progress (Ndou, 2004; Barkry, 2004; Aichholzer, 2004; Al-Adawi et al., 2005; Al-Shehry et al., 2006; Esteeves and Koseph, 2008). The socio-technical nature of e-government suggests that these issues should be addressed with careful attention to context (Seifert, 2002). Therefore for effective e-government, it is important to successfully introduce technology into the specific context (Heeks, 2003; Gupta and Jana, 2003).

2.2.2 Taxonomy of E-government

Based on the interaction and activities e-government has been classified government to citizen (G2C), government to business (G2B), government to government (G2G), and government to employee (G2E) categories (DeBenedicts et al.m 2002; Carter and Belanger, 2004; Ndou, 2004; Alsaghier et al., 2009).

In attempts to explore these classifications, the author provides a deeper insight into e-government.

- **Government to Citizen (G2C):** Allows citizens to retrieve information and complete government transaction e.g. e-tax filing. The Government to Citizen (G2C) sector refers to all dealings between citizens and the government over online medium (DeBenedictis et al., 2002). G2C e-government is designed to facilitate citizen interaction with government and is perceived to be the primary goal of e-government (Seifert, 2008; Carter and Bélanger, 2005). Using G2C e-government, citizens' transactions with government, such as license renewal, paying taxes can be less time consuming and easy to carry out.

- **Government to Business (G2B):** The G2B sector deals mainly with the sale of governments' goods to the public and the procurement of goods and services (Fang, 2002). Researchers highlight that G2B initiatives involve the sale of government goods and the procurement of goods and services for the government; this results in benefits for both the government and business (Jaeger, 2003). G2B transactions include various services exchanged between government and the business community, including dissemination of policies, memos, rules and regulations (Chavan and Rathod, 2009).
- **Government to Employee (G2E):** The G2E solution is about empowering employees to assist citizens in the fastest and most appropriate way, speed-up administrative processes, and optimise governmental solutions. Therefore, G2E services are specialised services that cater only government employees, such as the provision of human resource training and development that improves the bureaucracy's day-to-day functions and dealings with citizens (Chavan and Rathod, 2009). Examples of G2E e-government include the interaction between passport offices within the country and the embassy located in other countries.
- **Government to Government (G2G):** The G2G sector represents the backbone of e-government in which governments (federal, state, and local) integrate their internal systems and procedures into a central system (Seifert, 2008). G2G services are sharing of data, transactions between central, national, local government, other government agencies, and department-level, attached agencies and bureaus (Klamo et al., 2006). The main motivating force behind the G2G sector includes the growing attention being paid to improve the efficiency by saving transactions cost, increasing the speed of transactions, and improving the consistency of outcomes (Seifert, 2008).

As author considers G2C taxonomy for his research so in the light of above discussion, the following objectives can be observed to the G2C:

- To provide one-stop, on-line, access to information to individuals.
- Citizens should be able to find what they need quickly and easily.
- Receiving services should be citizen-focused and not agency focused.
- Able to deliver effective e-services directly to citizens.
- Building and enhancing trust in citizens.

2.3 E-government Performance Assessment Frameworks

Since e-government is a multidisciplinary area and involve various fields e.g. information system, computer science, and public administration so it was important to cover the possible number of existing studies and models in e-government. Literature indicates various conceptual models introduced by researchers to assess the performance of e-government in variety of perspectives. Author in this study considers review of various e-government assessment frameworks, e-government success assessment models, e-government service quality models and trust measurement frameworks. Further, India e-tax services are considered for validation of proposed framework, so it becomes important to review the existing performance assessment frameworks which have been developed for India e-government assessment.

2.3.1 E-Government Evaluation Frameworks and their Context

In order to propose e-government evaluation framework for e-government services, first it becomes essential to systematically review the existing assessment frameworks and their associated dimensions and contexts of measurement.

Bakry, (2004) presented a framework called STOPE framework. It has been developed and used for the evaluation of different ICT problems including e-business and e-government planning, and information security management. Framework focuses on the strategy, technology, organization, process and environment. This model was found good for the development of e-government. But as per e-service assessment issues it doesn't address. This model provides a basis for assessing e-readiness and technical infrastructure of e-government. In fact he mentioned that “STOPE-based development of typical e-government services” will be studied in his proposed future work.

Asgarkhani, (2005) assessed effectiveness of e-service in local government of New Zealand as case study. This study examines the effectiveness and value of e-services within the public sector by considering four specific features of effectiveness: “the view of management and ICT strategists; social, cultural and ethical implications; the implications of lack of access to ICT; and the citizens’ view of the usefulness and success of e-service initiatives”. Asgarkhani’s study is conceptual and major criteria for assessing the effectiveness of e-services including quality assessment criteria and citizens’ satisfaction is missing in this study. Effectiveness assessment dimensions in his study mainly focusing on e-government strategy, usefulness, and social, cultural and ethical issues.

Esteves and Joseph, (2008) presented a comprehensive e-government performance assessment framework for e-government projects (EAM). This framework is based on STOPE model proposed by Bakry, (2004). As discussed above that the STOPE model identifies strategy, technology, organizations, people, and environment as the core components for the development of e-government in the digital age. EAM uses the constructs of the STOPE model to provide the basis for assessment of e-government projects. EAM included two additional assessment dimensions outside the STOPE framework: operational and services.

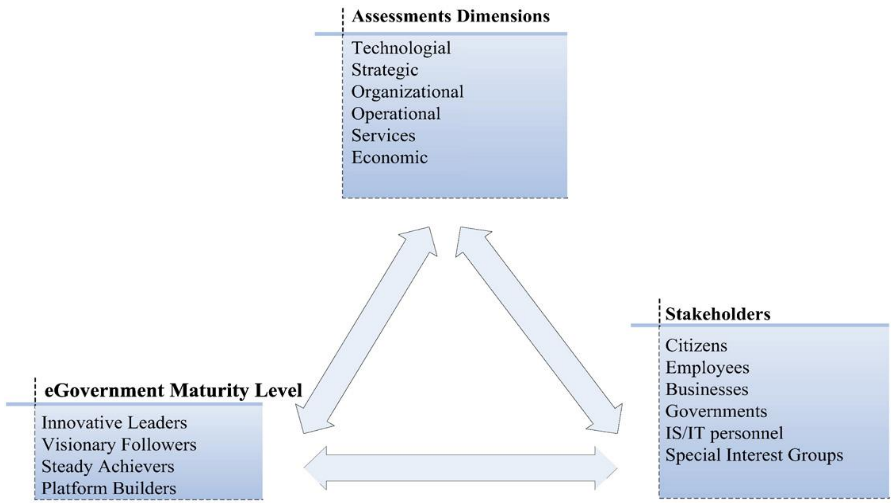


Figure 2.2: E-Government Assessment Framework (EAM)

(Source: Esteves et al., 2008)

The framework (EAM) is generic in nature and most of the dimensions cover the administrative perspective. However, this model cannot be considered as an e-service effectiveness evaluation framework because it does not provide specific measurements indexes.

Batini et al., (2009) proposed a framework GovQual which is a multi-layered framework that measures project quality with respect to an organization’s environment. This framework proposes a methodology for planning e-government initiatives in public administrations with specific attention to the strategic planning and preliminary operational planning phases. However, this framework does not examine strategy for e-government service quality measurement.

Shanshan et al., (2010) proposed a framework for web site evaluation. Framework has been established which suggests website assessment should be performed in three major aspects: website usefulness, service quality, and physical accessibility. This framework covers only the evaluations of the website and left other major dimensions like technology, e-government service quality related assessment dimensions, e-service effectiveness dimensions, and behavioural dimension. This framework doesn't support the overall performance assessment.

Ibrahim et al., (2011) proposed a framework "A new COBRAS framework to evaluate e-government services – A citizen centric approach". This framework was proposed based on the most successful measurement factors that impact the satisfaction of users with an e-government service. Such factors are classified into four groups and validated using e-government experts and users as follows: Cost, Opportunity, Benefit, Risk, and Analysis (COBRA) for Satisfaction. It doesn't tell about how to measure the delivered e-services and assess performance of e-government.

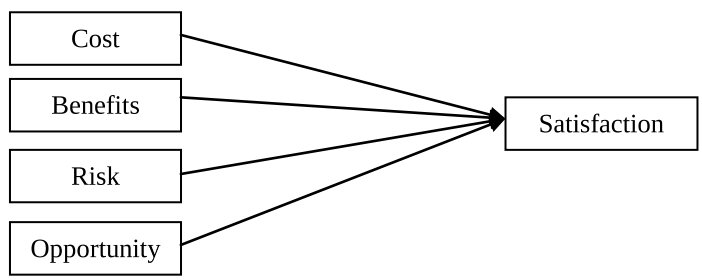


Figure 2.3: COBRA Model for User Satisfaction

(Source: Ibrahim et al., 2011)

Most of the above discussed models used different dimensions such as e-government strategies, technological infrastructure, organization policies, and environment for assessing e-government in varied context. The given approach cannot be used for evaluating the effectiveness of e-government service from the citizens' perspective.

2.3.2 Information Systems, E-Commerce and E-Government SuccessEvaluation Models

A stream of research has been conducted to identify IS success measures. Gorla et al., (2010) mentioned in his study that, to measure the success of various information systems (IS), organizations are moving beyond traditional financial measures, such as return on investment also consideringinformation systems quality as an important measure of IS success (Gorla et al., 2010). Pitt et al., (1995) argued that existing IS success measures strongly focus on product and services. With an increasing percentage of IS budgets being devoted to IS services, more emphasis is being given to the service dimension of IS (Pitt et al., 1995; Kettinger and Lee, 1997). Researchers have created models for IS success (DeLone and McLean, 1992; Seddon, 1997) emphasizing the need for better and more consistent success metrics. DeLone and McLean, (1992) proposed an IS Success model that incorporates several individual dimensions of success. DeLone and McLean, (2003) have updated their original success model and explained how the updated DeLone and McLean information system success model can be adapted to the measurement challenges of the new e-commerce world. Success has been widely studied in information system research (DeLone and McLean, 1992; Seddon, 1997; Seddon and Kiew, 1996; Rai et al., 2002; Roldán and Leal, 2003; Iivari, 2005) and e-commerce research (DeLone and McLean, 2003, 2004; Molla and Licker, 2001; Liu and Arnett, 2000; Cao et al., 2005). Molla and Licker, (2001) proposed an e-commerce success model based on the DeLone and McLean IS Success model. In their study, they proposed a partial extension and re-specification of the DeLone and McLean IS Success model to an e-commerce system. Hu et al., (2005) attempt to establish a suitable and systematic appraisal framework of e-government project success based on the IS success Model presented by DeLone and McLean in 1992. Further Wand and Liao, (2008) validated DeLone and McLean, (2003) model to assess the success of e-government systems by using e-tax services of Taiwan. Some researchers have synthesized the literature by examining one or more relationships in the DeLone and McLean IS success model using the quantitative technique (Mahmood et al., 2001; Bokhari, 2005; Sabherwal et al., 2006) to develop a better understanding of success.

DeLone and McLean's IS success model (1992) was used as the base model in many researches. Additional variables were incorporated into the model from various disciplines (IS, e-commerce), and re-specifications and extensions were made to develop a success model for government e-services (Saha et al., 2010).

Above discussed literature is evident that e-government success evaluation was done by various researchers and DeLone and McLean (1992, 2003) models were considered as base models in their studies. Now, it becomes essential to discuss in details DeLone and McLean information success and e-commerce success models to know the associated criteria of evaluation. It is also important to highlight those models which followed DeLone and McLean.

2.3.2.1 DeLone and McLean Information System Success (1992)

DeLone and McLean, (1992) proposed a model ‘‘Information systems success: the quest for the dependent variable’’ and attempted to systematically combine individual measures from IS success categories to create a comprehensive model. In their model, DeLone and McLean, (1992) argue that IS success is a dependent variable affected by six independent and interrelated dimensions or constructs. These constructs are: system quality, information quality, use, user satisfaction, individual impact, and organisational impact. The following is a brief explanation of each construct as stated in his study:

- System quality: refers to the contribution of information processing system. Some of its measures are: convenience of access, flexibility of system, integration of systems, response time, realisation of user expectations, reliability, ease of use, ease of learning, perceived usefulness, etc.
- Information quality: concerning the quality of information produced by the system. This can be measured by accuracy, timeliness, reliability, completeness, conciseness, relevance, understandability, etc.
- Use: defined as the user utilisation of the output of an IS. Some of its measures are: use or non use of different systems, frequency of use, motivation to use, etc.
- User satisfaction: presenting recipient reaction to the output of an IS. Main construct measures are: difference between information required and information received, user complaints regarding information centre services, user satisfaction concerning different facets of the IS, etc.
- Individual impact: refers to the effect of information on the recipient’s behaviour. Major measurements include: user confidence, efficient decisions, quality of decision analysis, quality of career plans, cost awareness, etc.
- Organisational impact: defined as the effect of information on organisational performance. Some of the construct’s measures are: profitability, cost reduction, production scheduling costs, market share, etc.

DeLone and McLean proposed that “System Quality and Information Quality singularly and jointly affect both Use and User Satisfaction’’. Additionally, ‘‘Use and User Satisfaction’’ are direct antecedents of ‘‘Individual Impact’’ and lastly, this impact on individual performance should eventually have some ‘‘Organizational Impact”. As shown in Figure below, DeLone and McLean’s model depicts the relationships of the six IS success dimensions. This model is regarded as the most comprehensive IS assessment model within the body of IS research.

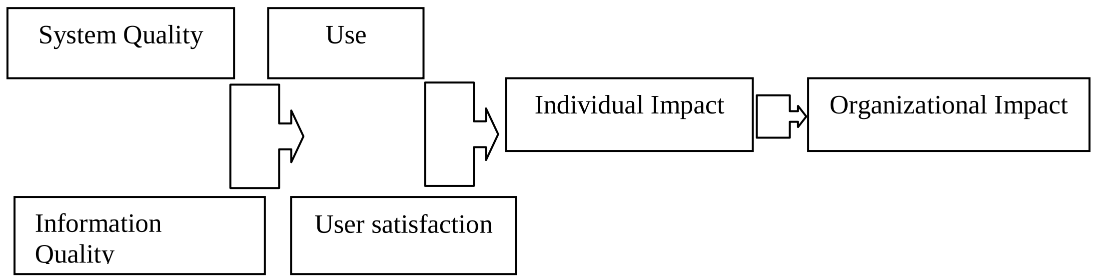


Figure 2.4: Information System Success Model

(Source: DeLone and McLean, 1992)

2.3.2.2 DeLone & McLean, (1992) IS success model’s extensions

Many researchers use the model as a foundation for suggesting modified frameworks for assessing information systems. DeLone and McLean include only system quality and information criteria for measuring success of information system. There are many other dimensions required for measuring the system performance or success.

Pitt et al., (1995) proposed a model of information system success similar to the DeLone and McLean’s model, except that service quality was included as one of the dimensions that affects both use and user satisfaction. Pitt et al., (1995) argue that an IS assessment should not focus only on the quality of the product but should also consider the quality of the service. The model shows the importance of an emerging dimension of ‘information service quality’ in information systems assessment. They highlight the role of the IS department in an organisation as a provider of both products and services. As a result, they included service quality as an additional construct to information quality and system quality. This view is supported by other researchers confirming the importance of including service quality measure as a part of IS success (Kettinger et al., 1997; Li, 1997; Wilkin and Hewett, 1999; Wilkin and Castleman, 2003). Moreover, Wilkin and Hewett, (1999) stress on the importance of evaluating the quality of service as expected and perceived by different stakeholders. Figure given below shows the interrelationship among seven dimensions with an inclusion of the service quality in DeLone and McLean’s work.

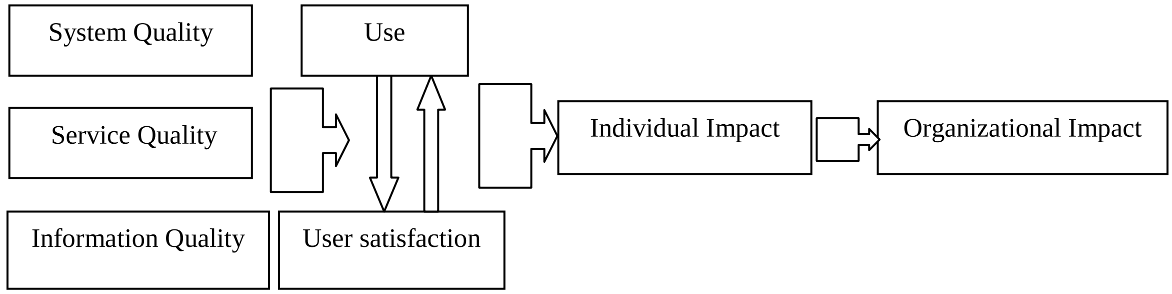


Figure 2.5: Service Quality Model for IS Success Assessment

(Source: Pitt et al., 1995)

Myers et al., (1997) proposed an "Information Systems Assessment" (ISA) framework with the inclusion of an additional dimension 'Work group impact' within Pitt et al.'s IS success model. The dimension is considered an important intermediate stage between the individual and the organization. The ISA proposed by Myers et al., (1997) is the most comprehensive IS assessment framework but still fails to adequately relate IS to organizational structure. Though such approaches attempt to rationalize the relationship between IS quality and organizational quality, they lack appropriate variables and linkages in the framework. Thus a new framework is imperative to further research on the relationship between IS quality and organizational quality. The model is given below.

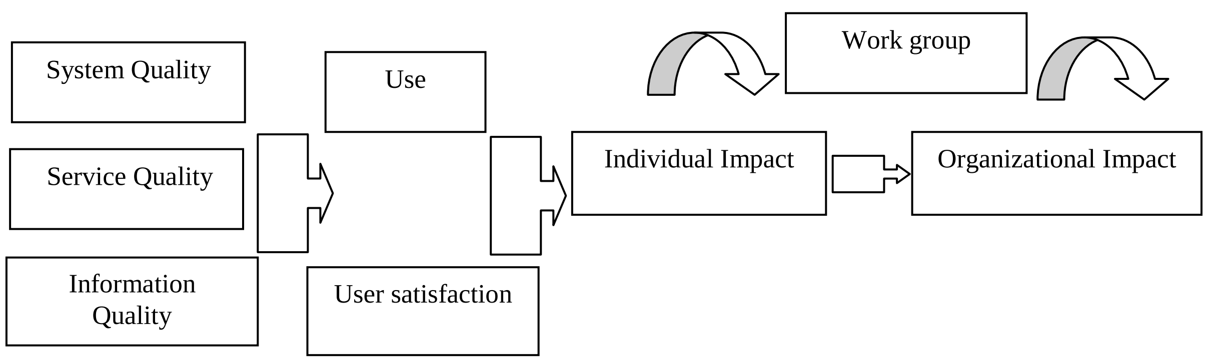


Figure 2.6: Information System Assessment Model

(Source: Myers et al., 1997)

Seddon, (1997) criticizes DeLone and McLean's, (1992) model argues that it is confusing. In order to relieve the confusion, they proposed a re-specified and extended version of the model based on the original model proposed by DeLone and McLean, (1992). He also presented three different meanings underpinning the "Use" construct which are: (i) benefits from use; (ii) beginning of a process that leads to user satisfaction, individual impact, and organisational impact; or (iii) future use. Seddon (1997) confirms that "Use" in this case is a behaviour and should not be considered as a measure or indicator of IS success. To overcome the limitations of DeLone and McLean's, (1992) model, he suggested a re-specified model through adding the following constructs: expectations about the net benefits of future IS use, consequences of IS use, perceived usefulness and net benefits of IS use to society. Finally, in their model, they mentioned system quality, information quality, perceived usefulness, and satisfaction as success measures. Although the framework highlights essential points in measuring IS success, it is not tested empirically to prove its validity. Rai et al., (2002) empirically and theoretically tested DeLone and McLean's, (1992) and Seddon's, (1997) models of information systems (IS) success. They extended the model and added perceived ease of use. In their model, perceived usefulness and information quality are included as the antecedents of satisfaction.

Molla and Licker, (2001) proposed a partial extension and re-specification of the DeLone and McLean's, (1992) "Information Systems success model" for measuring the success of e-commerce system which covers all functions and aspects related particularly to e-commerce information, transactions, and services. Molla and Licker, (2001) replaced user satisfaction by customer satisfaction and consider it an independent variable to e-commerce success. E-commerce system quality and information quality included along withtrust andsupport and services which shows effect on customers' use and e-commerce satisfaction. The study revealed that researchers have not yet agreed on a standard framework, but the six main constructs identified in most studies are: design; ease of use; system quality; information quality; service quality; and security and privacy. It requires further research to be validated and tested empirically. Figure 2.7 shows the model with various constructs.

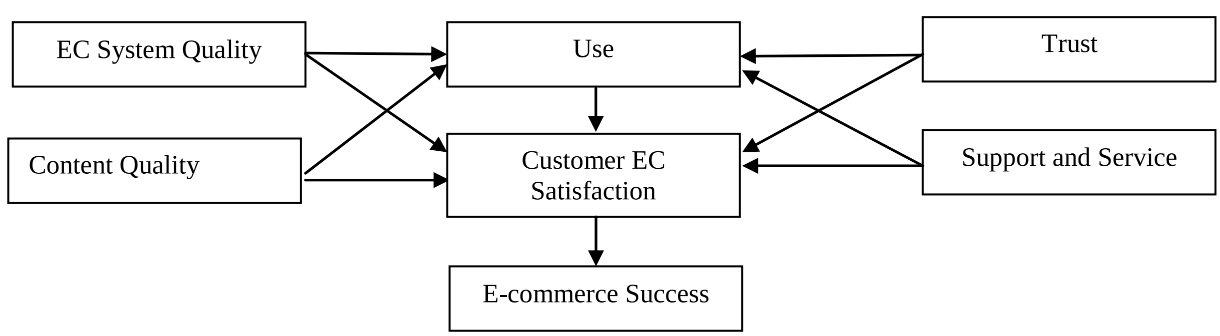


Figure 2.7: E-Commerce Success Model

(Source: Molla and Licker, 2001)

2.3.2.3 Updated DeLone & McLean Model (2003)

DeLone and McLean, (2003, 2004) proposed an updated IS success model "The DeLone and McLean model of information systems success: a ten-year update" and "Measuring e-commerce success: applying the DeLone and McLean information systems success model". Updated original IS success model found very usefulness in light of the major changes in IS practice, especially the advent and explosive growth of e-commerce. Based on prior studies, DeLone and McLean, (2003) proposes an updated model of IS success by adding a "service quality" measure as a new dimension of the IS success model, and by grouping all the "impact" measures into a single impact or benefit category called "net benefit." It consists of six dimensions which include system quality, information quality, service quality, system use, user satisfaction, and net benefits. Constructs of information quality, system quality, and service quality individually and jointly affect the factors of use and user satisfaction. The model further states that there is a reverse relation between the amount of system use and user satisfaction. User satisfaction and use jointly affect net benefit.

DeLone and McLean, (2004) used DeLone and McLean, (2003) model to measure the success of e-commerce system. Each of the constructs is discussed in the model are in the context of an e-commerce system. System quality is equated with the desired characteristics of an e-commerce system. Some of the measurement variables for system quality for users in an e-commerce system are usability, availability, reliability, adaptability, and response times, also known as download times. Information quality has involved features such as accuracy, relevancy, precision, reliability, completeness and currency. Information quality indicates how personalized, relevant, complete, secure, and easily accessible the Web content is for a user, so that the user or customer could be induced eventually to initiate a transaction and become a return customer. Service quality denotes the support services delivered by the e-commerce service provider. The other variable, user satisfaction, measures customer opinions of an e-commerce system. To avoid the different interpretations of the "use" construct, the model replaces use by "intension to use", which describes an attitude or willingness to use the IS or e-commerce systems. Finally net benefits, measures the difference between the positive and negative impacts of the e-commerce experience among customers, suppliers, organizations, markets, employee, and societies. The net benefit factor is consideredas important by the authors; however, they also stressed that this factor cannot be analyzed directly, but can only be measured indirectly through the system quality, information quality, and service quality measurement variables (DeLone and McLean, 2003). Based on this evaluation model, any online service can be evaluated in terms of information, system, and service quality.

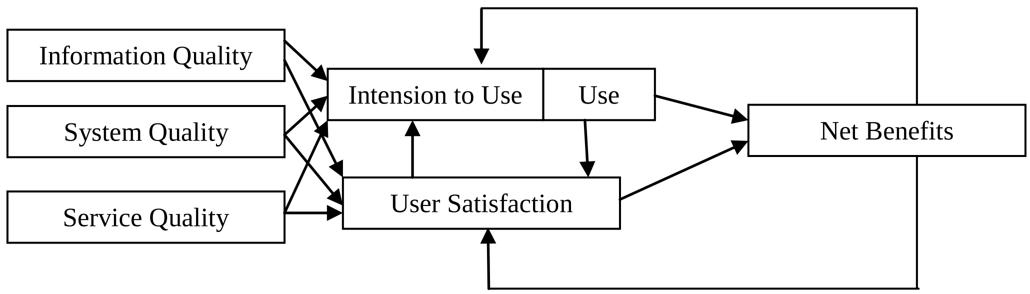


Figure 2.8: Updated DeLone and McLean IS Success Model

(Source: DeLone and McLean, 2003)

2.3.2.4 E-government Success Models

While reviewing the literature it was identified that many researchers used DeLone and McLean, (1992, 2003, and 2004) IS success, updated IS success, and E-commerce success evaluation models as base models for evaluating the e-government system's success. Here is the discussion of some studies which took place for evaluating the e-government system's success. Most of the researchers used DeLone and McLean, (1992) "Information Success assessment" model directly without changing the constructs but some researchers updated the existing model also.

Guo and Lu, (2005) applied DeLone and McLean, (1992) model in assessing e-government system in Australia. They claim that the existence of a website providing a communication channel between citizens and governments is vital in the case of e-government. Accordingly, they argue that when investigating IS quality, the new construct, web presence quality, should be added to the original two: information quality and system quality.

Wang and Liao, (2008) proposed a model for assessing e-government systems success, this model is a validation of the DeLone and McLean model, (2003). Proposed study used DeLone and McLean, (2003) model to assess the success of e-government systems in Taiwan. Wand and Liao collected the data from six different e-government systems and one of them was tax services. Their results showed that the hypothesized relationships between the six success factors are significantly supported by the data except he links from system quality to use. Instead of “Net Benefits” construct Wang and Liao used “Perceived Net Benefits”. Wang and Liao framework is useful and provides a sound evaluation tool. Actually, the G2C e-government service process fits nicely into the DeLone and McLean updated IS success model. Thus, the updated IS success model can be adapted to the system success measurement in the G2C e-government context (Wang and Liao, 2008). It has weak points too. Firstly, assessment data is collected from direct surveys which make it difficult to implement, and secondly some important project management assessment dimensions like project organization and project processes are not included in this framework. E-government service delivery and citizens’ trust are not the part of his proposed model.

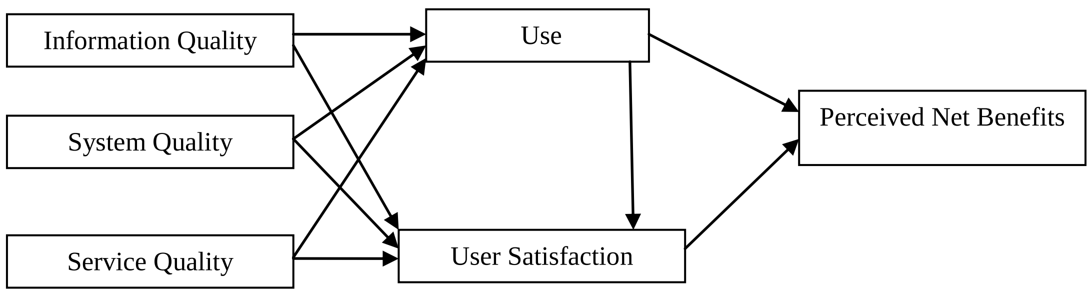


Figure 2.9: E-government success model

(Source: Wang and Liao, 2008)

Chutimaskul et al., (2008) highlighted the importance of information quality, process quality and service quality in sustainable e-government system development and mentioned that the e-government quality is composed of these three quality variables. His model doesn’t talk about the remaining criteria like usefulness, citizen’s satisfaction and trust. Chutimaskul et al., (2008) stated that the e-government quality is composed of process quality, information quality, and service quality.

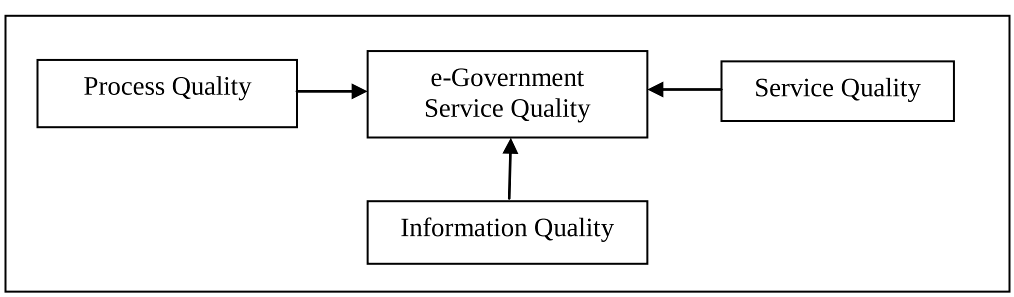


Figure 2.10: Three Aspects of E-Government Quality

(Source: Chutimaskul et al., 2008)

Chen et al., (2010) used the DeLone and McLean, (2003) model to assess the impact of quality antecedents on taxpayer satisfaction with online tax-filing systems. He applied structural equation modeling for the analysis and his results confirmed that the quality antecedents strongly influence taxpayer satisfaction with the online tax-filing system. His focus was in analyzing system and information quality. He concluded that the factors of information and system quality were more important than service quality in measuring taxpayer satisfaction, therefore Chen's study given less consideration on e-service quality. Floropoulos et al., (2010) implemented the DeLone and McLean, (2003) model to assess the success of the Greek Tax Information System. All hypothesized relationships were supported, except the relationship between system quality and user satisfaction.

Edrees and Mahmood, (2013) revalidated a multidimensional G2C e-government systems success model based on the validation of DeLone and McLean, (2003) model done by Wang and Liao, (2008). Wang and Liao, (2008) "assessing the e-government success" consider six success measures that are information quality, system quality, service quality, use, user satisfaction, and perceived net benefit. The findings of this study partially support Wang and Liao results.

2.4 E-Government E-Services

Proposed study is focusing on the effectiveness evaluation of government e-services so it is important to discuss the concept of e-services and e-service quality. This section highlights the existing studies associated with e-government services and e-service quality. Also various e-service assessment frameworks are being discussed in this section.

2.4.1 E-Service Quality Concepts

E-service is a highly generic term usually referring to "*The provision of services via the Internet, thus e-Service may also include e-Commerce, although it may also include non-commercial online services, which is usually provided by the government*" (Pavlichev and Garson, 2004).

Services in e-government play a very important role as these represent the main way to support government in reaching citizens with specific, dynamic, explicit and implicit needs. In other words, digital government services encapsulate public administration functionalities and information making them available through digital interfaces (Buckely, 2003).

The concept of e-service quality is derived from the concept of quality of traditional services. E-service quality can be classified as the key determinants to the success or failure of online organizations (Barnes and Vidgen, 2002). E-service quality is defined under many different perspectives, based on customer's perspective, service performance, customer expectations, and perceptions of service (Hien, 2014). The e-service and Web site quality both are very rich in the context of definitions, models and measurement instruments. However, different dimensions have been proposed and there is no consensus on the component dimensions. Collectively, the existing literature suggests that e-service quality is a multidimensional construct; although, the content of what constitutes e-service quality varies across studies (Zeithaml et al., 2002). Most of the service quality models existing in the literature are either from e-commerce or from marketing.

Parasuraman et al., (1988; 2005) and Zeithaml et al., (2002) presented service / e-service quality models available in the literature and have been using by many researchers in e-commerce and some researchers used in e-government studies. SERVQUAL model proposed by (Parasuraman et al., 1988) consists of 22 service quality measures that are organized in five dimensions: tangibles (appearance of physical facilities, equipment, personnel and communication materials); reliability (ability to perform the promised service dependable and accurately); responsiveness (willingness to help customers and provide prompt service); assurance (knowledge and courtesy of employees and ability to convey trust and confidence); and empathy (provision of caring, individualized attention to customers).

Zeithaml, et al., (2002) proposed E-ServQual for measuring e-service quality, and they mentioned that e-service quality affects users' satisfaction. They identified four applicable dimensions: efficiency, reliability, fulfillment, and privacy, thus forming the core E-ServQual scale that is used to measure customer perception of service quality delivered by online retailers.

Parasuraman et al., (2005) proposed E-S-QUAL and E-RecS-QUAL scales, to measure service quality of e-commerce systems, which are extensively used by researchers to evaluate e-service quality (e-SQ) in different applications. A multiple-item scale (E-S-QUAL) proposed for measuring the service quality delivered by web sites on which customers shop online. The basic E-S-QUAL scale developed in the research is a scale of four dimensions: efficiency, fulfillment, system availability, and privacy. The second scale, E-RecS-QUAL, contains three dimensions: responsiveness, compensation, and contact. This model is good for the quality assessment of commercial website.

Lee and Lin, (2005) identified the main dimensions by modifying SERVQUAL that have influenced service quality in online shopping. Web site design, reliability, responsiveness, trust and personalization are the dimensions. Many researchers have successfully employed SERVQUAL in e-commerce context (Lee and Lin, 2005). As a result of the differences between the methods of measuring service quality in e-government and physical market services, it is very important to reword and reformulate the SERVQUAL scale items before they are used extensively in the online government context (Hongxiu and Reima, 2009). Number of research papers that expanded or updated the SERVQUAL model. Although, SERVQUAL scale was developed in a marketing environment, it has been widely used in an IS context and IT. Service quality is an important factor to measure customer satisfaction (Alanezi et al., 2010).

2.4.2 E-government Service Quality and Models

E-service quality is an important measure in public sectors, and it encompasses three aspects including user focus, user satisfaction, and outcomes (Buckley, 2003). Research has often referred to e-government service quality as the degree to which an e-government web site facilitates the competent delivery of efficient e-services to help citizens, businesses and agencies in achieving their governmental transactions (Tan et al., 2008). Service quality in e-government or e-service quality is defined as users' overall assessment of quality in the virtual context and serves as one of the key factors in determining success or failure of e-government (Santos, 2003; Welch and Pandey, 2005). Some studies have reexamined the IS success model, and they include service quality as another important antecedent to user satisfaction (McLeod and Pippin, 2009).

Srivastava, (2011) describes e-government as the use of ICTs for improving the access to government services and delivery processes for the benefit of stakeholders. From previous research, it was found that researchers (Papadomichelaki et al., 2009; Shrivastava et al., 2011; Bhattacharya et al., 2012) have measured e-service quality of websites directly using privacy, security, usability, consistency, reliability, efficiency, and transparency items. As a result of that, the quality of e-government services can play a significant role in improving e-government efficiency as well as increase citizens' satisfactions. Jun et al., (2009) proposed two scales namely, E-G-S-QUAL and E-G-RecS-QUAL based on E-S-QUAL and E-RecS-QUAL (Parsuraman et al, 2005), consider the peculiarities of the services delivered by e-government web sites and also draw the correlation between e-commerce applications and e-government applications.

Papadomichelaki et al., (2009) proposed a multiple-item scale for assessing e-government service quality and conceptualises an e-government service quality model (e-GovQual) for measuring e-government service quality for public administration sites where citizens seek either information or services. E-GovQual considers six major dimensions e.g. ease of use; trust; functionality of the interaction; environment; reliability; content and appearance of information; and citizen support to measure the e-government service quality. Some of the quality attributes used in e-GovQual was identified from some conceptual models including E-S-QUAL (Zeithaml et al., 2002; Parasuraman, et al., 2005). The instrument (e-GovQual) measures users' perceived service quality of e-government sites. Limited numbers of dimensions were used in the model and system quality, information quality, and service quality dimensions do not appear. Papadomichelaki proposed the following multiple scale for assessing e-government service quality model:

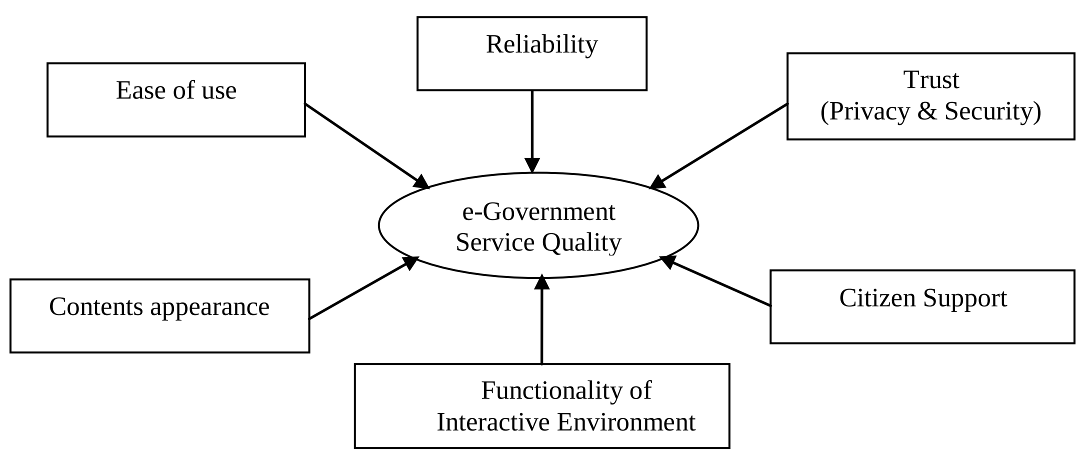


Figure 2.11: e-GovQual for measuring e-Government service

(Source: Papadomichelaki et al., 2009)

Alanezi et al., (2010) presented a conceptual model "A proposed instrument dimensions for measuring e-government service quality" to improve e-service performance and effectiveness which identified seven instrument's dimensions based on SERVQUAL scale of Parasuraman, et al., (1988). There are seven dimensions in this proposed scale identified for measuring the e-service quality in e-government domain. The proposed seven dimensions for measuring e-government service quality are website design, reliability, responsiveness, security/privacy, personalization, information, and ease of use. Proposed scale does not give comprehensive e-government performance assessment; however, reasonable number of items is identified for measuring e-service quality. Alenazi et al., (2010) study is purely conceptual study and their proposed instrument is not validated to examine the relationship between the scale's dimensions, user's satisfaction and user's trust.

Bhattacharya et al., (2012) proposed "E-service quality model for Indian government portals: citizens' perspective" which is a multi item scale for assessing the e-service quality of government portals involving transactions. Technology acceptance model (TAM) and D&M IS Success Model were used as base models in their study. Eight quality measurement items were used to evaluate e-service quality of government portals including: Citizen Centricity; Privacy and Security; Technical Adequacy; Usefulness of Information; Comprehensive information; Transaction Transparency; Interaction; and Usability; which were obtained from the existing literature. Quantitative data analysis technique applied for the analysis of e-government Web portal quality and "Indian Railway Transport Company and E-tax web portal of India" were considered for their study. Model was fairly found good for the analysis of web portal. Model shows that e-service quality is consolidated by information quality and system quality. In other words, e-service quality is assessed with information quality and system quality. However, various above discussed studies had used information quality, system quality, and service quality as independent dimensions and have their own items for assessment. Citizens' satisfaction and trust dimensions are not the part of e-service quality assessment. Hence this study does not give comprehensive view of e-government service effectiveness. The following figure shows the various dimensions.

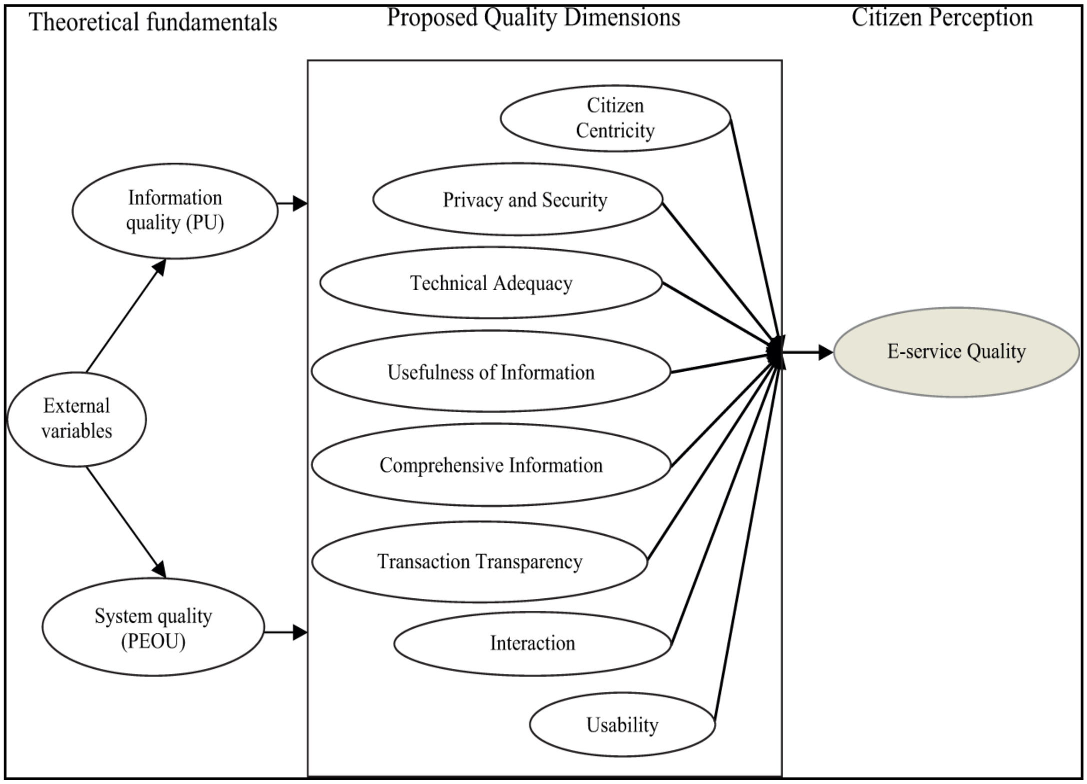


Figure 2.12: Model for Assessing E-service Quality of Government Portals

(Source: Bhatacharya et al., 2012)

Hien, (2014) conducted a conceptual study on "Evaluation of E-Government Service Quality" and intended to use acase study of e-Tokyo service in Japan for the validation of his conceptual model. Hein's proposed model includes "Organization Quality" as additional dimension and the model adheres similarities with (Bhatacharya et al., 2012) model. The selection of eight variables was based on previous e-government service quality studies. Reliability, communication, responsiveness, ease of use, contents, trust & security are the common variables along with two additional variables including e-governance and CIO used in Hien's study. The study is purely conceptual and not validated to confirm the solidarity of the dimensions in the proposed model. Figure 2.13 shows the Hien's model.

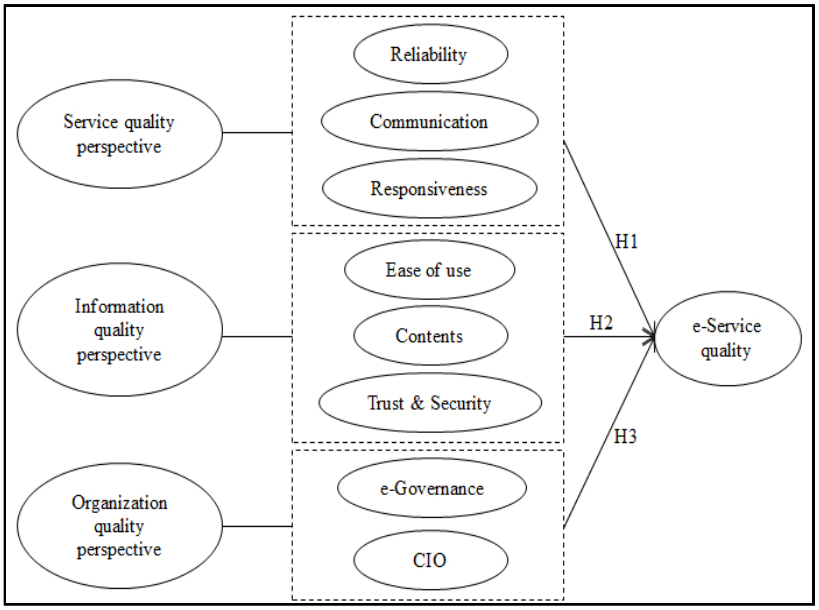


Figure 2.13: E-government Service Quality Model

(Source: Hien, 2014)

Discussion on the previous studies on e-government services clearly indicate that the e-government services may have various dimensions of assessment and different ways followed by various researchers. Web service quality, web service assessment, frameworks, methods, theories, models and many other metrics were used for the quality assessments of e-government services.

2.5 Trust in E-Government

2.5.1 Concept of Trust in E-Government

According to Grandison and Sloman, (2000) the "*Trust is the firm belief in the competence of an entity to act dependably, securely, and reliably within a specified context*". Most often the concept of trust is defined in a particular context, so in the context of technology, trust on technology implies, believing that the technology can be used to get the desired task accomplished satisfactorily. The concept of trust has been studied extensively which is used in many disciplines long before the visualization of e-government, but each field has its own interpretation. Generally, researchers have difficulties in defining this concept (Wang and Emurian, 2005). The relationship between trust and information system use has been the subject of many academic studies. In general, these studies primarily focus on e-commerce, online transactions and web purchases (Gefen et al., 2003; Genfen and Sturb, 2004). Trust is the foundation of relationship between citizens and government, which play a vital role in helping researchers to understand citizens' acceptance of e-government. Literature related to research in trust has focused mainly on citizen's trust in electronic business context. Researchers are just beginning to empirically explore the role of trust in e-government (Carter and Bélanger, 2005). Trust building is a cumulative process where the level of trust in the earlier stages affects the level of trust in the later stages and impacts the development of long-term trust relationships (Colesca, 2009). The conceptualization and empirical researches of a citizen trust models in e-government context has not been well addressed (Liu and Zhou, 2010). Recently, several researchers have expanded the concept of trust into a multi-dimensional construct, arguing that the complexity of the information system environments requires a more thorough review of the different aspects of trust.

Tassabehji et al., (2007) presented an article entitled "Generating Citizen Trust in E-Government Security: challenges perceptions". Going through all the phases of this article we come to the conclusion that the aim of this study is not to develop a new trust building model between government and citizens but to focus on security efforts which will lead to build the citizen's trust. Tassabehji, et al., (2007) classified trust building factors in two major categories including "Pre-Interactional factors" and "interactional factors". Pre-interactional factors involve individual behavioral, institutional attributes, and technology attributes whereas interactional factors involve service attributes, transactional delivery attributes, and information contents attributes.

Tan et al., (2008) presented his paper named "Building Citizen Trust towards E-Government Services: Do High Quality Websites Matter? In his study, he used SERVQUAL of Parshuram's SERVQUAL model for measuring the quality and service. An author used test data and came to the conclusion that good quality of government services can be given by a quality of website. SERVQUAL model has constituent dimensions (i.e., tangibles, reliability, responsiveness, assurance, and empathy) which cover various quality assessment factors of website. The study suggests the importance of SERVQUAL and emphasizes the use by public institutions to consider SERVQUAL which guides the design of e-Government websites. It is able to foster both sociological and technological oriented beliefs.

McLeod and Pippin, (2009) presented a multi-dimensional trust model, specifically focusing on "Security and Privacy" for measuring trust in e-government. E-tax filling service was considered for the validation of the model by applying qualitative analysis technique. This model illustrates that for the two-step process of individual tax preparation and e-filing, five dimensions of trust are important. Specifically, individual use of tax preparation software depends on individual trust in the software logic, trust on the creator of the software as well as trust in the software's ability to keep the tax information private and computing system secure. This model is good in the context of security and privacy which is the important factors for building trust in citizens, but for the comprehensive e-government service assessment model should include quality dimensions.

Above discussion clearly explains that trust measurement is based on the context and hence the authors have followed various sets of indicators to measure trust in e-government system. Trust-determining factors may vary between countries, cultures, and time. To evaluate government and determine the level of trust in government, citizens use different criteria for evaluation (Bouckaert and Walle, 2003). Citizens who are dissatisfied with the services provided will perceive lower level of trust in government services, and the opposite will be true when citizens are satisfied with the government services (Welch et al., 2005). The level of individual trust depends on the actual performance of government and the interpretation of the government's performance by citizens. Citizen interpretation can be formulated based on the gap between their expectations and the actual performance (reality) by the government (Saha et al., 2010).

2.5.2 Citizens' Satisfaction and Trust Relationship in E-government

Government has the potential to improve citizen satisfaction by its appropriate use of information and communication technology. Citizens' satisfaction with e-government services is related to citizen perception of online service convenience (transaction), reliability of information (transparency), and engaged electronic communication (interactivity) (Welch et al., 2003). Trust is strongly associated with satisfaction with the e-government services, and satisfaction is related to citizens' perceptions about the service, such as the reliability of information provided by the government, the convenience of the service, etc. Trust is the expected outcome of e-government service delivery (Welch et al., 2005; Liu and Zhou, 2010).

Kelly and Swindell, (2002) define service output as performance measurements and service outcomes as citizen satisfaction. According to Hu et al., (2009) "*User satisfaction refers the degree to which an individual is satisfied with his or her overall use of the system under evaluation*".

Welch et al., (2005) assessed government website by using only three dimensions including Website use, satisfaction, and citizen's trust.Welch stated that the citizen satisfaction is positively associated with trust in government. Increased citizen trust in government will increase citizen satisfaction in government e-service.Welch's study is fine to comprehend the relationship between satisfaction and trust dimensions. However, other quality related dimensions are not the part of their study also Welch's study doesn't discuses the effect of quality dimensions on satisfaction and citizen's trust. Therefore, this study can not be considered for assessing e-government quality and effectiveness. Figure 2.14 shows the relationships among the use of government web site, overall satisfaction with e-government and citizens' trust in e-government.

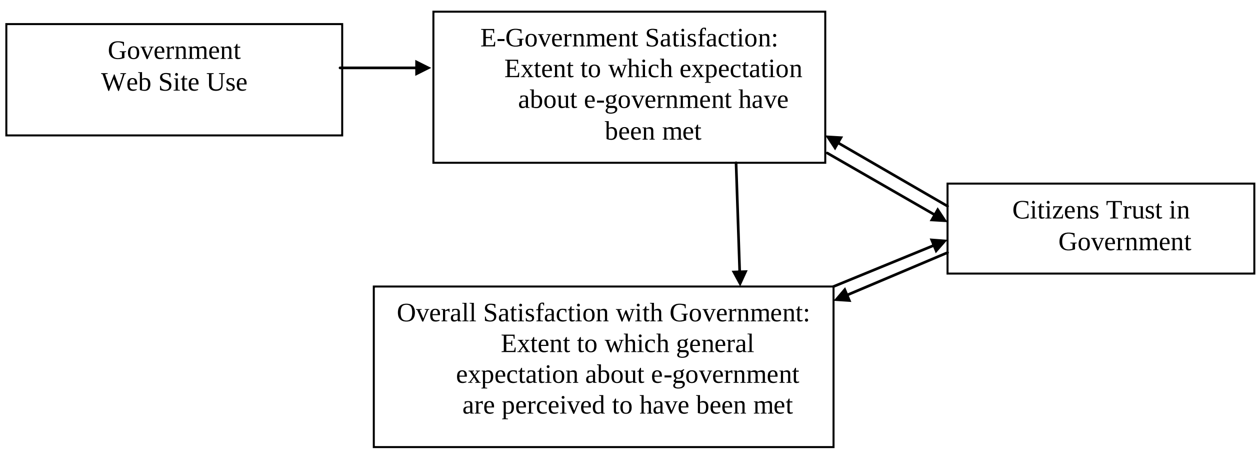


Figure 2.14: Model of e-Government and Trust

(Source: Welch et al., 2005)

Magoutas and Mentzas, (2010) conceptualize a semantic adaptive framework for monitoring citizen satisfaction from e-government services. It is a good model which covers service reliability, portal usability, and security to measure citizens' satisfaction in e-government services. Framework does not elaborate the relationship among citizen satisfaction and trust. Limited number of factors used in the framework does not consolidate the overall performance.

Liu and Zhou, (2010) presented a model "A citizen trust model for e-government" for measuring the trust in e-government. Model shows clear relationships between citizens' expectation, citizens' satisfaction and citizens' trust. The study has identified the determinants for citizen trust of the e-government and examined the causal relationships among the variables of citizen trust of the e-government. The results show that perceived usefulness, perceived ease of use and perceived security are important factors that influence citizen trust. Perceived usefulness, perceived ease of use and perceived security are the determinants used for measuring citizens' satisfaction. However, model kept perceived risk as separate determinant which influences the citizens' trust. Liu and Zhou, (2010) defined citizen satisfaction with e-government as the overall affective evaluation which a citizen has regarding his or her experience related with the e-government. Figure 2.15 shows the Liu and Zhou model and the association between various determinants.

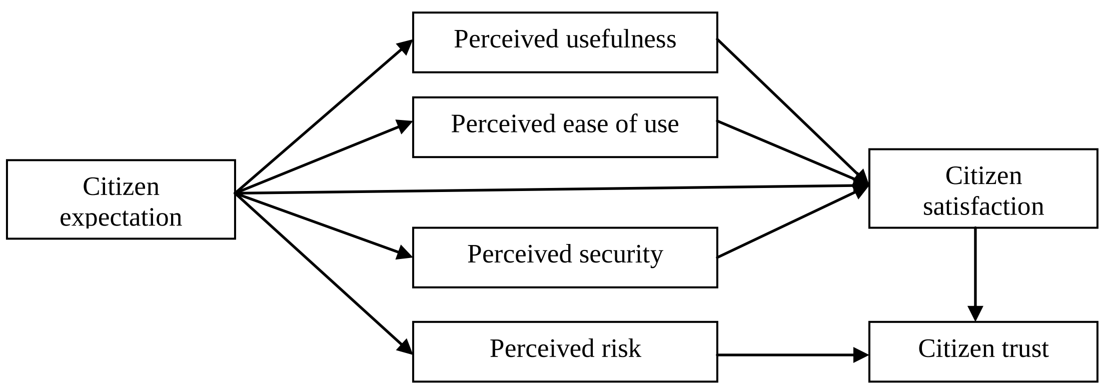


Figure 2.15: A Citizen Trust Model for E-government

(Source: Liu and Zhou, 2010)

Above mentioned research articles related with trust in e-government mainly address the website quality and contents, privacy and security in websites kind of elements. There were no discussions in the way of delivery of e-service quality, policies, procedures, and quality in information resources.

With the above discussion on citizens' satisfaction and trust related frameworks it is concluded that the level of individual trust depends on the actual performance of government and the interpretation of the government's performance by citizens. Citizen interpretation can be determined through the identified gap between their expectations and the actual performance (reality) by the government.

2.6 E-Government Assessment Frameworks with Reference to India

As per Indian e-government system, ministry of information technology has been working in providing e-services at various levels (national, state, local, and villages). Studies found that the states like A.P. (Andhra Pradesh), M.P. (Madhya Pradesh), Gujrat and T.N. (Tamil Nadu) are providing e-procurement services and e-land record management services, U.P. (Uttar Pradesh) state has introduced e-revenue collection and land record management services to the citizens. Range of the services is being offered to the citizens. Here is the discussion on the number of studies which took place to assess e-government services and system with special reference to India e-services.

Rao et al., (2004) worked on Ministry of Information Technology (MIT) project with Indian Institute of Management Ahmadabad (India) and developed "e-Government Assessment Framework (EAF)" which was the study of the impact of assessment of e-government projects. The framework referred as (EAF 2.0) and followed various attributes for the impact assessment e-governance projects (Rao et al., 2004). The EAF broadly consists of the following attribute classes for evaluation:

- Service-Orientation- class consisting of: Efficiency, User-convenience, and Citizen-centricity sub-groups.
- Technology class consisting of: Standards Architecture, Security, Scalability, and Reliability sub-groups.
- Sustainability class consisting of: Organizational, Commercial and Legal sustainability
- Cost-effectiveness class
- Replicability (reproducibility) class consisting of: Functional, Technological, and Commercial Replicability sub-groups.

Based on the above framework (EAF 2.0), we can conclude that e-government projects at present are being assessed from varied dimensions but with the limited scope.

Ray and Rao, (2004), propose a framework "Evaluating Government Service: A customers' Perspective of e-Government" suggest a method to assess service quality as a result of e-government project implementation. Service level expectations, empowerment, and anxiety reducing are the 3 main dimensions included in the study. A list of service quality dimensions regarding property tax system are identified and classified in three main categories including "service level expectation, empowerment, and anxiety reducing factors". Number of items included to assess government services are; Less time required for getting service (LT); Less Number of visits (LV); The system has accurate records (AR); Quick and clear answer to query (QQ); Service points easily accessible (EA). These numbers of dimensions and their items are not found sufficient to assess comprehensively the e-government services.

Piyush, (2007) presented an article on "Challenges and Issues in e-Government Project Assessment". The paper considers the key issues and challenges in assessing e-Government projects and proposed a model which has been piloted in one of the assessment studies at the national level in India. The author has recommended a cyclic assessment framework model, which encompasses the need leading to improvements in the project. Piyush, (2007) identified six components of the model:

- Stakeholder: An e-gov project is meant to deliver benefits to its various stakeholders.
- Expectations: All projects are intended to meet the needs of their associated stakeholders; therefore, it becomes necessary to assess the project to meet their expectations. The expectations might differ even for similar category of project (e.g. G2C Rural or Urban, G2B), depending on the country and area of implementation.
- Project Benefits*:* The expectations are taken into consideration for conceptualization of the service requirement. The benefits are the front end components which are visible to the stakeholders, and could be in terms of impact, or return on investment.
- Results: The project in terms of the benefits delivered to the stakeholders can be measured by specific result indicators.
- Enablers*:* The results are driven by enablers at the backend.
- Feedback: The model further stresses on the Feedback mechanism as part of the outcome of the assessment.

The above discussed study is the author’s ongoing study which does not show the validation of his proposed framework. This study is mainly conceptual and devoted to assess the e-government project challenges and issues. For the assessment of effectiveness of e-government services from the citizens’ point of view, one may need different sets of dimensions.

Bhatnagar and Singh, (2010) performed a study for assessing the impact of e-government projects in India. Framework presented in their study identifies key stakeholders’ dimensions on which the impact desires to be measured. Client value is measured primarily in two dimensions: cost to the client who is accessing services and client's perception concerning the quality of service and governance. In a limited way, the financial cost benefit impact of the agency implementing the project is also studied. As a result of the study, overall impact showed wide variation across projects, highlighting the need to pay greater attention to process reform in the design of e-government projects. Measurement of direct monetary benefits to the clients provides a basis for determining the services. The study assessed direct economic impact in terms of the cost of accessing the service. It did not measure the impact of efficient delivery of the service for the citizens.

Bhattacharya et al., (2012) proposed "e-service quality model for Indian government portals: citizens' perspective" which has been discussed above in "e-service quality". Quantitative data analysis technique applied for the analysis of e-government Web portal quality and "Indian Railway Transport Company and E-tax web portal of India" were considered for their study. This study considered the Web portal study not as the complete e-service quality of e-government. In fact, the assessment involves the use of a limited number of dimensions which lacks comprehensive assessment.

It is quite challenging to undertake an assessment study in a holistic manner which could address the expectations of all the stakeholders. Above references mention that Indian government has been implementing its e-government project since a decade but still needs an effective framework and that too such a framework which could assess the effectiveness of India's e-government projects in an efficient manner. Hence, exisitng studies and frameworks introduced for Indian e-government do not assess effectiveness of e-government services from the citizen's viewpoint.

2.7 Findings and Limitations of Various E-government Assessment Frameworks

After comprehensive review of literature, research gap in the area of e-government service effectiveness evaluation and trust assessment has been identified. Hence, it becomes necessary to develop the ways to measure and evaluate the effectiveness of e-government services. The major weakness remains in e-government is the limited amount of assessment of the service quality of government initiatives (Jaeger and Thompson, 2003). E-government is still in an early stage and has not achieved many of the expected outcomes (Heeks, 2006b). Research on e-government service quality is mostly descriptive and only discusses some of the aspects inherent in service quality. Some researches have been conducted for e-government by collecting users' opinions about the factors that characterize the quality of an e-government web page (Papadomichelaki and Mentaz, 2009). The assessment of trust in e-services is equally a big question (Liu, et al., 2010). It is believed that an effective e-government assessment solution has to clearly consider various aspects of effectiveness assessment by improving e-service quality and trust in offered services at different levels.

In the context of Indian e-government, according to (Bhattacharya et al., 2012), "*despite a well-structured, national-level plan on e-government and adequate funding in India, most of the projects under the scheme are far below the expectation level of citizens*". While doing literature review of e-government performance assessment specifically in the context of India, we found that there is a dearth of empirical studies, which can provide a comprehensive framework for e-service assessment of government. Therefore, in proposed E-GEEF study, author has tried to identify the constructs affecting e-service quality and citizens' trust from the existing conceptual studies.

Table 2.2 summaries the approaches, key findings, and limitations of various important frameworks related to "IS systems success, e-commerce systems success, e-government system success, e-government services, and trust"which have been discussed in detail in previous sections. The author highlights the findings and limitations of the existing e-government performance assessment frameworks which help in identifying the space in literature specifically in the area of e-government service effectiveness and trust assessment. This gives foundation for developing a framework E-GEEF to perform e-government service effectiveness assessment.

Table 2.2 describes and maps the aspects of that particular approach used in E-GEEF framework.

Table 2.2: E-government performance evaluation frameworks: key findings and limitations

Authors	Approach	Key Findings and Limitations	Aspects Used in E-GEEF
DeLone and McLean, (1992)	Framework for evaluating IS system success	• Measure success of e-commerce, focussed on system quality, information quality and customer satisfaction. • Limited to the evaluation of IS and does not include service quality.	DeLone and McLean, (1992, 2003, 2004); Pitt et al., (1995); Myers et al., (1997) Models assessed information system success and e- commerce success and used the dimensions system quality, information quality, service quality, customer satisfaction, intension use, and net benefits. Proposed and validated framework E-GEEF used the system quality, information quality, and service quality in e-government domain for evaluating the effectiveness of e-government service. However, intension to use and user satisfaction dimensions from the above references were modified and used as “Citizens’ Use /Usefulness and Citizens’ Satisfaction. Further, e-government service quality, citizens’ trust, and perceived effectiveness were identified as new dimension in E-GEEF.
Pitt et al., (1995)	Revised Information success model of DeLone & McLean (1992)	• Measure success of e-commerce, focussed on system quality, Service Quality, information quality and customer satisfaction. • He added service quality as a dimension in the DeLone and McLean model. • Not validated using e-government services	
Myers et al., (1997)	Information Systems Assessment (ISA) framework for assessing the quality and productivity of the information systems function with the inclusion of an additional dimension ‘Work group impact’ within Pitt et. al., IS success model	• Comprehensive IS assessment framework but fails to adequately relate IS to organizational structure. • Though such approaches attempt to rationalize the relationship between IS quality and organizational quality. • They lack appropriate variables and linkages in the framework.	
DeLone and McLean, (2003, 2004)	Information system success measurement model and measuring e-commerce success	• It consists of six dimensions of success factors: system quality, information quality, service quality, system use, user satisfaction, and net benefits. • This evaluation model is good for evaluating online services in terms of information; system; and service quality. • Trust element is not included and implemented in the context of e-commerce.	

Authors	Approach	Key Findings and Limitations	Aspects Used in E-GEEF
Bakry, (2004)	STOPE model Strategy, Technology, Organization, Process, Environment	• Focus on the strategy, technology, organization, and process • Study of development of e-government • Model considered as good model for the analysis of strategy of organization. • Doesn't speak about the service delivery, quality and citizens' perspective.	Some technological attributes e.g. ICT infrastructure, availability, performance, and support were found useful.
Welch et al., (2005)	Assessed government website	• Presented the relationship use of government website with satisfaction and trust. • System, information, and service quality dimension are missing.	Use, satisfaction, and trust dimensions were found useful in government website assessment. Therefore, these dimensions were included in e-government service effectiveness assessment.
Wang and Liao, (2008)	Assessed e-government success in G2C context and model was based on DeLone and McLean IS success model	• Assessment data are collected from direct Surveys • It is validation of DeLone and McLean IS success model and followed the same dimensions without any further addition and amendments. Instead of Net benefits Want and Liao used "Perceived Net Benefits". • Good part of this model is that this is the first model applied in e-government and assessed the success of e-government. However, citizens' satisfaction and trust issues were not discussed.	Wang and Liao (2008) model assesses e-government systems success in Taiwan in G2C contextusing DeLone and McLean (2003). This confirms that DeLone and McLean (2003) model can be used in e-government domain.
Chutimaskul et al., (2008)	The quality framework of e-government development	• Good conceptualised study to understand the relationship between e-government service quality with system, information, and service quality dimensions. • Needs further empirical validation of this framework. • Citizens' use, citizens' satisfaction, and citizens' trust dimensions are not included.	Chutimaskul's conceptual study shows the conceptual relationship between e-government service quality with system, information, and service quality dimensions, which were used in E-GEEF framework for evaluating the effectiveness of e-government service.

Authors	Approach	Key Findings and Limitations	Aspects Used in E-GEEF
Batini, (2009)	GovQual: A Quality Driven Methodology for E-government Project Planning	• Study focuses on social and technological aspects of e-government and presents multidisciplinary methodology for e-government planning • Specific attention given to the strategic planning and preliminary operational planning phases. • Framework does not how to assess effectiveness of e-government. • Trust related issues are not considered.	GovQual model has some useful quality assessment attributes including accountability, accessibility, efficiency, and effectiveness.
Esteves and Joseph, (2009)	EAM, e-Government Assessment Framework	• Model based on STOPE model (Bakry,2004), so most of the dimensions obtained from STOPE • It uses dimensions concerning organization's maturity and stakeholders • It does not define specific indexes or targets • It will only be valuable if there are clear guidelines for execution and delivery of outcomes • Service quality issues in the context of G2C are not included.	Some technological attributes e.g. infrastructure, availability, performance, operational, and service and support of EAM were found useful.
Papadomichelaki et al., (2009)	e-GovQual: Multiple item scale for evaluating e-service quality	• E-GovQual considers six major dimensions e.g. ease of use; trust; functionality of the interaction environment; reliability; content and appearance of information; and citizen support (interactivity). • Some of items took from E-S-QUAL (Zeithaml et al., 2002; Parasuraman, et al., 2005). • System quality, information quality, and service quality dimension do not appear in the model.	Papadomichelaki et al., (2009) show the relationship between trust and e-government service quality which is used in E-GEEF.

Authors	Approach	Key Findings and Limitations	Aspects Used in E-GEEF
Liu and Zhou, (2010)	A citizen trust model for e-government	• Shows relationships between citizens' expectation, citizens' satisfaction and citizens' trust. • The results show that perceived usefulness, perceived ease of use and perceived security are important factors that influence citizen trust. • No discussions about system, information quality, and service quality in delivery of e-service.	Model is similar to Welch et al., (2005) study which includes use, satisfaction, and trust dimension. Perceived usefulness, ease of use, security and privacy are additional attributes incorporated in Liu and Zhou, (2010) study which were found useful in E-GEEF.
Chen, (2010)	Measured impact of quality antecedents on e-tax payers' satisfaction based on DeLone and McLean (2003) model.	• Model adopted system quality, information quality, service quality dimensions and shown their impact on e-tax payers' satisfaction • Structural equation modeling results confirmed that the quality antecedents strongly influence taxpayer satisfaction with the online tax-filing system • Focus was not given to e-government service quality and trust issues.	Useful to show relationship and impact of quality dimensions on e-tax payers' satisfaction.
Ibrahim et al., (2011)	A new COBRAS framework to evaluate e-government service: a citizen centric approach	• Cost, Opportunity, Benefit, Risk Analysis were used to assess satisfaction are the main dimensions used. • Framework evaluates satisfaction of users and the success of e-government services. • Does not cover technological assessment aspect.	COBRAS's framework is useful for understanding the role of satisfaction in evaluating e-government service. Proposed framework E-GEEF used citizens' satisfaction in evaluating e-government service quality.

Authors	Approach	Key Findings and Limitations	Aspects Used in E-GEEF
Bhattacharya et al., (2012)	E-service quality model for Indian portal	• A multi item scale for assessing the e-service quality of government portals involving transactions. Based on "Technology acceptance model (TAM) and D&M IS Success Model". • Citizens' satisfaction and trust dimensions are not the part of e-service quality assessment. • Does not give comprehensive view of e-government service performance.	Six attributes including transaction transparency, usability, adequacy, completeness of information, privacy and security, and usefulness of information were found valuable for assessing service quality of government portals and were also found useful for E-GEEF framework.
Edrees and Mahmood, (2013)	Revalidated multidimensional G2C e-government success, already validated by Wang and Liao, (2008)	• Considered Wang and Liao, (2008) "assessing the e-government success" for revalidation • Six success measures that are information quality, system quality, service quality, use, user satisfaction, and perceived net benefit. • The findings of this study partially support Wang and Liao results.	Edress and Mahmood, (2013), revalidated the Wang and Liao (2008) model by measuring the e-government success of Bahrain using same six dimensions. This confirms that DeLone and McLean (2003) model can be used in e-government assessment.
Present study is further evolution of DeLone and McLean (2003) model of "Information Systems and E-Commerce Success" in "E-government context" by developing E-GEEF: (E-Government Effectiveness Evaluation Framework).			

2.8 Summary

This chapter presents an overview of e-government and issues related to definitions, concepts, taxonomy and perceptions. First, study highlighted different meanings of e-government and the e-government definitions selected by the researchers which cover all e-governments aspects. Due to the interdisciplinary nature, various issues are elucidated by identifying the main characteristics and different perspectives, and their interaction necessary when embracing e-government. The interdisciplinary nature, multiple definitions and meanings reflect the complexity existing in e-government. The other sections of the chapter presented the different performance evaluation frameworks, e-services quality and various trust related models. The investigation of e-government models and frameworks addressing critical factors and assessment dimensions highlighted many contextual factors related to e-government assessment. The literature review also focused on e-government assessment issues in developing countries, in particular India. The review emphasized the relative lack of e-government effectiveness assessment research dedicated to developing countries. The literature review clearly demonstrated that lack of appropriate dimensions and elements may lead to an inappropriate assessment of e-government services and trust also rare number of studies related to the e-government service effectiveness with respect to the assessment of e-government service quality and citizens' trust in G2C interaction environment has been carried out. There is also the scarcity of assessment of e-government in the developing countries.

The next chapter illustrates the conceptualization of the framework E-GEEF.

CHAPTER – 3

Theoretical Development of Framework E-GEEF

The aim of this chapter is to propose an initial conceptual framework E-GEEF, identifying the critical dimensions and constructs which will assess the effectiveness of e-government services and citizens' trust in e-government. Chapter provides a complete description of the proposed framework which was derived from the literature on IS success models, e-commerce success models, e-government service performance assessment, e-service quality, and trust assessment. The objective of this chapter is to explain the different parts of the preliminary framework and define the link between the measuring constructs of the dimensions of the framework. The proposed conceptual framework used as a road map for empirical data collection and analysis, established a comprehensive overview of e-government service effectiveness assessment in Indian context. Here is the description of various sections included in this chapter.

- **Section (3.1):** Background and Framework (E-GEEF) Development Approach
- **Section (3.2):** Explanation of using DeLone and McLean (2003) IS Success Model
- **Section (3.3):** Proposed Theoretical Framework (E-GEEF)
- **Section (3.4):** Description of the Proposed Framework (E-GEEF)
    - 3.4.1 System Quality
    - 3.4.2 Information Quality
    - 3.4.3 Service Quality
    - 3.4.4 Citizens' Use / Usefulness
    - 3.4.5 Citizens' Satisfaction
    - 3.4.6. Citizens' Trust
    - 3.4.7 E-government Service Quality
    - 3.4.8 Perceived Effectiveness
- **Section (3.5):** E-GEEF Framework's Dimensions and Measurement Items
- **Section (3.6):** Hypotheses for Proposed Framework (E-GEEF)
- **Section (3.7):** Summary

3.1 Background and Framework (E-GEEF) Development Approach

The purpose of this study is to develop a framework E-GEEF for assessing the effectiveness of e-government services from the citizens' perspective. The focus of the study is to consider G2C (Government to Citizen) approach because the role of citizens is extremely important in considering whether the quality of e-services is up to the expectation or not. G2C services include public policy information, employment and business opportunities, voting information, tax filing, license registration or renewal, payment of fines, information about government forms and services, and submission of comments to government officials (Wang et al., 2008). Present study considered IS Success model of DeLone and McLean (2003) as a base model. This model provided a common framework toevaluate IS success in information system research. Within this research, very little was done in the context of e-government. Therefore, based upon the review of literature, author in present research uses this model with modifications and updation in the context of e-government. E-tax filing service will be considered for assessing the effectiveness. (Wang et al., 2008) validated the model DeLone and McLean (2003) model by using Taiwan e-services. Based on previous research, it was suggested that success and its measurement may be different for any system and organization, so according to the specific context, the model should be modified (Hu, 2003). Indeed, additional variables are incorporated from the literature to extend this model. Motivated by DeLone and McLean's call for further development and validation of their model, many researchers have attempted to extend or re-specify the original model. A number of researchers claim that the DeLone and McLean (1992, 2003) IS Success Models are incomplete and they suggested that more dimensions should be included in the model, or present alternative success models (Seddon and Kiew, 1994; Ballantine et al., 1996; Seddon 1997). Other researchers focus on the application and validation of the model (e.g. Rai et al. 2002).

This study is planned to develop framework E-GEEF and test this framework in an e-government context to assess the effectiveness of e-government services and determine the trust of citizens in e-government as well as determine the new relationships that may have significant impact with regard to the e-government. Some scholars suggest extension of DeLone and McLean, (2003) model to measure of e-government in various context (Scholl, 2006).

Research considered the following steps related to the development of the framework E-GEEF (Creswell, 2009).

- Thorough review of literature identifies the research gap and need arises to develop the framework E-GEEF.
- Classify the identified factors and combining them in an assessment framework E-GEEF under different categories.
- Translate the identified factors in to dependent and independent variables.
- Set hypotheses and create assumptions about the type of relations between the variables.
- Focus on observable aspects which determine the appropriate parameters for measuring those variables.
- Test the framework's hypotheses through conducting an empirical research which is in Chapter 5.

3.2 Explanation of using DeLone and McLean (2003) IS Success Model

In all the performance assessment models of e-government presented in literature, it was identified that the use of different sets of indicators and different weights assigned to them lead to varying conclusions on the performance of the countries evaluated. While doing literature review, we found that there is a lack of empirical studies in India, which can provide a comprehensive framework for service delivery assessment of e-government Therefore, in the present study; author is trying to identify the dimensions and their associated items responsible for assessing the e-government service effectiveness. Existing studies with different scales and hypothesis by various researchers were carefully examined during literature review and these helped in concurrence of the proposed study. DeLone and McLean, (2003) model which is an extension of DeLone and McLean (1992) is considered as base model for the present study. This model provided an extendable framework for evaluating IS success in information system research. DeLone and McLean (1992) was widely used by many researchers (Pitt et al., 1995; Myers et al., 1997; Molla & Licker, 2001; Seddon & Kiew, 1996; Seddon, 1997; McKinney et al., 2002) in IS and e-commerce success assessment.

DeLone and McLean (2003) model was used in measuring information system success and e-commerce success also some authors used this model in different contexts within the e-government domain. DeLone and McLean (2003) mentioned that this model is upgradable so in previous years some researchers (Wang and Liao, 2008; Teo et al., 2008; Chutimaskul et al., 2008; Papadomichelaki et al., 2009; Chen, 2010; Saha et al., 2010; Bhattacharya et al., 2012; Al-Khatib, (2013), Edrees and Mahmood, 2013; Hien, 2014) used DeLone and McLean (2003) model in the context of e-government domain for assessing the e-government success, e-government websites and their quality using existing dimensions or by offering some amendments in DeLone and McLean. Further, Csetenyi, (2000) stated that e-commerce technology can be used in e-government which will enhance the efficiency of services providing to citizens. Since, DeLone and McLean (2003) model provides common framework for assessing the IS success and some studies used this model in e-government domain so within the scope of present research E-GEEF its use is reasonable.

DeLone and McLean (1992) earlier attempted to systematically combine individual measures from IS success categories to create a comprehensive model. DeLone and McLean proposed that "System Quality and Information Quality singularly and jointly affect both Use and User Satisfaction. Additionally, the amount of Use can affect the degree of User Satisfaction – positively or negatively – as well as the reverse being true. Use and User Satisfaction are direct antecedents of Individual Impact; and lastly, this Impact on individual performance should eventually have some Organizational Impact." As shown in Figure 3.1, DeLone and McLean's model, (1992) depicts the relationships of the six IS success dimensions. This model is regarded as the most comprehensive IS assessment model within the body of IS research.

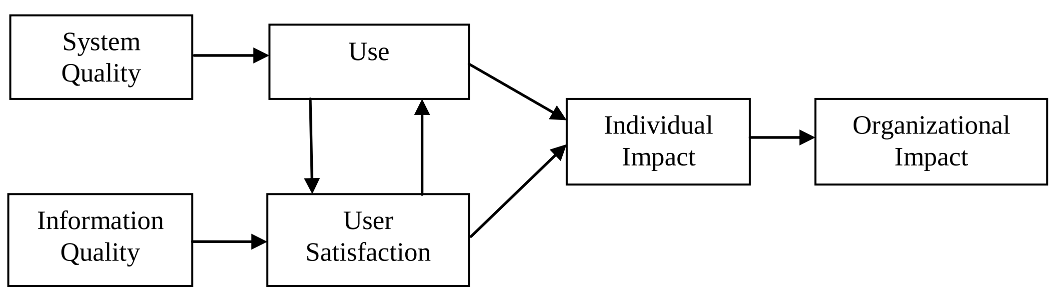


Figure 3.1: Information System Success Model

(Source: DeLone and McLean, 1992)

DeLone and McLean, (2003) later proposed an updated IS success model and evaluated its usefulness in the light of the dramatic changes in IS practice, especially the advent and explosive growth of e-Commerce. Based on prior studies, DeLone and McLean, (2003) proposed an updated model of IS success by adding a "service quality" measure as a new dimension of the IS success model, and by grouping all the "impact" measures into a single impact or benefit category called "net benefit."

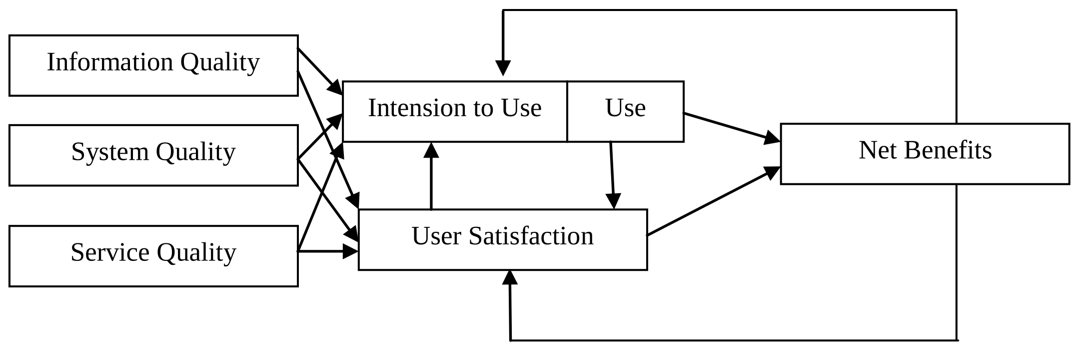


Figure 3.2: Updated DeLone and McLean IS Success Model

(Source: DeLone and McLean, 2003)

Previously discussed information system success model was introduced by DeLone and McLean, (1992) for measuring the success of information system. This model provided a generic framework to evaluate IS success in information system research and has been cited by many researchers (Pitt, 1995; Seddon, 1997; Myers et al., 1997). Later DeLone and McLean (2004) measured the success of e-commerce system which was based on their own DeLone and McLean, (2003) model. Updated McLean and DeLone, (2003) IS success model was validated by using e-government system success by (Wang and Liao, 2008 and Edress and Mehmood, 2013) whereas Zaidi et al., (2014) extended the DeLone and McLean, (2003) by adding additional dimensions "citizens' trust" and "perceived e-government service quality" and assessed the e-government services and citizens' trust in e-tax service of India. Based on previous research, it was suggested that IS success and its measurement criteria may be different and depend upon the distinctiveness of the system and the organization to be evaluated. So, in the e-government which is specific context of study, the model can be tailored. In fact, additional variables are required to extend this model. DeLone and McLean, (1992) comprehensively reviewed the different IS success measures and proposed a six-factor IS success model as a taxonomy and framework for measuring the complex-dependent variables in IS research. The categories in this taxonomy are (i) system quality (ii) information quality (iii) use (iv) user satisfaction (v) individual impact and (vi) organizational impact. DeLone and McLean, (2003) proposed an updated model of IS success by adding a "service quality" measure as a new dimension of the IS success model, and by grouping all the "impact" measures into a single impact or benefit category called "net benefit." Updated

DeLone and McLean, (2003) IS success model depicts the relationship between system quality, information quality, service quality, use, user satisfaction, and net benefit. It doesn't provide an empirical validation of the updated model, and suggest that further development and validation are needed. Further the IS success models applied DeLone and McLean for measuring the success. Later Wang and Liao validated this model in (2008) and assessed the e-government success without making any modifications in the existing dimensions. Instead of "net benefits" Wang and Liao used "perceived net benefits" as measuring dimension. This model was used by many researchers for assessing e-commerce and IS success.

Gartner's four phases of e-government model developed by Baum and Maio, (2000), but are restricted to government websites only. Baum and Maio, (2000) consider strategy, people, process and technology as requirements to be associated with each of the four website phases: presence, interaction, transaction, and transformation. Models (Baum and Maio, 2000; Bakary, 2004; Esteves and Joseph, 2008) which used strategy, people, process, technology, and environment are applicable for e-government project assessment and their most of the dimensions cover the administrative perspective. Such frameworks do not fit to directly assess the e-government services from citizens' point of view. However, their most of the dimensions are the part of DeLone and McLean models.

If we compare the above discussed model with DeLone and McLean models then we find that the dimensions of DeLone and McLean cover the strategy, processes, technology and people which were used in other models. With the above discussion it can be concluded that, DeLone and McLean (1992, 2003) models have been used as base models in many e-commerce researches and now researchers are considering these models in e-government research context.

3.3 Proposed Theoritical Framework (E-GEEF)

In the introduction chapter, the research problem was identified as "the development of the framework for assessing the effectiveness of e-government services". Going through various articles and research papers many issues and questions have aroused. Major research question is "*What is the framework that could best evaluate the effectiveness of e-government services*"?

For answering the above research question we need to indentify the number of dimensions and measuring items as well as method which will be useful for assessing the e-government effectiveness of e-government. Series of hypotheses are required to be developed from the research question, and these will be tested for the proposed research framework.

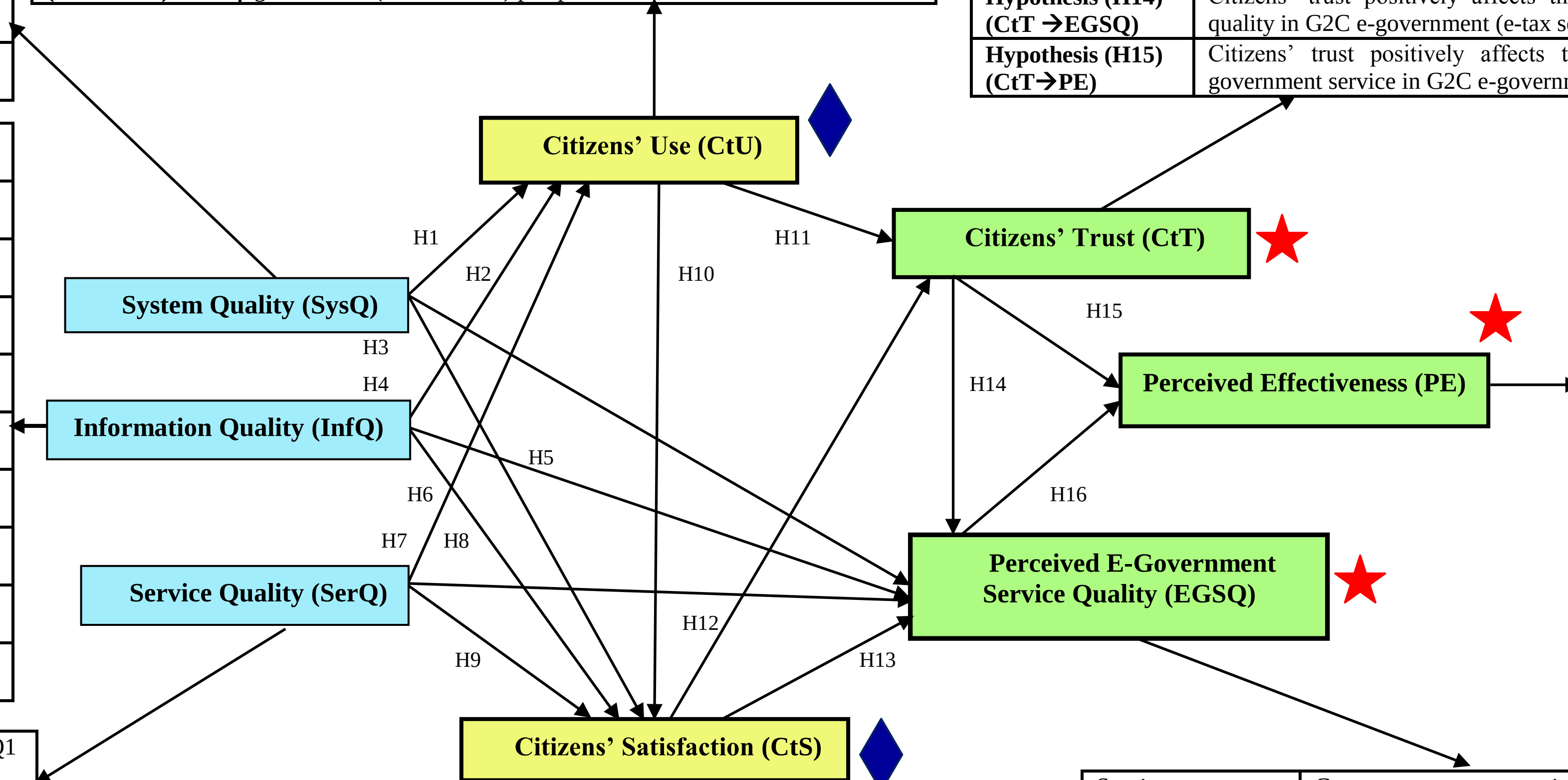
In accordance with DeLone and McLean, (2003) this study proposes a comprehensive multidimensional framework E-GEEF which suggests quality dimensions: system quality, information quality, service quality, citizen's use, user satisfaction, and perceived e-service quality. Figure 3.3 shows the comprehensive framework E-GEEF.

Accessibility	Government e-tax system is accessible 24 hours online every day whenever I need to access I can access it	SysQ1
Flexibility	E-tax website offers flexibility to use it anywhere	SysQ2
Functionality	E-tax website is easy in its functionality that allows user to browse different pages and does not stuck while using	SysQ3
Reliability	E-tax website is available all the time and quality of contents is appropriate, error free, precise and related to the subject according to the citizen's need	SysQ4
Easy to use	E-tax website allows citizens to use e-government system that enables citizen to accomplish tasks more easily and quickly	SysQ5
Integration	E-tax website provides integration to other website of ministries	SysQ6
Navigation	It is easy to navigate within this website which allows citizen to go back and forth between pages	SysQ7
Hypothesis (H1) (SysQ →CtU)	System quality is positively related and affects the citizens' use / usefulness of e-tax service in the G2C e-government perspective	
Hypothesis (H2) (SysQ →EGSQ)	System quality is positively related and affects perceived e-government service quality in G2C e-government (e-tax service) perspective.	
Hypothesis (H3) (SysQ → CtS)	System quality is positively related and affects citizens' satisfaction with e-tax service in the G2C e-government perspective.	

Frequency of use	I regularly use government e-tax service and whenever I need to file my tax online I choose to file through e-tax website	CtU1
Intension to reuse	I have intension to use government e-tax service again in the future	CtU2
Nature of use	Effectively I can use and perform a variety of e-tax related operations and tasks using government e-tax service	CtU3
Interactivity	It is easy to interact efficiently while navigating within the government e-tax e-service website	CtU4
Number of transaction	Using the government e-tax service makes it easier to do my task and I can perform number of transactions	CtU5
Hypothesis (H10) (CtU→CtS)	Citizens' Use /Usefulness positively affect the citizens' satisfaction in G2C e-government (e-tax service) perspective	
Hypothesis (H11) (CtU→CtT)	Citizens' Use / Usefulness positively affect citizens' trust in G2C e-government (e-tax service) perspective.	

Usability	Based on my experience with e-tax service, I found that there is usable trustworthy e-tax service is being offered	CtT1
Privacy	Based on my experience I found that there is sufficient privacy given to my account and associated information	CtT2
Security	Based on my experience I found there is a sufficient security measure followed to protect my online information	CtT3
Transaction Transparency	I found that offered e-tax e-service is transparent in the transactions	CtT4
Unambiguous	I found that offered e-tax service is transparent / unambiguous and provides appropriate transparent information to the citizens	CtT5
Responsiveness	Based on my experience with e-tax service, I found that my e-tax request processed in minimum amount of time	CtT6
Tangible	Based on my experience with e-tax service, I found that e-tax service system offers tangible service	CtT7
Hypothesis (H14) (CtT →EGSQ)	Citizens' trust positively affects the perceived e-government service quality in G2C e-government (e-tax service) perspective.	
Hypothesis (H15) (CtT→PE)	Citizens' trust positively affects the perceived effectiveness of e-government service in G2C e-government (e-tax service) perspective.	

Accuracy	Information on the government e-tax website is accurate and error free also, covers all information desired	InfQ1
Relevance	Information presented on the government e-tax website is comparative to the citizen's needs and subject matter	InfQ2
Completeness	Government e-tax service website provides up-to-date and sufficient information which enables citizens to complete their task	InfQ3
Trusworithiness	Information on the government e-tax website is trustworthy and consistent	InfQ4
Availability	Government e-tax service website provides precise information to the citizens	InfQ5
Timeliness	Government e-tax service website provides desired information at the right time or in timely manner to the citizens	InfQ6
Consistency	Information on this e-tax service website is consistently available for the citizens to complete their task	InfQ7
Hypothesis (H4) (InfQ →CtU)	Information quality is positively related and affects the citizens' use / usefulness in G2C e-government (e-tax service) perspective	
Hypothesis (H5) (InfQ →EGSQ)	Information quality is positively related and affects perceived e-government service quality in the G2C e-government (e-tax service) perspective	
Hypothesis (H5) (InfQ →CtS)	Information quality is positively related and affects the citizens' satisfaction in G2C e-government (e-tax service) perspective.	



Based on my experience I have full trust in offered government e-tax service.	PE1
Government e-tax service provides overall outstanding e-service quality to the citizens.	PE2
Government e-tax service offers risk free e-tax service to their citizens.	PE3
Government e-tax service is overall effective.	PE4

Assurance	Government e-tax service website assures citizens to provide necessary information and forms to be downloaded	SerQ1
Flexibility	E-tax service website provides citizens flexibility to continue and complete the remaining work at any time in next login and whenever citizen find comfortable	SerQ2
Reliability	Government e-tax service website provides reliable service to their citizens	SerQ3
Tangibility	Government e-tax service provides concrete and substantial or tangible services to their citizens	SerQ4
Transparent	Government e-tax service provides citizens transparent service. Nothing they keep hidden when services released to their citizens	SerQ5
Sufficiency	Government provides sufficient understanding and helpful instructions to the citizens to complete their task related to the e-tax	SerQ6
Responsiveness	Government online services loads all texts and graphics quickly and respond to the query made by citizens	SerQ7
Hypothesis (H7) (SerQ →CtU)	Service quality is positively related and affects the citizens' use / usefulness in G2C e-government (e-tax service) perspective	
Hypothesis (H8) (SerQ →EGSQ)	Service quality positively affects perceived e-government service quality in the G2C e-government (e-tax service) perspective.	
Hypothesis (H9) (SerQ →CtS)	Service quality is positively related and affects the citizens' satisfaction in G2C e-government (e-tax service) perspective.	

Efficiency	Based on my experience I found e-tax services are effective and efficient	CtS1
Valuable	Based on my experience I found e-tax service is valuable and the information includes all necessary values	CtS2
Adequacy	While using government e-tax service I found satisfactory use of it which provides full confidentiality to my information	CtS3
System Satisfaction	I found e-tax service system is competent and I am fully satisfied with e-tax service system of government	CtS4
Information Satisfaction	Based on my experience I found that overall I am satisfied by information provided by e-tax service	CtS5
Hypothesis (H12) (CtS →CtT)	Citizens' satisfaction positively affects and forms citizens' trust in e-government service in G2C e-government (e-tax service) perspective	
Hypothesis (H13) (CtS →EGSQ)	Citizens' satisfaction has positive effect on perceived e-government service quality in G2C e-government (e-tax service) perspective.	

Service Functionality	Government e-tax service provides interactive environment to the citizens along with effective functionality of e-tax service system	EGSQ1
Reliability	Government e-tax service provides reliable service to the citizens	EGSQ2
Citizens' support	Government e-tax service provides necessary user support on the website and gives special attention to every users individually	EGSQ3
Service Satisfaction	Government e-tax service website provides helpful instruction for performing my task	EGSQ4
Hypothesis (H16) (EGSQ→PE)	Overall perceived e-government service quality affects the e-government perceived effectiveness in G2C e-government (e-tax service) perspective.	

★ **New Dimensions**
♦ **Revised Dimensions**

Figure 3.3: Proposed Theoretical Framework (E-GEEF)
E-Government Effectiveness Evaluation Framework Based on DeLone & McLean, (2003)

3.4 Description of the Proposed Framework (E-GEEF) and Hypotheses

Each dimension in the framework contains a number of measuring constructs derived from the literature. The following sections explain the theoretical background from which all constructs under each dimension are derived.

As we discussed before that to measure information system success, DeLone and McLean, (1992, 2003) developed a success measurement framework known as an IS success model. DeLone and McLean updated their model in the context of e-commerce and based on support provided by Pitt et al., (1995) they included service quality as a success measure. In the DeLone and McLean, (2003) IS Success Model, “systems quality” measures technical success; “information quality” measures semantic success; and “service quality” measures use, user satisfaction and net benefit measure effectiveness success (DeLone and McLean, 2003). Here also DeLone and McLean model, (1992, 2003) are being considered for identifying the quality related dimensions and constructs. As it is clear from above discussion that three dimensions which are system quality, service quality and information quality are technical, semantic and service constructs which impact user satisfaction, system use, usage intension, and net system benefit which can lead to the success of e-government quality. Therefore we will concentrate here on system quality, service quality and information quality in order to investigate them in deep and find the most related dimensions and constructs and validate them in the context of e-government.

To the best of the researchers’ knowledge, there are studies that have been carried out about system, information and service quality separately but rarely any comprehensive study carried out that have assessed overall quality in the context of e-government system from the citizens’ perspective.

3.4.1 System Quality

System quality represents the quality of the information system processing itself, which includes software and data components, and it is a measure of the extent to which the system is technically sound (Narasimhaiah et al., 2010). DeLone and McLean, (1992) IS success model consider system quality as main dimension which constitutes the desirable characteristics of an IS. These measures typically focus on usability aspects and assessment characteristics of the system. Wang and Liao, (2008) validated the e-Government system success using DeLone and

McLean, (2003) IS system success model and used system quality, information quality, and service quality as key dimensions. Chutimaskul et al., (2008) used term "process quality" with respect to "system quality" and mentioned that "*the process quality / system quality means the quality of work and/or activities under e-government system"*.

According to Seddon, (1997*) "system quality is concerned with whether there are bugs in the system, the consistency of user interface, ease of use, quality of documentation, and sometimes, quality and maintainability of program code".*

Citizens perform online transactions with the government using e-government Web portal through interfaces and interact with the e-government system so it is important to evaluate Web site functionality that focuses on the online service functions it provides (Saha et al., 2010; Bhattacharya et al., 2012). Consistent availability of the Web site and speed of access to the Web site are essential. Hence "System quality measures the desired functionality and effectiveness characteristics of a government system, interaction with the system are through the Web site".

It becomes important to understand that what are the items / attributes required to measure the system quality. Existing studies (DeLone and McLean, 1992, 2003, 2004; Wangpipatwong et al., 2005; Chutimaskul et al., 2008) show that system quality is measured by attributes, such as accessibility, ease of use, usability, flexibility, functionality, response time, convenience, data quality, integration , system accuracy / reliability, and interactivity & navigation. From the previous literature, it is found that ease of use was considered a component of system quality (Seddon and Kiew, 1996; Seddon, 1997) but some researchers (Papadomichelak and Mentzas, 2009; Saha et al., 2010) used "ease of use" as separate independent dimensions in their studies. Furthermore, the ISO/IEC 9126 standard also defines this quality consisting of the characteristics including suitability, accurateness, interoperability, security, compliance, maturity, fault tolerance, recoverability, understandability, learnability, operability, time behavior, resource behavior, analyzability, changeability, stability, testability, adaptability, installability, conformance, and replacability. Some of the standards can be deployed in the context of e-government quality.

From the previous literature, seven items were identified to measure system quality that covered accessibility, flexibility, functionality, system accuracy / reliability, ease of use, integration, and nevigationas the main characteristics of system quality. Following are exemplary measures of system quality along with their references listed below which were used by researchers to measure system quality other than DeLone and McLean.

Table 3.1: System quality and identified attributes

Items / constructs	Explanation	Reference
Accessibility	The degree to which the system and the information it contains can be accessed with relatively low effort.	McKinney et al., (2002); Gable et al., (2008).
Flexibility	The system is flexible enough to meet needs or demands.	DeLone and McLean, (2003); Gable et al., (2008); Iivari, (2005).
Functionality	The required functions are available in the system.	DeLone and McLean, (2003)
System accuracy/ Reliability	The degree to which a system is accurate and dependable over time. The degree to which a system offers quick and timely responses to requests for information or action.	DeLone and McLean, (2003); Iivari, (2005); Gable et al., (2008)
Ease of use	The degree to which citizen believes that using the e-government to perform transactions with the government would be free of effort.	DeLone and McLean, (2003)
Integration	The degree to which a system facilitates the combination of information from various sources.	DeLone and McLean, (2003).
Navigation	It is also important to judge the navigation characteristics of the Web site and evaluate the presence of links for necessary information.	McKinney et al., (2002)

From the literature, it is found that the functionality, navigation, and accessibility are the main characteristics of system quality which are important to evaluate Web site functionality. Reliability, all time accessibility, and availability are the essential feature of online system. It is also important to judge the navigation characteristics of the Web site and evaluate the presence of appropriate linkage for necessary information on the Web (McKinney et al., 2002). While using online services the system quality in the government Web site affects on citizens' use and citizens' satisfaction (Wang and Liao, 2008). Hence, it should be an essential part of E-GEEF". System quality is one of the major constituents of e-government development and has direct impact on e-government service quality (Chutimaskul et al., 2008). In the context of present study, e-government service quality is consideredas perceived e-government service quality. We may summarize the statement and conclude as: "System quality measures the desired functionality and effectiveness characteristics of e-government system or services which delivered through the Web site".

With the above discussion the hypothesized relationship between system quality, usefulness, citizens' satisfaction, and perceived e-government service quality can be defined as follows.

Hypothesis (H1): System quality is positively related to and affects the citizens' use / usefulness of e-tax service in the G2C e-government perspective.

Hypothesis (H2): System quality is positively related to and affects perceived e-government service quality in G2C e-government (e-tax service) perspective.

Hypothesis (H3): System quality is positively related to and affects citizens' satisfaction with e-tax service in the G2C e-government perspective.

Table 3.2: Hypotheses related to system quality

Hypotheses	References
(H1): System quality is positively related to and affects the citizens' use / usefulness of e-tax service in the G2C e-government perspective.	DeLone and McLean (1992, 2003); Seddon (1997); Wang and Liao (2008); Saha et al., (2010); Khayun, V. (2011); Zaidi et al., (2012, 2013, 2014)
(H2): System quality positively related to and affects perceived e-government service quality in G2C e-government (e-tax service) perspective.	Saha, et al., (2010); Zaidi et al., (2012, 2013, 2014)
(H3): System quality positively related to and affects citizens' satisfaction with e-tax service in the G2C e-government perspective.	DeLone and McLean (1992, 2003); Seddon (1997); Wang and Liao (2008); Saha et al., (2010); Khayun, (2011); Zaidi et al., (2012, 2013, 2014)

3.4.2 Information Quality

The success dimension information quality of DeLone and McLean (1992, 2003) models constitute the desirable characteristics of an IS's output. Information quality refers to the quality of outputs which the information system produces (DeLone and McLean, 1992, 2003). In the e-commerce context, information delivery is an important role of Web sites, and quality is considered a critical issue. Several quality evaluation aspects are essential, including the correctness of the output information, the availability of the output information at a time suitable for its use, and the comprehensiveness of the output information contents (McKinney et al., 2002). It is also important to consider issues such as relatedness, clearness, and goodness of the information (McKinney et al., 2002). Huh et al., (1990) defines four dimensions of information quality which include accuracy, completeness, consistency, and currency. Accuracy is agreement with an attribute about a real world entity, a value stored in another database, or the result of an arithmetic computation. Completeness is to be defined with respect to some specific application, and it refers to whether all of the data relevant to that application are present. While consistency refers to an absence of conflict between two datasets, currency refers to up-to-date information. Researchers have used a variety of attributes for information quality.

Five items used by DeLone and McLean, (2003) to measure information quality include: accuracy, timeliness, completeness, relevance, and consistency. In the context of e-government, the information quality refers to the quality of information related to government activities. It basically contains the measures like accuracy, timeliness, relevance, precision, and completeness.Information Quality is concerned with issues such as the relevance, timeliness, and accuracy of the information generated by an information system (DeLone and McLean, 2003; Wangpipatwong et al., 2005). COBIT 4.1 (Control Objectives for Information and Related Technology) addresses the criteria of information quality as consisting of efficiency, confidentiality, integrity, availability, compliance, effectiveness, and reliability concepts. Our constructs are comparable to those used by previous researchers. 7 items along with DeLone and McLean's (2003) 5 items to measure information quality (accuracy, timeliness, completeness, relevance, and consistency) are included in information quality dimension in present study. Information quality is one of the major constituents of e-government development and has direct impact on e-government service quality (Chutimaskul et al., 2008). Following are exemplary measures of information quality along with their references listed below which were used by researchers to measure information quality other than DeLone and McLean.

Table 3.3: Information quality and identified attributes

Items / constructs	Explanation	Reference
Accuracy	The degree to which information is sufficiently accurate.	Gable et al. (2008); Iivari (2005); McKinney et al., (2002).
Relevance	The degree to which information corresponds to the need and is applicable for the task at hand.	Gable et al., (2008); Iivari, (2005); DeLone and McLean, (2003); McKinney et al., (2002).
Completeness	The extent to which information is completed and sufficient.	Gable et al., (2008); Iivari, (2005); DeLone and McLean, (2003).
Trusworthiness	The degree to which information is clear and trustworthy.	DeLone and McLean (2003); McKinney et al., (2002).
Availability	The degree to which up to date and current information is available to the citizens.	DeLone and McLean, (2003); Gable et al. (2008).
Timeliness	The degree to which citizens are able to find current information at the time of its publication.	DeLone and McLean, (2003); Gable et al., (2008); Iivari, (2005); McKinney et al., (2002)
Consistency	The degree to which the information is consistently available to the citizens on the Web.	Iivari, (2005)

In the perspective of the present study, we define information quality as follows:

"Information quality measures the characteristics of information provided by a government Web site". While using online e-services the information quality in the government affects on citizens' satisfaction. Hence, it should be an essential part of E-GEEF. Information quality in the government Web site has a significant effect on citizens' usefulness. Hence, it should be an essential part of E-GEEF.

With reference to the above discussion three hypotheses can be drawn:

Hypothesis (H4): Information quality is positively related and affects the citizens' use / usefulness in G2C e-government (e-tax service) perspective.

Hypothesis (H5): Information quality is positively related and affects perceived e-government service quality in the G2C e-government (e-tax service) perspective.

Hypothesis (H6): Information quality positively affects citizens' satisfaction in the G2C e-government (e-tax service) perspective.

Table 3.4: Hypotheses related to information quality

Hypotheses	References
(H6): Information quality is positively related and affects the citizens' use / usefulness in G2C e-government (e-tax service) perspective.	DeLone and McLean (1992, 2003); Seddon (1997); Wang and Liao (2008); Saha et al., (2010); Khayun, (2011); Zaidi et al., (2012, 2013, 2014).
(H5): Information quality positively affects perceived e-government service quality in the G2C e-government (e-tax service) perspective.	Saha et al., (2010); Zaidi et al., (2012, 2013, 2014).
(H6): Information quality positively affects citizens' satisfaction in the G2C e-government (e-tax service) perspective.	DeLone and McLean (1992, 2003); Seddon (1997); Wang and Liao (2008); Saha et al., (2010); Khayun, (2011); Zaidi et al., (2012, 2013, 2014).

3.4.3 Service Quality

IS/IT departments operate as service units for various users in any organization, and organizational achievement depends on how well the IS services are delivered. Delivery of services on time and with error-free performance by the IS unit will result in timely and efficient decision making, and increase the better internal organizational efficiency (Narasimhaiah et al., 2010). Service quality is an important factor to measure customer satisfaction. DeLone and McLean, (2003) proposed an updated model of IS success by adding a "service quality" measure as a new dimension of the IS success model, and by grouping all the impact measures into a single impact or benefit category called net benefit. Most researchers agree with DeLone and McLean's, (2003) suggestion that service quality deserves to be included along with system quality and information quality as a component of IS success. Seddon, (1997) and DeLone and McLean, (2003) have also come to a compromise on the use of net benefit as an IS success measure. However, the challenge for the researcher is to define clearly and carefully the stakeholders and context in which net benefit are to be measured (DeLone and McLean, 2003). Service quality is an important measure in public secto rs which is comprised of three aspects user focused, user satisfaction, and outcomes (Buckley, 2003).

Parasuraman et al., (1988) identified the SERVQUAL model, which provides five dimensions of service quality measurement, namely tangibility, reliability, responsiveness, assurance, and empathy. Pitt et al., (1995) proposed five indicators which include reliability, responsiveness, assurance, tangibility and empathy for measuring service quality. Zeithaml et al., (2002) have developed e-SERVQUAL for measuring e-service quality, and they mentioned that e-SQ affects satisfaction. They identified four applicable dimensions, efficiency, reliability, fulfillment, and privacy. Alanezi et al., (2010) proposed another scale to assess service quality of government portals having website design, reliability, responsiveness, security / privacy, personalization, information and ease to use as the seven factors. Narasimhaiah et al., (2010) used reliability, assurance, responsiveness, and empathy for measuring the service quality.

The ISO 9241 standard also declares the characteristics of service quality that can be used for e-government. Such characteristics are the guidance on task requirements, input and output requirements, dialogue principles, platform, guidance on the work environment, usability, presentation of information, and user guidance. Hence, the service quality of e-government is an important factor to measure the citizens' satisfaction. Service quality is one of the major constituents of e-government development and has direct impact on e-government service quality (Chutimaskul et al., 2008). Proposed an updated model for assessing effectiveness of e-government service includes a "service quality" measure as a new dimension. Following are exemplary measures of service quality along with their references listed below.

Table 3.5: Service quality and identified attributes

Items / constructs	Explanation	Reference
Assurance	The degree to which services are assured, trusted and consistent.	Pitt et al., (1995).
Flexibility	The services should be flexible enough to meet needs or demands of citizens.	Chang and King, (2005).
Reliability	The system should offer reliable services.	DeLone and McLean, (2003)
Accuracy	The degree to which services are accurate.	Pitt et al., (1995).
Tangible	Tangible in e-government context is determined by the appearance of the web interface, its functionality and the type of services provided.	Pitt et al., (1995).
Transparency	The degree to which up to date, current, and unambiguous services are available to the citizens.	Welch and Hinnant, (2003)
Sufficiency	The extent to which information is completed and sufficient.	Pitt et al., (1995).
Responsiveness	The degree to which e-government employees' concerned is willing and ready to provide service. It involves timeliness of service.	Chang and King, (2005); Pitt et al., (1995).

With reference to the above discussion present study is using assurance, flexibility, reliability tangible, transparency, sufficiency, and responsiveness items / attributes to measure service quality.

From the previous researches, it is found that several scholars have measured service quality directly with the various items (Wang et al., 2008). In the context of the present study, we define service quality as follows:

"*Service quality can be defined in a government context as the extent to which a Web site facilitates efficient and effective delivery of public services including information, communication, interaction, contracting, and transactions to citizens*". Service quality in the government Web site has a significant effect on citizens' satisfaction. Therefore, it should be an essential part of E-GEEF.

Hence, the following hypothesis can be drawn:

Hypothesis (H7): Service quality is positively related and affects the citizens' use / usefulness in G2C e-government (e-tax service) perspective.

Hypothesis (H8): Service quality is positively related and affects the citizens' satisfaction in G2C e-government (e-tax service) perspective.

Hypothesis (H9): Service quality is positively related and affects the citizens' satisfaction in G2C e-government (e-tax service) perspective.

Table 3.6: Hypotheses related to service quality

Hypotheses	References
(H7): Service quality is positively related and affects the citizens' use / usefulness in G2C e-government (e-tax service) perspective.	DeLone and McLean (1992, 2003); Seddon (1997); Wang and Liao (2008); Saha et al., (2010); Khayun, (2011); Zaidi et al., (2012, 2013, 2014).
(H8): Service quality is positively related and affects the perceived e-government service quality in G2C e-government (e-tax service) perspective.	Saha et al., (2010); Zaidi et al., (2012, 2013, 2014).
(H9): Service quality is positively related and affects the citizens' satisfaction in G2C e-government (e-tax service) perspective.	DeLone and McLean (1992, 2003); Seddon (1997); Wang and Liao (2008); Saha et al., (2010); Khayun, (2011); Zaidi et al., (2012, 2013, 2014).

3.4.4 Citizens' Use / Usefulness

DeLone and McLean (1992) comprehensively reviewed IS success measures by using various dimensions which also includes "Use" as one of the dimensions. Since 1992, a number of studies (Seddon and Kiew, 1994; Li, 1997; Rai et al., 2002) have empirically investigated the multidimensional relationships amongst the measures of IS success and replaced "Use" by "Usefulness". DeLone and McLean (2003) proposed an updated IS success model and evaluatedits usefulness by measuring the success of e-commerce system. Instead of "Use" as measure, DeLone and McLean replaced it by "Intension to use / Use". Seddon (1997) re-specified and extended the DeLone and McLean IS success model and included "perceived usefulness" as an important success measure for IS success. Seddon (1997) proposes "perceived usefulness" instead of "Use / Usefulness" because Seddon argued that the IS "use" is a behavior rather than a success measure, and replaced DeLone and McLean's IS "use" with "perceived usefulness" which serves as a general perceptual measure of net benefits of IS use. However, Rai et al. (2002) empirically assessed the DeLone and McLean (1992) and Seddon (1997) models of IS success and found that both the models exhibited reasonable fit with the collected data.

Davis (1989) found that perceived usefulness is an important predictor of IS use. Perception of users for adopting new information systems has been explained by Davis (1989) through "technology acceptance model". The Davis model establishes relation of end users' perceived usefulness (PU) and perceived ease of use (PEOU) of a technology enabled system with users' behavioral intention to accept it. This argument indicates that the acceptance of technology depends upon the "use" or "Perceived usefulness". According to Davis (1989), perceived ease of use *"refers to the degree to which a person believes that using a particular system would be free of effort".*

Within the G2C e-government context, citizens' use an Internet-based application to search information and conduct transactions (e.g., tax filing, payment of fee and fines), hence significance of contents, organized information and customized presentation are some of the criteria for perceived usefulness of information. This Internet-based application is an IS phenomenon which is being studied by using the updated IS success model (Wang and Liao, 2008). DeLone and McLean 1992; Seddon, 1997) found that information quality and usefulness of a system are closely related. Users will perceive a system to be of greater usefulness if it provides a higher quality of information also the nature of system use could be addressed by determining whether the full functionality of a system is being used for the intended purposes. DeLone and McLean (1992) explained “information quality” and “system quality” as two determining factors which influence the “use / intention of use” and “user satisfaction” whereas DeLone and McLean (2003) show the importance of “service quality” which determines the “use and user satisfaction”. DeLone and McLean, (2003) stated that the “use and user satisfaction” are closely interrelated. His model reveals that the positive experience with “use” will lead to greater “user satisfaction”.

According to Lin and Lu, (2000), perceived usefulness is directly and positively influenced by information quality; however, the same cannot be said of perceived ease of use. Along with system quality, information quality, and service quality, they included perceived usefulness and identified that system quality, information quality and service quality are the important factors in determining perceived usefulness.

With the above discussion, we can say that the higher system quality in an e-service (e-tax filing), such as fast access, easy navigation, and functionality, can increase the effectiveness and citizens’ (taxpayers’) interest, which can help them to perceive the system as useful. It has also been stated that perceived ease of use can positively influence system quality. Similarly, better information quality, such as accurate, complete, and relevant e-service (e-tax) information may increase citizens’ (taxpayers’) attention and effectiveness in using e-service (e-tax), and may help them to achieve perceived usefulness of the system (Chang et al., 2005). In the context of the present study on e-government effectiveness assessment, we are using “citizens’ use /usefulness” means that the positive experience of citizens in using e-government service. Citizens’ positive experience effects “usefulness” and “citizens’ satisfaction” of e-government service. In e-government effectiveness assessment, perceived usefulness is defined as: “the degree to which citizens believe that using an offered e-service is effective and useful for them and increases work performance.” Perceived usefulness of the government e-services has a positive effect on satisfaction and therefore it is positively related to service quality and becomes an important factor in assessing e-government effectiveness. If citizens can perform their tax filing processes successfully, effectively and they experience system is easy to use, then they will be interested in using this online service. In the online tax filing context, perceived usefulness is directly determined by perceived ease of use of the system (Chang et al., 2005). Trust and citizens' confidence in e-government services are assured only when the system contents are reliable and usable (Yang et al., 2005; Kumar et al., 2007). Following are exemplary measures of "citizens' use / usefulness / perceived usefulness" along with their references listed below which were used by researchers to measure usefulness other than DeLone and McLean.

Table 3.7: Citizens' use /usefulness and identified attributes

Items / constructs	Explanation	Reference
Frequency of use / Daily use	The degree to which citizens use the e-government services frequently to accomplish their work. How frequently stakeholders use the e-government services on regular basis.	Almutairi and Subramanian (2005); Iivari (2005).
Intention to (re)use	Whether the citizens are ready to reuse the online services again.	DeLone and McLean (2003); Wang and Liao, (2008).
Nature of use	Kind of jobs accomplished by user /citizens while using e-government services.	DeLone and McLean (2003).
Interactivity	Allows citizens to interact effectively and enhance usefulness.	DeLone and McLean (2003).
Number of transactions	Number of transactions executed by the user /citizen.	DeLone and McLean (2003).

The hypothesized relationship between use, user satisfaction, and the three quality variables is based on the theoretical and empirical work reported by DeLone and McLean (2003), as they suggest, use and user satisfaction are closely interrelated. Positive experience with "use" will lead to greater "user satisfaction" in the DeLone and McLean model; and because of usage and user satisfaction, a certain net benefit will occur.

With the above discussion the following hypothesis can be given:

Hypothesis (H10): Citizens' Use /Usefulness positively affect the citizens' satisfaction in G2C e-government (e-tax service) perspective.

Hypothesis (H11): Citizens'Use /Usefulness positively affect citizens' trust in G2C e-government (e-tax service) perspective.

Table 3.8: Hypotheses related to citizens' use / usefulness

Hypotheses	References
(H10): Citizens' Use /Usefulness positively affect the citizens' satisfaction in G2C e-government (e-tax service) perspective.	DeLone and McLean (1992, 2003); Seddon (1997); Wang and Liao (2008); Saha et al., (2010); Liu and Zhou, (2010); Khayun, (2011); Zaidi et al., (2012, 2013, 2014).
(H11): Citizens'Use /Usefulness positively affect trust in G2C e-government (e-tax service) perspective.	Welch et al., (2005); Chang and Fang, (2013); Zaidi et al., (2012, 2013, 2014).

3.4.5 Citizens' Satisfaction

DeLone and McLean (2003) reported the hypothesized relationship between use, user satisfaction, and the three quality variables (system, information, and service quality) which is based on the theoretical and empirical work. Use and user satisfaction are closely interrelated. Positive experience with "use" will lead to greater "user satisfaction" in the DeLone and McLean model. The success dimension user satisfactionconstitutes the user's level of satisfaction when utilizing an IS. It is considered as one of the most important measures of IS success (DeLone and McLean, 2003). Previous researches also suggested that user satisfaction is considered a significant factor in measuring success (DeLone and McLean, 1992; Seddon and Kiew, 1996; Rai et al., 2002; McKinney et al., 2002; DeLone and McLean, 2003). To determine user satisfaction, information aspects and system features were separated by DeLone and McLean (1992). Updated IS success model by (DeLone and McLean, 2003) includes service quality as third measure introduced which also determines the customer satisfaction. Therefore, studies show that system quality, information quality, and service quality affect user satisfaction (DeLone and McLean, 2003; McKinney et al., 2002). This indicates that the higher system quality, information quality and service quality if perceived by users, the more satisfied they are with the IS system (DeLone and McLean, 2003). Several studies found that service quality is the key determinant of satisfaction (DeLone and McLean, 2003*;* Yang and Fang 2004, Cao et al., 2005). In case of e-commerce, customer satisfaction can be influenced by satisfaction with the quality of a Web site's information content, and the Web site's system performance for information delivery (McKinney et al., 2002).

In the present context of the study, we use citizen instead of user because present study is related to the e-government and citizens do the transaction with e-government. How citizens' satisfaction is to be measured and what items constitute that measure appropriately citizens' satisfaction is a challenge in e-government. Citizen satisfaction with e-government services is related to a citizen's perception about online service convenience (transaction), reliability of the information (transparency), and engagement with electronic communication (interactivity) (Welch et al., 2005). Within the context of this research, satisfaction is considered as a citizens' decision of overall use of the service.

Citizens' satisfaction with e-government services is related to a citizens' perception and the use of government web site, also citizens' satisfaction is positively related with trust in government. Quality of service delivery increases citizens' satisfaction and hence citizens' satisfaction is strongly related to the trust in government service delivery (Welch et al., 2003). Increased citizens' trust in government will increase citizens' satisfaction in government e-service delivery (Welch et al., 2003 and 2005). Rai et al. (2002) identified perceived ease of use and perceived usefulness as antecedents of satisfaction, which clearly indicates that the usefulness of system, information and services impact the citizens' satisfaction.

Following are exemplary measures of citizen satisfaction along with their references listed below which were used by researchers to measure users' satisfaction quality other than DeLone and McLean.

Table 3.9: Citizens' satisfaction and identified attributes

Items / constructs	Explanation	Reference
Efficiency	The ease and speed of accessing and using the site.	Almutairi and Subramanian, (2005); Seddon and Kiew, (1994).
Value	Whether the system is effective and offers valuable services to the citizens.	Almutairi and Subramanian, (2005); Seddon and Kiew, (1994).
Adequacy	Whether the system offers sufficient amount of services.	Almutairi and Subramanian, (2005); Seddon and Kiew, (1994).
System satisfaction	Whether the system offers satisfactory level of services.	Gable et al., (2008).
Information satisfaction	Whether the available information through the system is up to date.	Gable et al., (2008).
Overall satisfaction	Users /citizens are fully satisfied with the services while using the system.	Almutairi and subramanian, (2005); Gable et al., (2008); Rai et al., (2002); Seddon and Kiew, (1994).

Above table shows that number of items was used by researchers to major satisfaction. Present study is considering efficiency, value, adequacy, system satisfaction, and information satisfaction.

As per this research context and based on previous studies, we define satisfaction as follows: *"The degree to which, a citizen is satisfied with overall use of the e-service provided by the government*". System quality, information quality, and service quality affect user's satisfaction in the G2C e-Government context.

The following hypothesis can be drawn:

Hypothesis (H12): Citizens' satisfaction positively affects and forms citizens' trust in e-government service in G2C e-government (e-tax service) perspective.

Hypothesis (H13): Citizens' satisfaction has positive effect on perceived e-government service quality in G2C e-government (e-tax service) perspective.

Table 3.10: Hypotheses related to citizens' satisfaction

Hypotheses	References
(H12): Citizens' satisfaction positively affects and forms citizens' trust in e-government service in G2C e-government (e-tax service) perspective.	Welch et al., (2005); Liu and Zhou, (2010); Zaidi et al., (2012, 2013, 2014).
(H13): Citizens' satisfaction has positive effect on perceived e-government service quality in G2C e-government (e-tax service) perspective.	Welch et al., (2005); Saha et al., (2010); Chang and Fang, (2013); Zaidi et al., (2012, 2013, 2014).

3.4.6 Citizens' Trust

There are few studies which have discussed the relationship between trust and satisfaction. Generally, satisfaction reflects the "affect status," which is shaped by the user's previous experience with the Web site, and trust shapes the user's expectation towards the future behavior of the trustee. Thus, satisfaction is sometimes regarded as an antecedent of trust (Kim et al., 2004). In the context of e-government, the role of trust in the usage of Web sites of government is more important. In the absence of sufficient trust in e-government Web sites, users may be motivated to revert to the traditional offline means of interaction with the government. Therefore, building citizen trust is often considered as a key factor for the successful implementation of e-government Web sites (Warkentin et al., 2002). Citizen's satisfaction with e-government services is related to the use of a government web site, and citizens' satisfaction is positively associated with trust in government. Increased citizen's trust in government will increase citizen's satisfaction in government e-service delivery (Welch et al., 2005; Welch and Hinnant, 2003). Citizens' perceived quality of public service delivery increases citizen's satisfaction, citizen satisfaction is strongly related to trust in government service delivery (Wallech et al., 2004).

Trust increases the perceived usefulness of the web site. Trust in e-services motivates citizens to access e-services. When a user uses the web site, it is necessary that the web site should be understandable and easy to use. Perceived ease of use also increases the trust invested in the web site (Gefen et al., 2003). Increased citizens' trust in government will increase citizens' satisfaction in government e-service delivery (Welch et al., 2003). According to Welch and Hinnant, (2003) the use or usefulness of the online services is dependent on transparency and interactivity which might help to build public trust in government. Trust is positively related to usefulness of e-government service. Perceived "ease of use" increases the trust in the web site (Gefen et al., 2003). (Teo et al., 2008) proposed two dimensions of trusting beliefs (or trust) in e-government Web sites namely, "trust in government" and "trust in technology". Elevated levels of "trust" will influence the citizens to hold optimistic approach towards services and as result accomplishment in a high level perceived service quality is assured whereas distrust may yield low level of perceived service quality (Jarvenpaa et al., 2004).

Following are exemplary measures of citizens' trust along with their references listed below which were used by researchers to measure trust.

Table 3.11: Citizens' trust and identified attributes

Items / constructs	Explanation	Reference
Usability	The content needs to be reliable and usable to build trust and confidence in citizens.	Yang et al., (2005); Kumar et al., (2007).
Privacy	Ensuring privacy help to build trust in public agency.	Karunasena et al., (2011).
Security	Ensuring security help to build trust in public agency.	Karunasena et al., (2011).
Transaction transparency	The degree to which a services are accurate and dependable over time.	Pitt et al., (1995).
Unambiguous	The degree to which up to date, current, and unambiguous services are available to the citizens.	Welch and Hinnant, (2003).
Responsiveness	The degree to which e-government employees' concerned is willing and ready to provide service. It involves timeliness of service.	Chang and King, (2005); Pitt et al., (1995).
Tangible	Tangible in e-government context is determined by the appearance of the web interface, its functionality	Pitt et al., (1995), Alanezi et al., (2010).

Items / constructs	Explanation	Reference
	and the type of services provided. Alanezi et al., (2010) explain tangible attribute in e-government as “*physical facilities and functional appeal*” this means tangibility is related to the design of government website, appearance, and technical functionality. Further, Alanezi explains e-government website should be: visually appealing, have well organized appearance, able to quickly complete operations, availabile for citizens, web site does not crash and while entering information webpage should not be freezed. Many researchers preferto replace tangible dimension with “design of web” asdimension.	

With this discussion we can conclude that trust is positively associated with usefulness and citizens’ satisfaction in e-government services. With these references we can conclude that trust is a construct which can’t be measured directly. It depends upon the other previous discussed factors like use, and perceived usefulness and these later measures depend upon the system quality, information quality, and e-service quality. Trust can be achieved among citizens based on good satisfaction and e-service quality. E-government “trust” is positively related to the use, usefulness and citizen’s satisfaction. The following hypothesis can be drawn with the above discussion.

Hypothesis (H14): Citizens’ trust positively affects the perceived e-government service quality in G2C e-government (e-tax service) perspective.

Hypothesis (H15): Citizens’ trust positively affects the perceived effectiveness of e-government service in G2C e-government (e-tax service) perspective.

Table 3.12: Hypotheses related to citizens’ trust

Hypotheses	References
(H14): Citizens’ trust positively affects the perceived e-government service quality in G2C e-government (e-tax service) perspective.	Teo et al. (2009b); Saha et al., (2010); Khayun and Ractham, (2011); Hien, (2014); Zaidi et al., (2012, 2013, 2014).
(H15): Citizens’ trust positively affects the effectiveness expectation of e-government service in G2C e-government (e-tax service) perspective.	Khayun and Ractham, (2011); Zaidi et al., (2012, 2013, 2014).

3.4.7 Perceived E-government Service Quality

Perceived e-government service quality in the present study is considered as overall e-government service quality. Bigne et al., (2003) identified the concept of perceived quality and satisfaction and stated that measuring the perceived quality and satisfaction is complex and hence it is necessary to take overall perceived quality. Whereas Lihua and Zheng, (2005) identified internet service quality as e-government performance and considered it as dependent variable that includes various service constituents. Chutimaskul et al., (2008) tested empirically the e-government quality using system quality, information quality, and service quality and hypothesized the individual impact of previous mentioned quality measures on e-government service quality. Bhattacharya et al., (2012) in their study of “e-service quality model”, confirmed that the e-service quality can be defined as “overall quality assessment of e-services”. E-service quality is determining indicator of e-government achievement or being unsuccessful in the virtual perspective.According to Srivastava, (2011), e-service quality influences the citizens as well as government efforts. According to Teo et al., (2009), “trust in e-government” as a construct affects “perceived service quality of government” Web site and their study evaluated the affect of “trust in government system”. Saha et al., (2008) studied the e-government service delivery success and hypothesized the relationships between system quality and service quality along with information quality, user’s satisfaction to explore the relationship among them. Quality of e-government services can be evaluated by user satisfaction and intention of future use (Bhattacharya et al., 2012). Bhattacharya et al., (2012) considered seven items including citizen centricity, transaction transparency, technical adequacy, usability, complete information, privacy and security and usefulness for measuring users’ perceived e-service quality for Indian Web portals. These seven items not only show relationship with his e-service quality but also show relationships with system quality and information quality dimensions.Papadomichelaki et al., (2009) measured e-government service quality using reliability, ease of use, trust (privacy and security), contents appearance, citizen’s support, and functionality of interactive environment. Considering the previous discussion, present study chooses “functionality of interactive environment, service reliability, citizens’ support, and service satisfaction” items for e-government service quality.

DeLone and McLean did not provide an empirical validation of the updated model, and suggest that further development and validation are needed; however, (Wang and Liao, 2008; Edrees and Mahmood, 2013) validated e-government of their respective countries by using similar dimension which were proposed by DeLone and McLean, (2003). According to Wang and Liao, (2008), the G2C e-government `service process fits satisfactorily into the DeLone and McLean updated IS success model along with its system quality, information quality, service quality, use and user satisfaction dimensions. Wang and Liao, (2008) also mentioned the importance of continuous research which is needed to asses comprehensively DeLone's and McLean's models in the perspective of e-government systems success evaluation.

With the above discussion we may conclude that system quality, information quality and service quality affect the citizens' usefulness of e-services and also these affect the citizens' satisfaction and citizens' trust in e-government. Further citizens' satisfaction and citizens' trust in e-government influence the perceived e-government service quality. This means perceived e-government service quality is a dependent variable which has impact of previous antecedent constructs and measured perceived e-government service quality can be considered one of the factors of evaluation of e-government services.

Hence in the perspective of present study, author considers "perceived e-government service quality" as overall e-government service quality as a major evaluation construct of "perceived effectiveness" of e-government service. The following hypothetical relationships are stated.

Hypothesis (H16): Perceived e-government service quality affects the effectiveness of e-government service in G2C e-government perspective.

Table 3.13: Hypotheses related to perceived e-government service quality

Hypotheses	References
(H16): Perceived e-government service quality affects the e-government perceived effectiveness in G2C e-government perspective.	Chutimaskul et al., (2008); Khayun and Ractham, (2011); Bhattacharya et al., (2012); Zaidi et al., (2012, 2013, 2014); Hien, (2014)

3.4.8 Perceived Effectiveness

As author's study is to evaluate the effectiveness of e-government service, so the dimension "perceived effectiveness" is conceptualized for assessing the e-government service effectiveness by considering the India e-tax service. As present study considered DeLone and

McLean (2003) as base model which assesses the IS success using "Net Benefits" as concluding variable. Literature review in Chapter 2 clearly reveals that the variable "Net Benefit" as a dimension used in various contexts. DeLone and McLean, (2003) measured "net benefits", Wang and Laio, (2008) measured e-government success as "perceived net benefits", Scott et al., (2010) measured the "citizens' value", Saha et al., (2008) measured "Citizens Satisfaction", Khayun and Ractham, (2011) measured "Perceived Net Benefits" of e-excise services, and Edrees and Mahmood, (2013) measured "Perceived Net Benefits" in the context of e-government success. Wang and Liao, (2008) and Edrees and Mahmood, (2013) validated DeLone and McLean, (2003) model and used "perceived net benefit" instead of net benefit. Wang and Liao, (2008) mentioned that *"the challenge for the researcher is to define clearly and carefully the stakeholders and context in which net benefit are to be measured"*.

Different stakeholders may have different beliefs as to what constitutes a benefit to them (DeLone & McLean, 2003). In the context of e-commerce, the "net benefits" measures the difference between the positive and negative impacts of the e-commerce experience among organization, customers, and suppliers (Saha et al., 2010). Wang and Laio, (2008) measure e-government success as perceived net benefits further, Scott et al., (2010) in their study stated "the use of public value" as a new method for meeting the challenges of efficiency, accountability and equity in understanding success. Scott et al., (2010) measure the citizens' value in e-government services also the aspects of IT Quality influence e-government success.

Literature clearly indicates that the "Net Benefit" as a final construct used in various contexts by the researchers is not clearly specified and seems ambiguous. Hence in the context of present study author considers "Perceived Effectiveness" as most appropriate keyword for e-government effectiveness assessment instead of "net benefit" which gives rational nomenclature of what to measure in e-government context. Hence in the perspective of present study, the author considers "perceived effectiveness" as major "e-government service evaluation" construct along with overall citizens' trust, overall e-government service quality, overall risk, and overall e-service effectiveness as items to evaluate perceived effectiveness of e-government service. Perceived effectiveness is the final construct which is influenced by its antecedent technological and behavioural constructs. Perceived effectiveness construct examines how effectively e-government service (e-tax service) is being offered and it focuses on specific constituents which contribute to the effectiveness evaluation.

3.5 E-GEEF Framework's Dimensions and Measurement Items

Based upon the above discussion on various e-government service assessment indicators, following items are identified for each corresponding constructs for proposed framework E-GEEF listed in the table.

Table 3.14: Dimensions and measurement items in proposed E-GEEF framework

Quality Dimensions	Items	Description of Measurement Items
System Quality (SysQ)	SysQ1	Accessibility
	SysQ2	Flexibility
	SysQ3	Functionality
	SysQ4	System accuracy / Reliability
	SysQ5	Ease of use
	SysQ6	Integration
	SysQ7	Navigation
Information Quality (InfQ)	InfQ1	Accuracy
	InfQ2	Relevance
	InfQ3	Completeness
	InfQ4	Trustworthiness
	InfQ5	Availability
	InfQ6	Timeliness
	InfQ7	Consistency
Service Quality (SerQ)	SerQ1	Assurance
	SerQ2	Flexibility
	SerQ3	Accurateness
	SerQ4	Tangible
	SerQ5	Transparency
	SerQ6	Sufficiency
	SerQ7	Responsiveness
Citizens' Use (CtU)	CtU1	Frequency of use
	CtU2	Nature of use
	CtU3	Intention to (re)use
	CtU4	Interactivity
	CtU5	Number of transactions
Citizens' Satisfaction (CtS)	CtS1	Efficiency
	CtS2	Value
	CtS3	Adequacy

Quality Dimensions	Items	Description of Measurement Items
	CtS4	System satisfaction
	CtS5	Information satisfaction
Citizens' Trust (CtT)	CtT1	Usability
	CtT2	Privacy
	CtT3	Security
	CtT4	Transaction transparency
	CtT5	Unambiguous
	CtT6	Responsiveness
	CtT7	Tangible
Perceived E-government Service Quality (EGSQ)	EGSQ1	Service functionality of interactive environment
	EGSQ3	Service Reliability
	EGSQ3	Citizens' Support
	EGSQ4	Service satisfaction
Perceived Effectiveness (PE)	PE1	Overall citizens' trust
	PE2	Overall e-government service quality
	PE3	Overall risk
	PE4	Overall e-service effectiveness

3.6 Hypotheses for Proposed Framework (E-GEEF)

The following is the list of all above discussed hypotheses derived for proposed e-GEEF framework.

Hypothesis (H1): System quality is positively related to and affects the citizens' use / usefulness of e-tax service in the G2C e-government perspective.

Hypothesis (H2): System quality is positively related to and affects perceived e-government service quality in G2C e-government (e-tax service) perspective.

Hypothesis (H3): System quality is positively related to and affects citizens' satisfaction with e-tax service in the G2C e-government perspective.

Hypothesis (H4): Information quality is positively related and affects the citizens' use / usefulness in G2C e-government (e-tax service) perspective.

Hypothesis (H5): Information quality is positively related and affects perceived e-government service quality in the G2C e-government (e-tax service) perspective.

Hypothesis (H6): Information quality is positively related and affects the citizens' satisfaction in G2C e-government (e-tax service) perspective.

Hypothesis (H7): Service quality is positively related and affects the citizens' use / usefulness in G2C e-government (e-tax service) perspective.

Hypothesis (H8): Service quality positively affects perceived e-government service quality in the G2C e-government (e-tax service) perspective.

Hypothesis (H9): Service quality is positively related and affects the citizens' satisfaction in G2C e-government (e-tax service) perspective.

Hypothesis (H10): Citizens' Use /Usefulness positively affect the citizens' satisfaction in G2C e-government (e-tax service) perspective.

Hypothesis (H11): Citizens'Use /Usefulness positively affect citizens' trust in G2C e-government (e-tax service) perspective.

Hypothesis (H12): Citizens' satisfaction positively affects and forms citizens' trust in e-government service in G2C e-government (e-tax service) perspective.

Hypothesis (H13): Citizens' satisfaction has positive effect on perceived e-government service quality in G2C e-government (e-tax service) perspective.

Hypothesis (H14): Citizens' trust positively affects the perceived e-government service quality in G2C e-government (e-tax service) perspective.

Hypothesis (H15): Citizens' trust positively affects the perceived effectiveness of e-government service in G2C e-government (e-tax service) perspective.

Hypothesis (H16): Overall perceived e-government service quality affects the e-government perceived effectiveness in G2C e-government (e-tax service) perspective.

3.7 Summary

This chapter proposed the framework E-GEEF for measuring the effectiveness of e-government services and trust in e-government. The chapter has identified different dimensions and their relationships. Also, number of items in each dimension was identified. Extracted e-government service quality and citizens' trust related factors from the literature are believed to be of high significance for e-government service effectiveness assessment. Two issues were considered: the assessment of "perceived e-government service quality and citizens' trust" which will be responsible for determining the perceived effectiveness of e-government service for the assessment of e-tax service effectiveness in the context of India. The chapter has achieved its aim by proposing the conceptual framework and a holistic view of various dimensions with their measuring items in e-government which will be used in public sector for assessing the e-services.

CHAPTER – 4

Research Methodologies

The aim of this chapter is to describe and develop the research methodology for the proposed research work in this thesis. The author presents in detail the empirical research methodology. This elucidation is within the perspective of research methods that is used generally in the interdisciplinary area of Information Systems and Computer Science. There are several research approaches and techniques available but the selection of appropriate methodology is based on the research aim and research problem. This chapter discusses the research methodology along with how data was collected, and the techniques and methods adopted to meet the aim of the study. It demonstrates the steps related to the research design, research strategy, and research method used in the study. It further discusses the research approaches available in the quantitative and qualitative data analysis. Later, it proceeds with selection of the appropriate research method for this study. It also discusses data analysis stages along with reliability and validity of the proposed framework.

The chapter is divided in different sections:

- **Section (4.1)**: Research Methodology for Framework Validation
- **Section (4.2)**: Research Approach and Rationale of Selection
    - 4.2.1 Quantitative Research Approach
    - 4.2.2 Qualitative Research Approach
- **Section (4.3)**: Research Design
- **Section (4.4)**: Research Strategy
- **Section (4.5)**: Research Method
- **Section (4.6)**: Survey Method
    - 4.6.1 Questionnaire
    - 4.6.2 Questionnaires Evaluation Scale
    - 4.6.3 Sampling
        - 4.6.3.1 Defining Target Population (Users of e-Tax Service in India)
        - 4.6.3.2 Selection of Sample Frame
        - 4.6.3.3 Selecting the Sampling Methods

4.6.3.4 Sampling Size

- **Section (4.7)**: Data Collection
    - 4.7.1 Developing the measures for the study
    - 4.7.2 Specifying the domain of the construct
    - 4.7.3 Generation of Item Scales
- **Section (4.8)**: Data Analysis
    - 4.8.1 Descriptive Statistics
    - 4.8.2 Structural Equation Modeling
- **Section (4.9)**: Measurement model
    - 4.9.1 Confirmatory Analysis
    - 4.9.2 Measurements of model fit
    - 4.9.3 Overall model fit
- **Section (4.10)**: Instrument Validation
    - 4.10.1 Instrument's Reliability Analysis
    - 4.10.2 Instrument's Validity Analysis
        - 4.10.2.1 Content Validity
        - 4.10.2.2 Construct Validity
            - 4.10.2.2.1 Discriminant Validity
            - 4.10.2.2.2 Convergent Validity
- **Section (4.11)**: Structural model assessment
- **Section (4.12)**: Data storage and disposal
- **Section (4.13)**: Summary

4.1 Research Methodology for Framework Validation

E-government is classified within the Information Systems (IS) field, which covers many areas, including: technology, computing, management, public administration and political science (Heeks and Bailur, 2007). However, Clarke (1992) conceptualised information systems domain into two fields of study: (i) computer science, concerned with software engineering, database management, and applications of software development; and (ii) business clusters of disciplines, addressing systems analysis and organisational behaviour. This interdisciplinary nature of IS made it particularly difficult to select an appropriate strategy and research approach. Orlikowski and Baroudi, (1991) argued that IS are not related to a single theoretical perspective, and therefore, researchers are able to choose an appropriate method from a range of research approaches.

Research methodology takes a major place in research development to ensure systematic and relevant research into the phenomenon under investigation and discover knowledge about something happening or existing in society, science or nature (Neuman, 2003; Hair et al., 2010). The current research has a philosophical and theoretical foundation, where theoretical foundation involves theory testing and theory building (De Vaus, 2007). The concept of theory is often regarded as a research methodology that includes the principles and an assumption of the hypotheses, in which the theory is based (Blaikie, 2007; Hair et al., 2010). Further, research is a systematic process of collecting and analysing data with the aim of discovering new knowledge or expanding and verifying an existing theory (Blaikie, 2007). In fact, research methodology assists in a procedure and logic for generating the new knowledge of the current study, starting with data collection, data analysis, reporting the findings and drawing conclusions (Fielding and Gilbert, 2006). Number of factors including research topic, objectives, research questions, and nature of the research problem are considered for the selection of an appropriate research methodology (Yin, 2003). IS research can be seen as an area of diverse research methods, paradigms and approaches (Wade and Hulland, 2004). The choice of an appropriate research methodology is a basic requirement in order to achieve a final result of high quality (Al-Shehry et al., 2006). Thus, the reliability of the findings and the validity of the research study depend upon the robustness of the applied methodology.

The research problem addressed by this thesis is identified as development of aframework E-GEEF to assess the effectiveness of e-government services. However, the most important part of a research is the research question; which is certainly “the glue that holds the project together” (Wilson, 2010). Thus, the research problem must be translated into a research question that describes the nature and scope of the research, and the choice between quantitative and qualitative research methods (Wilson, 2010). Blaikie (2007) highlights the three types of research questions which include ‘what’, ‘why’, and ‘how’. ′What′ types of questions require descriptive answers in the form of patterns of association. ′Why′ types of questions look for causes or reasons for the existence of these patterns, and finally ′how′ types of questions are concerned with intervention and practical outcomes. However, the major research question in the current study is “*What is the framework that could best evaluate the effectiveness of e-government services*”? As a result, in an attempt to provide answers to the preceding research question and find solutions to the problem addressed in Chapter 1, the research problem in this thesis is divided into the furtherthree minor possible research questions:

a. *What are the effectiveness assessment frameworks for e-government services existing and why would a new framework be evolved?*
b. *What are the dimensions contributing to effectiveness evaluation of e-government services?*
c. *What could be the relationship among various effectiveness evaluation dimensions?*

The present research is undertaken to generate a body of knowledge by attempting to measure the effectiveness of e-government service from the citizens’ perspective. Mainly the quantitative approach was chosen to test the developed research framework empirically since that approach is more useful for testing theory (Hair et al., 2007). In addition, it allows the researcher a greater variety of structured data collection techniques for use with a large representative sample, in order to achieve reliability and validity of the measures used.

As mentioned earlier that the nature of the present study is multidisciplinary, so in this research, methodology uses partial qualitative research approach and mainly the quantitative research approach, which is called triangulation of method. This approach maximizes the strength of collected data also it increases the reliability and validity of research findings (Barnes, 2006; Oates, 2006). Therefore, before applying the quantitative approach, a small priliminary qualitative study was conducted to determine whether the measurement items selected were appropriate in the specific context of the research. Previous years’surveys of

Indian e-tax service and e-tax finling web site were studied carefully. This helped in identifying the current status of Indian e-tax services.

4.2 Research Approach and Rationale of Selection

Galliers (1992) asserts that there is no specific framework which may combine all aspects of knowledge needed for the study of IS. Due to such multi disciplinary nature of IS the selection of an appropriate research approach to study IS related phenomenon is not an easy task and it is particularly difficult to select an appropriate strategy and research approach. A variety of research paradigm exists in IS research domain. The researcher suggests that for each different research paradigm there is a different way to gain knowledge which is termed as epistemology (Oates, 2006). IS encompasses a number of philosophical (or epistemological) approaches which includes positivism, interpretive, and critical (Straub et al., 2005).

DeVilliers (2005) explains that the positivist research is intended to produce an exact representation of reality. Research results should be reliable and consistent, free from perceptions and biases of the researcher. Positivist research relies primarily on quantitative methods, where data comprises mainly numbers and measurements and analysis is done using statistical methods. Interpretivism research relies primarily on qualitative methods where the interpretation or underlying meanings of statements are identified in the appropriate context. Myers and Avison (2002) define these epistemological categories of research in various ways: (i) positivist, presuming that reality is impartially given and can be expressed through measurable means, mainly concerned with testing hypothesis and with quantifiable measures of variables; (ii) interpretive, assuming that reality can be discovered through interactions, based principally on understanding phenomena and how people's perceptions could be interpreted; and (iii) critical, suggesting that reality is in a continuous shape by people who have limited capability to change their social and economic status due to various constraints, essentially directed towards criticising and highlighting these conditions or constraints. Crotty, (1998) suggests epistemology and its interrelationship with methodology, research method and theoretical perspective adopted by the researcher. Table 4.1 shows the previous interrelationship.

Table 4.1 Epistemology, theoretical perspectives, methodology and research methods relationships

Epistemology ⇨ Theoretical Perspective ⇨	Methodology ⇨	Research Method
• Positivism • Interpretivism • Critical inquiry • Symbolic interactionism • Phenomenology • Feminism • Postmodernism etc.	• Experimental research • Survey research • Ethnography • Phenomenological research • Grounded theory • Heuristic inquiry • Action research • Discourse analysis etc.	• Sampling • Statistical analysis • Questionnaire • Observation • Interview • Focus group • Document analysis • Content etc.

(Source: Adapted from Crotty, 1998)

Jörg Becker and Björn Niehaves, (2007) study highlights the findings that the quantitative methods dominate in IS research in USA up to (71%), while (49%) of papers published in the European journals apply qualitative methods. The vast majority (89%) of the USA publications followed positivist paradigm. Below table 4.2 shows the importance of quantitative methodology along with positivism research paradigm in IS research.

Table 4.2 Methodological and paradigmatic diversity in IS research

Method	USA Journals	EU Journals
Quantitative	71%	40%
Qualitative	20%	49%
Mixed	9%	11%
Paradigm		
Positivist	89%	66%
Interpretivist	11%	34%

(Source: Adapted from Jörg Becker and Björn Niehaves, 2007)

Positivism is most naturally operationalised using quantitative methods (DeVilliers, 2005). Further, the positivism approach has been the prime epistemology in IS research (Galliers, 1992; Yin, 2003; Straub et al., 2004). Thus, considering the nature of the author’s current research, mainly quantitative method found suitable and useful; however, as mentioned earlier that there is a partial use of qualitative method also. A research approach that follows a quantitative approach falls within the positivist claims of knowledge. The main characteristics are breaking the problem down to specific variables, building of hypotheses, and testing theories using instruments and observations that provide statistical data (Creswell, 2003).

Quantitative research usually involves building up hypotheses based on theoretical statements, and variables measured for effects.

There are three common research approaches quantitative, qualitative and mixed method (Williams, 2007). Since positivist approach follows quantitative research approach and interpretivism research follows qualitative research approach so it is important to understand clear difference among both of them.

4.2.1 Quantitative Research Approach

Researchers come up with various arguments about whether to employ quantitative or qualitative research approach but both depends upon the context of the research. Quantitative and qualitative research approaches have been the topic of discussion among IS research community since past few years but quantitative research methods were originally developed in the natural sciences to study natural phenomena (Myers, 1997). Creswell, (2003) emphasized that quantitative research originated in the physical sciences and researcher uses mathematical models as the methodology for data analysis. Nature of collected data is numeric for quantitative data analysis. In addition, the researcher uses the inquiry methods to ensure alignment with statistical data collection methodology (Willams, 2007). Quantitative research approach falls within the positivist claim of knowledge position. Quantitative research usually involves building up hypotheses based on theoretical statements, and variables measured for effects. The main characteristics are breaking the problem down to specific variables, building of hypotheses, and testing theories using instruments and observations that provide statistical data (Creswell, 2003). Creswell, (2003) argues that the quantitative approach is most appropriate when the problem is to identify factors that influence an outcome and understand the best predictors of outcomes. Research adopting the quantitative approach is said to be mostly numerical and is designed to ensure objectivity, generalizability and reliability. Further, quantitative research is an empirical research which refers to any research approach based on something that can be accurately and precisely measured. Quantitative method enables the researcher to test the relationships between the variables identified in the model and thereby let him provide evidence to support or disprove the hypotheses (Carter and Belanger, 2005). Table 4.3 depicts the strength and weakness of quantitative approach also shows the relationship to the proposed study.

Table 4.3 Quantitative approach (Comparison Strengths Vs Weaknesses) & relationship to the present study

Strengths	Weaknesses	Relationship to the Thesis
• Allows researchers to analyse more easily because quantitative data is in numerical and strcutrured form. • Analysis comes usually in the form of statistics, tables, chart, and discussion which they relate to the given hypothesis. • Quantitative analysis allows for the classifying of features and constructing more complex statistical models in an attempt to explain what is observed. • Findings can be generalised to a larger population. • Provides high level of accuracy. • Allows to present analysis graphically. • Data must be valid and reliable and independent of the research setting and process. • Large samples (over 50)	• Quantitative implementation is slow, and needs time compared with qualitative. • Picture of the data which emerges from quantitative analysis lacks richness of detail compared with data from qualitative analysis reduced to numerical form. • Can be expensive. • Low response rates. • Not simple to implement. • Quantitative often requires computer analysis.	• Using survey technique, structured numerical data was collected. • Set of steps e.g. descriptive analysis, reliability, validity of the constructs, measurement model fit, and structural modeling techniques are used in quantitative analysis which are in numerical forms. • Quantitative analysis technique helped in validating proposed framework E-GEEF by applying various stages of statistical tests. • Findings after the quantitative analysis confirmed the included dimensions and their use for measuring e-government service effectiveness which could be generalized and used for future research. • After the analysis, obtained results were found within the range while compared with the standard results which show the accuracy of analysis. • AMOS 21 is used for confirmatory factor analysis, measurement model fit, and structural equation modeling. Using AMOS various rounds of simulations were performed for E-GEEF. Statistical tests and graphical representations in the form of figures are available in Chapter 5. • Various hypotheses were tested using structural equation modeling. • Quantitative analysis includes various stages of analysis therefore it is time consuming and needs specialized software tools, such as AMOS for the analysis. • Questionnaire responses are always low and take time of minimum 6 months to collect the data. In the present study, data collection took more than a year and half. • Present study's sample size is 550.

(Source: Adapted from Bernard, 2000; Creswell, 2003; Hair et al., 2007)

4.2.2 Qualitative Research Approach

According to Myers (1997), the qualitative approach in information systems involves the use of qualitative data such as interviews, documents and observations to understand and explain social phenomena. While Leedy and Ormrod, (2001) recommend five various method to perform qualitative analysis including case studies, grounded theory, ethnography, content analysis, and phenomenological. Creswell (2003) states that the interpretive and naturalistic approach is involved in a qualitative research approach. From the natural settings, researchers study events, where the researcher uses case studies, personal experience, interviews, observational, historical, and visual text to collect a variety of empirical materials (Creswell, 2003). The content analysis study within qualitative approach is designed to identify the body of material to be studied and define the quality characteristics of the contents to be examined (Leedy and Ormrod, 2001).

From various qualitative approachesinterviews and archival records were used for analysis in the study and were found to be suitable for indentifying the quality characteristics of India e-tax filing website. Hence, content analysis of interviews and archival records or documents and observation method as qualitative approach helped in identifying and developing the measuring constructs and questionnaires. India e-tax filing website contents were thoroughly investigated.

Based on previous literature, a framework E-GEEF to measure the e-government e-tax service effectiveness and citizens' trust was developed and the quantitative approach along with partial qualitative approach was chosen to test the developed framework empirically. The quantitative approach is more useful for testing theory (Hair et al., 2007). In addition, it allows the researcher a greater variety of structured data collection techniques for use with a large representative sample, in order to achieve reliability and validity of the measures used in the framework.

Table 4.4 Qualitative approach (Comparison Strengths Vs Weaknesses) & relationship to the present study

Strengths	Weaknesses	Relationship to the Thesis
• Ambiguities, which are inherent in human language, can be recognised in the analysis. • Data are in the form of words from observations and documents. • The qualitative analysis allows a complete, rich and detailed description. • Can be faster when compared to quantitative methods. • Does not reduce complex human experiences to numerical form and allows a good insight into a person's experiences and behaviour. • Qualitative methods can be cheaper than quantitative research. • Small samples (1-50)	• Qualitative data is difficult to analyse and needs a high level of interpretative skills. • Good chance of bias. • Hard to draw brief conclusions from qualitative data. • Qualitative data faces difficulties in terms of comparison. • Low level of accuracy in terms of statistics.	• Interviews and archival records considered for preliminary qualitative study. • Interview questions and discussions with 10 e-tax paying citizens provided richer picture of the present status of Indian e-tax service. • Interview reponoses were interpreted and relavant information was extracted out from the transcribed interviews. • Qualitative data analysis needs few sample interviews that's why it took less time to conduct interviews as compared to the collection of quantitative data. • Qualitative study for the present research was found good only for preliminary study to know the citizens' view about e-tax service and whether the identified dimensions for the E-GEEF are appropriate or not. • As weakness of qualitative data analysis is hard to draw the conclusion and low level of accuracy of the results so present study partially used qualitative analysis and mostly used quantitative analysis.

(Source: Adapted from Bernard, 2000; Creswell, 2003; Hair et al., 2007)

4.3 Research Design

The research design is a logical sequence that connects the empirical data to an initial research question and eventually to its conclusions for any study (Yin, 2003). Therefore, the research design of a study is defined as a set of guidelines and instructions to be followed in addressing the problems. Hair et al., (2003) define research design as "*the basic direction for carrying out the project*". There are three main types of research designs, which can be classified according to the objective of the study including: (i) exploratory research; (ii) descriptive research; and (iii) causal research (Hair et al., 2003). Table 4.5 shows the comparison between various research designs.

Table 4.5 Comparison table between various research designs

Research Design	Explanation	Research Methods	Used in E-GEEF
Exploratory (Hair et al., 2003; Saunders et al., 2003).	Exploratory research is applied where the literature lacks information about the problem under investigation which means such type of research design tends to tackle new problems on which little or no previous research has been conducted. Explanatory research focuses on "why" questions	Qualitative approach mainly considered for such situation. Documents study, Searching the literature, dialogues with experts in the subject & conducting interviews, archival records.	Interviews with the citizens and study of archival records performed.
Descriptive (Hair et al., 2003; Blaikie, 2007)	Descriptive research design aims to describe a phenomenon as "what exists" with respect to variables or some previous understanding of the nature to the research problem and the relationship between variables. Also descriptive research is designed to measure an event and activity and used to test a hypothesis. It focuses on "what" and "how" questions.	Quantitative & statistical techniques are typically used to interpret the data and it uses a set of scientific methods.	Survey method applied for quantitative data collection. Descriptive statistics and structural equation modeling technique applied for the analysis of quantitative data.
Casual /Conclusive (Hair et al., 2007 ; Wilson, 2010)	It aims to explain the relationship of cause and effect between the variables. Causal research is needed when the research must test whether one occasion caused another. A change in X cause a change in Y.	Quantitative & statistical techniques are typically used to summaries the data	Not used

Strauss and Corbin, (1998) explain research design as a plan to study the overall framework for the collection of data, outline the detailed steps in the study and provide systematic guidelines for gathering the data. Authors state that a research design is similar to an architectural blueprint which plans on organizing and integrating the results in a particular end product. Further, they indicate that the research design is a plan that will be applied during the investigation in order to answer the research question.

The purpose of the research is to assess the effectiveness of government e-tax service. In this proposed research framework weveral hypotheses were formulated. The aim is to test the hypotheses and determine the strength of the relationships among various dimensions. Based on the purpose of the study and available research design methods, the present study is descriptive in nature. Therefore, descriptive research design is found to be appropriate for the present study. Descriptive studies involve "designing and collecting data", "checking for errors", and "coding and storing data" (Hair et al., 2003). It begins with a defined structure and proceeds to actual data collection in order to describe the phenomenon which is under analysis (Hair et al., 2003). Dissimilar to exploratory researches, descriptive researches are confirmatory; therefore, they are used to test the specific hypotheses (Hair et al., 2003).

E-government literature and their associated studies address the issue under investigation; therefore, it cannot be categorised under exploratory research also the current study should not be categorised under causal research. As mentioned before that the purpose of the current research is to develop a framework to assess the effectiveness of e-government services so the outcome of the research is expected to develop theory that attempts to describe and predict the effectiveness of e-tax service of Indian e-government.

4.4 Research Strategy

Determining the philosophical assumption leading the research led to a successive stage that involved the investigation of the most relevant research strategies. In fact after the identification of research question and research deign, the choice of an appropriate research strategy is the most important decision that a researcher should make.

Remenyi et al., (2003) provide the overall direction of the research including the process by which the research is conducted. Saunders et al., (2009) defined research strategy as "*the general plan of how the researcher will go about answering the research questions*". The research strategy is the general plan set by the researcher that outlines how the researcher plans to answer the research questions. It will specify the source of data collection with consideration of issues such as access of data, time, location, money, and ethical issues. The choice of which strategy should be followed is dependent upon the nature of the research problem (Noor, 2008). Saunders et al., (2009) mentioned that appropriate research strategy has to be selected based on research questions and objectives, the extent of existing knowledge on the subject area to be researched, the amount of time and resources available, and the philosophical underpinnings of the researcher. Bryman (2008) identified research strategy as "*a general orientation to the conduct of research*". Some of the common research strategies where the social interaction takes place are experiment, survey, case study, action research, grounded theory, archival research, cross sectional studies, longitudinal studies, and participative enquiry (Yin, 1994; Collis and Hussey, 2009; Saunders et al., 2009). The grounded theory approach consists of a set of steps whose careful execution is thought to "guarantee" a good theory as the outcome (Strauss and Corbin, 1994). Dey (1999) summarizes the structure of grounded theory research into various stages including (i) initiating research, (ii) selecting data, (iii) collecting data using questionnaire, (iv) analysing data, and (v) concluding research.

Table 4.6 shows the research strategies and the possible number of questions which these handle.

Table 4.6 Research strategies and research questions

Research Strategy	Type of Questions
Case study	How, why & what
Experiment	How & why
Survey	Who, what, where, how much & how many
Archival analysis	Who, what, where, how much & how many
History	How & why

(Source: Adapted from Yin, 1994)

The choice of research strategy is the most important decision that researchers have to make to carry out their research. This refers to the logics or reasoning of enquiry that are used to answer the research questions (Blaikie, 2007). Blaikie (2007) classifies research strategy in deductive and inductive which are based upon the reasoning in philosophy.

Inductive reasoning is considered more exploratory in nature and it is a study in which theory is developed from the observation of empirical reality. It is most commonly associated with qualitative research (Collis and Hussey, 2009; Blaikie, 2007; Remenyi et al., 1998). Deductive Reasoning is top down apparoach which is narrower in nature and concerned with testing or confirming hypotheses. It is referred to as empirical research and is basically rooted in theories. It is most commonly associated with quantitative research which leads to test hypotheses with specific data and then, confirmation or rejection of the original theories (Collis and Hussey, 2009; Blaikie, 2007). Figure 4.1 shows the six sequential stages through which deductive reasoning of the current research progresses.

Theory
DeLone and McLean, (2003)
↓
Developing Hypotheses
SixteenHypotheses were deducted in Chapter Three
↓
Data Collection
Survey: Set of Questionnaire
↓
Data Analysis
Structured Equation Modelling using – AMOS
↓
Findings from the Analysis (Hypotheses Confirmation or Rejection)
Reconsideration of Theory

Figure 4.1 Deductive Reasoning Approach

A theoretical framework E-GEEF was developed with various hypotheses in Chapter 3 based on the literature review is presented in Chapter 2. Since positivist research design approach was selected for the study so for testing and confirming hypotheses deductive reasoning approach was found suitable and also it worked from the general to the more specific (Collis and Hussey, 2009; Blaikie, 2007). To establish generalizability within the specific research context of the proposed framework, the set of questionnaire, survey, interview, and archival records examinationapproaches were found to be suitable for the proposed research work for designing and validating the E-GEEF framework.Data collection was done using set of questionnaire. As the data is analyzed, the researcher searches for a core variable, which will serve as the foundation for theory generation.

4.5 Research Method

The current study is classified under the quantitative empirical approach which involves developing hypotheses based on theoretical statements and variables measured. Further, it falls within the deductive positivist approach and has its roots in natural science (Blaikie, 2007). The positivism approach leads the IS research and it has been widely adopted by the many researchers in IS research (Orlikowski and Baroudim, 1991). The positivism approach emphasises the importance of an objective scientific method (Blaikie, 2007; Remenyi et al., 1998). Scientific research involves an efficient process that focuses on being objective and gathering a large amount of information for analysis (Bryman, 2008). Since e-government systems fall within the IS context due to this the scientific approach fits well with author's present study.

Diversity in research methods is considered as a major strength of information systems (IS) research (Sidorova et al. 2008). Blaikie, (2007) defines research method as the techniques that are used to generate and analyse data in order to explain characteristics, patterns and processes in social life. In other way, research methods describe the tools and resources used for data collection, and the tools and techniques applied for data analysis. Research methods include action research, case study, ethnography, grounded research, semiotics, discourse analysis, surveys, simulation, mathematical modeling, laboratory experiments, statistical analysis, econometric and structured equations modeling (Myers, 2009). Orlikowski and Baroudi (1991) suggest that there are six types of research designs for conducting IS research, including case study, survey, laboratory, experiment, field experiment, action research. Therefore, survey approach is one of them which fits within the context of IS and e-government research.

4.6 Survey Method

Quantitative analysis includes one of the methods called survey, where data for a large number of organizations are collected through various methods such as mail questionnaires, telephone interviews, or from published statistics, and these data are analyzed using statistical techniques (Gable, 1994). Straub et al., (2005) have mentioned that surveys can be used as a data collection technique together with other techniques, such as interviews, within the same field. Surveying is known as data collection approach that can generate precise findings and indication about large population. For many researchers, surveying through questionnaire or interviews is always the foremost choice (Oates, 2006). According to Gable, (1994) surveys can accurately document the norm, identify extreme outcomes, and delineate associations between variables in a sample. Additionally, a survey is a systematic method for assembling information from a sample of the population for the rationale of constructing quantitative attributes (Al-Shafi, 2009). Scholars mentioned that the main purpose of a survey is to produce quantitative statistics about some aspects of a study and a survey is a systematic method for assembling information from a sample of the population for the rationale of constructing quantitative attributes. Groves et al., (2004) argue that survey methodology look to discover the principle about the design, collection, processing, and analysis of surveys, also, survey methodology is used both in the scientific fields and professional management fields.

Present study intends to assess the effectiveness of e-government service from the citizens' perspective which indicates that how citizens perceive the offered e-tax services hence survey approach in such situation is most widely used particularly where the technological acceptance /adoption is addressed (Shareef et al., 2009; Dwivedi and Irani, 2009).

There are many different types of surveys as well as several ways to administer them, and many methods of sampling. There are two key features of survey research (Neuman, 2003).

- Questionnaires - a predefined series of questions used to collect information from individuals
- Sampling - a technique in which a subgroup of the population is selected to answer the survey questions and the information collected can be generalized to the entire population of interest.

4.6.1 Questionnaire

Earlier researchers have used the questionnaire approach to study information technology acceptance, adoption, and use (Gilbert et al., 2004; Liu et al., 2005). Questionnaires are an efficient data collection mechanism when the researcher knows exactly what is required and how to measure the variables of interest (Sekaran and Bougie, 2010).

According to Peterson (2000) *"the quality of information is obtained from the questionnaire is directly proportional to the quality of questionnaire. A well-designed questionnaire that was* *used effectively can gather information on both the overall performance of the system to be tested as well as information on specific components of the system"*.

Empirical studies are associated usually with a survey approach and data is often obtained via questionnaire hence structured set of data collection from a sizeable population should be done by the researchers (Hair et al., 2003). Therefore the questionnaire for this study is designed very carefully considering the design issues, length of question, sequence, wording and layout of the questions. Appendix B provides the English version of distributed questionnaires. Surveys are generally administered either in person, by e-mail, or through electronic web-surveyssystems (Gil-Garcia et al., 2009).

The author's country of origin is India so target population for this study is Indian citizens. As a result, the current study conducted self-administered questionnaires in which respondents answered the questions directly. Indian government offers e-tax services which every citizen including private and public sectors' employee and business personals routinely use to file their taxes online. Therefore, the set of questionnaire was distributed to e-tax payers of India. The closed ended questionnaire was distributed to the wide range of citizens' profile with different age, position, rank, gender, education background and experienced in internet usage. Distribution of the questionnaire made use of the researchers' wide network of professional contacts to seek permission and assistance in administering the questionnaire to citizens.

The questionnaire offers a brief explanation of the purpose of the research to the participants and participation was on a purely voluntary basis. The questionnaires were completed in an environment which was impartial and at the respondent's own pace. The survey questionnaire was distributed to a total of 550 citizens between the period of June and August 2011. From 550 questionnaires distributed, 515 responses were received. 35 questionnaires were discarded due to incomplete and unanswered submission.

4.6.2 Questionnaires Evaluation Scale

The questionnaire was developed based on research literature and the qualitative study of the documents and contents available on India e-tax filing website. A 5-point 'Likert' scale was chosen to be the main instrument in the questionnaire. The proposed variables with items in the framework were measured using 5-point scales ranging from 'strongly disagree' to 'strongly agree', in which '1' equals the negative end and '5' the positive end of the scale for all model components. Each item was measured using a five point Likert scale (Papadomichelaki and Mentzas, 2009) relating to the citizen's experience about the usage of e-tax service. Neumann (1983) recommends researchers to use a 5-point Likert scale instead of the 7-point scale, especially when research is being conducted considering the human behavior. Al-Shafi and Weerakkody (2009) considered the use of the 5-point Likert type scales instead of the 7-point Likert type scales in their studies and found it robust for survey's questionnaire.

4.6.3 Sampling

According to Haque (2010) *"Sampling may be defined as the selection of some part of an aggregate or totality on the basis of which a judgment or inference about the aggregate or totality is made. In other words it is the process of obtaining information about an entire population by examining only a part of it".*

Sampling is the act, process, or technique of selecting a suitable sample, or a representative part of a population for the purpose of determining parameters or characteristics of the whole population (www.uonbi.ac.ke). One of the primary strengths of sampling is that accurate estimates of a population's characteristics can be obtained by surveying a small proportion of the population. One of the most important aspects of survey research is selecting a population of interest and developing a method to sample units from that population (Hair et al., 2007). In quantitative research, the primary objective is to obtain a representative sample which is a key to the sampling. The researcher's aim is to collect a small unit of cases from a large population, in which a smaller group is representative of a larger group of the population, and the researcher can produce accurate generalizations about the larger group (Neuman, 2003). There are a number of considerations when designing a sample including cost, level of accuracy and timing. According to (Hair et al., 2003), representative samples may be obtained by the following well-defined steps.

- Defining the Target Population
- Selection of Sampling Frame
- Selecting the Sampling Method
- Determining the Sample-Size

Below is the explanation of above mentioned sampling procedure's steps.

4.6.3.1 Defining Target Population (Users of e-Tax Service in India)

In order to test the proposed framework and assessing the effectiveness and citizens' trust in government e-tax service, we focused on Indian government Web site http:// incometaxindiaefiling.gov.in, which is primarily a tax services-related website. A typical respondent for the survey is a person who pays his online e-tax through the site. There are two main reasons for choosing India as the setting for this thesis. India is the researcher's country of origin; therefore, collecting the data was more feasible. Second reason was India's e-service delivery world ranking nowhere in United Nation's 2013-14 survey and India could not find place in top 20 Asian countries in e-government ranking (United Nation Survey, 2014). However, Waseda's University yearly ranking shows India e-government at 29th position with score 61.49 out of 100 in the world (Waseda, 2013) which is still far behind from the expectations. Although, India is leading in software service industry and its export as well as the IT usage among India citizens is widespread even then India lacks in offering excellent e-service delivery. Thus, it became important to know the associated factors with the effectiveness of e-government services along with citizens' perception. This is why target Indian e-taxpaying population as target population was found suitable for sampling.

4.6.3.2 Selection of Sample Frame

A simple definition of a sampling frame is the set of source materials from which the sample is selected. The definition also encompasses the purpose of sampling frames, which is to provide a means for choosing the particular members of the target population for the survey (Turner and Anthony G., 2003). According to Collis and Hussey, (2009) the sampling frame is *"a record of the population from which a sample can be drawn".* Hair et al. (2003) define the sampling frame to be the target population, so the present research targeted the population were e-tax payers of India who had actual online interaction with government through http:// incometaxindiaefiling.gov.in. Accordingly, it was not possible and feasible to obtain the list of e-tax payers and their personal details as sample frame for this research mainly due to the data privacy issues. Option left to obtain the sample was random selection of e-tax payers which could solve the sampling issues.

4.6.3.3 Selecting the Sampling Methods

There are a number of common sampling techniques, and researchers should carefully consider which approach best suits their needs. The sampling method was considered based upon three aspects: the nature of the study, the objectives of the study, and the budget constraints (Hair et. al., 2003). Survey sampling methods for data collection are classified in two major categories including random (probability sampling) and non-random (non-probability sampling). Probability sampling is the most representative sampling technique, and it is associated largely with survey-based studies and used for drawing statistical conclusions (Saunders, Lewis and Thornhill, 2003). Probability sampling techniques are primarily used in quantitatively oriented studies (Teddlie and Yu, 2007). On the contrary, non-probability (non-random) sampling, sometimes termed as purposive sampling or biased, is chosen usually during the exploratory phases and during pretesting of survey questionnaires. Purposive means the process involves purposely choosing individuals from the population based on the authority's or the researcher's knowledge and judgment also when limited number of individuals possess the interest (Saunders, Lewis and Thornhill, 2003; Hair et al., 2003). Non random or purposive sampling techniques are primarily used in qualitative research studies (Teddlie and Yu, 2007).Nature of the present study is quantitative; therefore, to achieve a suitable sample frame for this study; it was decided to consider the probability sampling technique which was found to be suitable. Further, Teddlie and Yu, (2007) classify probability sampling technique in the following three categories.

- Random sampling: is considered when each sampling unit in a clearly defined population has an equal chance of being included in the sample.
- Stratified sampling: is considered when the researcher divides the population into subgroups such that each unit belongs to a single stratum (e.g., low income, medium income, high income) and then selects units from those strata.
- Cluster sampling: is considered when the sampling unit is not an individual but a group (cluster) that occurs naturally in the population such as neighborhoods, hospitals, schools, or classrooms.

Based upon the types of probability sampling and quantitative nature of the present study, the research adheres to random probability sampling technique which is found to be appropriate because it considers the sampling unit in a clearly defined population.

Thus, an India e-tax service is being considered as an application area for this study. In view of that, research data was collected from India. The reasons for choosing India are (i) the researcher's origin is from India, and as researcher knows very well about India e-government e-service status and the culture of India thus it is easier to collect data, and (ii) in terms of Internet usage maturity and IT usage, India holds a considerable position, though there is big gap of the usage of IT between rural and urban citizens.

4.6.3.4 Sampling Size

Determining the size of representative sample is a very essential step in statistical sampling and can impact the quality of the data obtained. The sample size refers to the number of individuals or groups required to respond to achieve the required level of survey accuracy. According to Weston (2006), there are no fixed rules for deciding the sample size, sample design, level of accuracy required, non responses, factors, and sampling methods used. However, the higher the number of participants, the greater the statistical power yielded (Hair et al., 2010). According to Hair et al., (2010), a sample should preferably be more than 100 to proceed for factor analysis and should be higher than 300 and this is considered comfortable by Tabachnick and Fidell (2007). Sample sizes larger than 300 and less than 500 are appropriate for most researches (Sekaran and Bougie, 2010).For structural equation modeling (SEM) technique, if it is being used in the analysis then optimal size of sample is required to obtain reliable estimates (Hair et al., 2010). Considering the above discussion about sample size for SEM application, obtained sample size above 500 for the author's research found to be optimal.

4.7 Data Collection

4.7.1 Developing the Measures for the Study

The measures used in this research primarily adapted from previous research. Few standard models which have already developed brought under consideration for identifying the dimensions, and measurement indicators. Some of the models are De-Lone andMcLean's "IS success model", Parashuram's E-S-QUAL: A Multiple-Item Scale for Assessing Electronic Service Quality", Wimmer's "A Multiple-Item Scale for Assessing E-government Service Quality", and Wang's "online service trust model" considered for deriving the indicators for measurement. Other researchers also used these models or part of it in different contexts and empirically tested it in those different contexts. So, the measurement items used in present study derived from different information system, computer science, and e-government literature, and they will be tested in the e-government context.

4.7.2 Specifying the Domain of the Construct

Researcher needs to specify the domain of the construct. Literature review provides the bases for identifying the variables, all variables to be defined in this model. Some of the definitions may be adapted directly. For others; however, some changes need to be incorporated to fit within the context.

4.7.3 Generation of Item Scales

In this stage, measurement items for each constructs including system quality, information quality, service quality, citizens' use, citizens' satisfaction, citizens' trust, perceived e-government service quality, and perceived effectiveness of e-government services would be identified.

4.8 Data Analysis

As previously stated that quantitative data was collected through surveys so next step was to carry out the analysis of quantitative data using various statistical techniques. Following the guidelines of Creswell (2003) about quantitative data analysis, it was analysed by first determining the number of valid and invalid responses and then by building a descriptive analysis about the research variables. Second stage of quantitative data analysis, as prescribed by Creswell (2003) involved testing the proposed framework through identifying the statistical procedures as well as the reliability and validity approaches. Hair et al., (2006; 2010) described in quantitative data analysis two parts which involve: (i) descriptive statistics to obtain a descriptive overview of data, and (ii) hypothesis testing using statistical testing methods (e.g. SEM). Data analysis followed two major stages. After descriptive statistics the first stage involves the measurement model which was estimated using confirmatory factor analysis to test whether the constructs possessed reasonable validation and reliability. To ensure data validity and reliability, internal consistency, convergent validity, and discriminant validity were conducted. Second, was the structural model that best fitted the data identified, and the hypotheses were tested between constructs in the proposed model (Hair et al. 2006).

4.8.1 Descriptive Statistics

In order to get a descriptive overview of the data, descriptive statistics is applied. Descriptive statistics is used to perform data examination which is an initial step in any quantitative analysis. Initial data examination requires screening the data; handling missing data; cleaning and coding the data; and testing the assumptions. Descriptive statistics is a quantitative index that describes the performance of sample (Hair et al., 2010). According to Hair et al., (2010) prior to analysing the data, researchers should examine the data normality, consistency, and completeness. Descriptive statistics contains main indicators including frequency distribution, measure of central tendency (e.g. mean, median, and mode) and measure of dispersion (e.g. standard deviation, variance). The use of frequency distribution indicates how the scores of individual respondents are distributed for each of the variables (Janssens et al., 2008). The measure of central tendency helps a researcher to summarize the characteristics of a variable in one statistical indicator to obtain a better understanding (Hair et al., 2007). Further, the range of the standard deviation and variance is used to measure the dispersion. According to Hair et al. (2006) normality is the assumption about the degree to which the distributions of the sample data correspond to a normal distribution. Normality of the variable's data could be read from the standard deviation. When the standard deviation (S.D. <1) then, it indicates normality. Measuring the value of skewness, and kurtosis also confirm the normality of data. According to Hair et al. (2010), the range of acceptable limits for skewness and Kurtosis is from - 2.58 to + 2.58.

Hence, descriptive statistics have been conducted to determine whether the data is normally distributed and the results of descriptive statistics are presented in chapter 5. SPSS 20 program was used for serving this purpose due to its powerful features in producing descriptive statistics such as variety of variable types, and easy process in coding variables.

4.8.2 Structural Equation Modeling

According to (Hair et al., 2006), quantitative data analysis needs initially to perform descriptive statistics to obtain a descriptive overview of data, and later statistical tests to perform hypothesis testing.Structural equation modeling (SEM) has become an increasingly popular tool for researchers to assess and modify theoretical models (Gefen et al., 2000). SEM technique has significant potential for assessing and modifying theoretical models which further has become an important and widely acceptable research tool for theory development in the information system (IS), social and behavioral science researches (Roberts and Grover, 2009). SEM enables researchers to accomplish a single, systematic and comprehensive analysis by modeling relationships among multiple independent and dependent variables simultaneously (Kline, 2005). SEM techniques are especially powerful in that they enable researchers to test complete research models. It allows researchers to model higher order latent variables that have motivated many researchers in the IS field to use it for measuring constructs and developing and testing IS theories (Roberts and Grover 2009).

SEM consists of two parts: (i) the measurement model, which links observed variables to latent variables via a confirmatory factor analysis (CFA) and (ii) a structural model (SM), which links latent variables to other observed variables via simultaneous equations and uses maximum likelihood estimation as an estimation of the model parameters (Hair et al., 2006; Byrne, 2010). SEM allows complex relationships between observed and unobserved variables which are two basic types of variables (Kline, 2011; Hair et al., 2010). An observed variable is regarded as a measured or manifested variable that can be measured relatively easily while unobserved variables are termed as latent factors or constructs and are not directly observable (Kline, 2011). According to SEM latent variables are theoretical and hypothetical constructs should be determined if a theoretical model is supported by the data collected (Kline, 2011; Hair et al., 2010)

Figure 4.2 depicts the sequence of activities that are needed to conduct effective SEM analysis suggested by (Kline, 2005; Hair et al. 2006) includes (i) model specification, (ii) data screening, (iii) model estimation and assessment, and (iv) model re-specification.

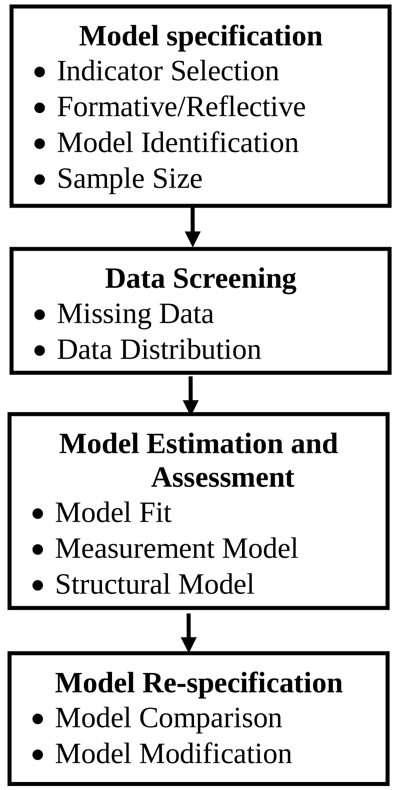


Figure 4.2 Methodological Stages of SEM Analysis

(Source: Roberts and Grover, 2009)

Roberts and Grover (2009) mention in their study that the use of SEM is steadily growing up and its application is evenly distributed in three prestigious IS research journals including Information Systems Research (ISR), Journal of Management Information Systems (JMIS), and MIS Quarterly (MISQ), which is evident that using SEM for information system research specifically for quantitative data analysis is an appropriate choice.

4.9 Measurement Model

Confirmatory factor analysis is an essential procedure to validate the measurement model before proceeding to the structural model. This process is essential to clear the model of poor loadings and establish the constructs validity for the successful structural model analysis. To accomplish the analysis of measurement model, Hair et al., (2006) recommended assessment of measurement model overall fit and later reliability (composite reliability) and validity criteria including convergent validity and discriminant validity of the measure should be established. Section 4.10 addresses the instrument's validity criteria.

4.9.1 Confirmatory Analysis

Confirmatory factor analysis (CFA) is a technique to confirm a pre-specified relationship of observed measures. This helps a researcher find out the degree to which different assumed variables correctly measure a certain factor. Confirmatory factor analysis is used to validate an instrument (Janssens et al., 2008). The purpose of confirmatory factor analysis is to identify a small number of factors and each factor is explained by the variable, in part by its path loading. CFA combined along with the construct validity tests to provide researcher a better understanding of the quality of the measures (Hair et al., 2006; 2010). According to Moore, (2012) CFA is precursor of structural equation modeling that deals specifically with measurement models and presents the relationships between observed measures or indicators (e.g., test items) and latent variables or factors. Further, CFA allows the researcher to test the hypothesis that a relationship between the observed variables and their essential latent construct exists and uses this approach to test a proposed theory or model. CFA is a technique to confirm a pre-specified relationship of observed measures. Confirmatory factor analysis is used to validate an instrument and helps a researcher find out the degree to which different assumed variables correctly measure a certain factor (Janssens et al., 2008). According to Janssens et al. (2008) all of the latent variable measures must have a high loading (>.50) and must be significant (critical ratio-C.R. = t-value > 1.96).

In the present study, confirmatory factor analysis was used to determine factor structure with empirical support. After conducting the confirmatory factor analysis for each construct, the full measurement model was developed with all constructs to estimate the relationship between latent variables. The measurement model draws covariance between all variables and estimates how well the scale items contribute together towards a relationship between the variables. Measurements assessment model is assessed in terms of validity including convergent validity and discriminant validity. Convergent validity is shown when each measurement item correlates strongly with its proposed constructs (Gefen, et. al., 2005). Next, is to assess overall fits for the model (Hair, et al., 2006).

4.9.2 Measurements of Model Fit

Evaluation of model fit in SEM is not as simple as it is in statistical approaches based on variables measured without error. There are several varied fit measures as multiple criteria used to verify to what degree the hypothetical model can fit to the data; hence, for each estimation procedure, a large number of goodness-of-fit indices are provided to determine whether the model is consistent with the empirical data (Hair et al., 2006). The choice of the fit indices estimation depends on the type of data included in the model. Model fit determines the degree to which SEM fits the sample data. The objective of any fit indicators is to assist the researcher in discriminating between acceptably and unacceptably specified models (Hair et al., 2010; Kline, 2011).

4.9.3 Overall Model Fit

In order to determine whether the model adequately represents the set of causal relationships, the research must assess overall fits for the model and this is done through assessing goodness of fit (GOF) measures (Hair et al., 2010).

The Chi-square ($\chi2$) is typically used as a test of overall model fit in SEM and ($\chi2$) value is an indicator of how well the data fits the model (Hair et al, 2010). However, it is sensitive to sample size which means that the Chi-Square statistic nearly always rejects the model when large samples are used (Jöreskog and Sörbom, 1993). On the other hand, where small samples are used, the Chi-square statistic may not discriminate between good fitting models and poor fitting models. Due to the sample size dependency of the Chi-square, researchers have sought alternative indices to assess model fit (Hooper, 2008). In such situation $\chi2$ is used as an alternative measure to moderate the sample size by dividing Chi-square by the degree of freedom ($\chi2$/df) where the value <3.0 is an indicator of better fit (Kline, 2011).

There are variety of fit indices measures anticipated in the literature to evaluate the relative fit of the data to the model. These GOF may be categorised as absolute fit measures, incremental fit measures and parsimonious fit measures (Kline, 2011; Hair et al., 2010). However, there is no agreement among researchers on a particular set of measures of model fit for the SEM (Hair et al., 2010). Kline (2011) suggests a minimum collection of fit indices types when reporting findings: (i) Chi-square ($\chi2$) test statistic with corresponding degrees of freedom and level of significance; (ii) root mean square approximation (RMSEA); (iii) standardised root means square residual (SRMR); and (iv) comparative fit index (CFI). Further, Hair et al. (2006) also recommended thatusing three to four fit indices provides adequate evidence of model fit.

Table 4.7 illustrates the types of GOF indices used in the present study.

Table 4.7 Model fit indices for Goodness of Fit

Model Fit Measurements		
Fit Indices	**Range**	**Reference**
	Absolute Fit Measure	
Chi – Square Symbol (χ2)	The (χ2: df) rule of thumb, the higher the number (> 5.00) is poor model fit Lower the number (< 3.00) better the model fit	(Kline, 2011 Byrne, 2010;Jöreskog and Sörbom, 1993)
Root Mean Square Error Approximation (RMSEA)	Value(<.06) Good model fit value (>=.08 &<=0.10) Reasonable fit Value(>.10) Poor fit	(Hair et al., 2010)
Goodness of Fit Index (GFI)	Values (≥.90) Good model fit	(Hair et al., 2010)
Standardised Root Means Square Residual (SRMR) / Root Mean Square Residual (RMR)	(≤ .08) Good model fit	(Kline, 2011)
	Incremental Fit Measures	
Comparative Fit Indexes (CFI)	(≥ .90) Good model fit	(Hu and Bentler, 1999)
Tucker–Lewis Index (TLI) Normal Fit Index (NFI)	(≥ .90) Good model fit (≥ .90) Good model fit	(Kline, 2011; Hair et al., 2010) (Kline, 2011; Hair et al., 2010)
	Parsimony Fit Measures	
Adjusted goodness of fit (AGFI)	(>0.90) Good model fit	(Byrne, 2010)

(*Source*: Adapted from Hair et al., 2006)

4.10 Instrument Validation

Straub et al. (2004) specify that reliability and construct validity are mandatory validities for instrument measurement. While reliability is an issue of measurement within a construct whereas construct validity has to do with measurement between constructs. To achieve the validity of assessment instruments, results should reliable and valid for study. Thus, reliability and validity should be examined for each measures of assessment instrument used to measure study outcomes.

4.10.1 Instrument's Reliability Analysis

According to Hair et al., (2003), "*Reliability is an assessment of the degree of consistency between multiple measurements of a variable*". In other way reliability is used to evaluate the internal consistency of a construct. Internal consistency refers to the ability of a scale item to correlate with other items in the scale that are intended to measure the same construct. Reliability indicates the consistency of the research findings widely used to measure reliability as internal consistency of the entire scale. Coefficient alpha which is also known as Cronabch's alpha is considered as the most common method of assessing internal consistency for reliability estimate (Hair et. al., 2006). Reliability measures the degree to which a set of indicators of a latent construct is consistent internally in their measurements (Hair et al., 2010). Reliability estimate (0.70) or higher is considered as good reliability specifically in the case of assessment of instrument's quality, whereas reliability between 0.60 and 0.70 may be acceptable provided that other indicators of a model's construct validity are good. However, the lowest acceptable limit for Cronbach's coefficient (α) is .0.70 but in some cases 0.60 is also acceptable (Hair et al., 2006). A commonly acceptedrule for describing internal consistency using Cronbach's alpha is given in the below table 4.8.

Table 4.8 Cronbach's Coefficient (α) for internal consistency

Cronbach's alpha	Internal consistency
$\alpha \geq 0.9$	Excellent
$0.7 \leq \alpha < 0.9$	Good
$0.6 \leq \alpha < 0.7$	Acceptable
$0.5 \leq \alpha < 0.6$	Poor
$\alpha < 0.5$	Unacceptable

(Source: Adapted from Cortina, 1993 & Hair et al., 2006)

Another test of reliability can be determined on the basis of composite reliability. For every latent variable, composite reliability must be calculated manually. For composite reliability, the guideline is that the value should be higher than 0.70 (Janssens et al., 2008). Composite reliability can be calculated using the following formula (Hair et al., 1998):

Composite reliability =

(∑ standardized loadings) 2 / {(∑standardized loadings) 2 + ∑ measurement errors}

Or

(Square of the summation of the standardized factor loadings) /

{(square of the summation of the standardized factor loadings) + (summation of error variables)}

Cronbach's alpha and composite reliability both are used in the present research.

4.10.2 Instrument's Validity Analysis

According to Hair et al., (2007), "*Validity is the extent to which a construct measures what it is supposed to measure*". In the scientific research, the degree of validity and reliability of the behavioural measures must be assessed, simultaneously validation concept provides a high degree of assurance about positivist methods which is useful for scientific precision (Straub et al, 2004). Validity analysis includes content validity, construct validity, convergent validity and discriminant validity approaches can be used to assess instrument's validity (Hair et al., 2007). This analysis will be useful for the validity of the framework particularly in validating the contents and construct.

4.10.2.1 Content Validity

In content validity, it is required to check whether the developing instrument's items associate with the identified domain of content or not. This approach assumes that researcher has a good detailed description of the content domain. In other ways, content validity of a scale asks whether the scale items are truly measuring what they are supposed to measure (Hair et al, 2007). After thorough literature review, number of constructs along with the items in each construct has been proposed for the framework E-GEEF. In order to ensure content validity, all the items that measure each construct were mainly adapted from previous research works (Wang and Liao, 2008). Experienced e-tax payers in India along with experienced researchers reviewed the items and constructs and finally published in ICDS conference and in a journal too.

4.10.2.2 Construct Validity

Construct validity refers to the extent to which an instrument measures what it is supposed to measure. This means that construct validity explains how well researcher translated or transformed a concept, idea, or behaviour of a construct into a functioning and operating reality which is called operationalisation (Trochim, 2006). Construct validity measures the hypothetical constructs under investigation (Kline, 2005). Such type of validity is related to the accuracy of the measurement in order to assure that item measures taken from a sample are representative of the actual factual score obtained from the population (Hair et al., 2010). Construct validity encompasses discriminant validity and convergent validity; further, the test of both validity should be carried out for the assessment of construct validity (Hair et al. 2010).

4.10.2.2.1 Discriminant Validity

Discriminant validity is the extent to which a construct is truly distinct from other constructs (Hair et al., 2006). Fornell and Larcker, (1981) suggested that the square of the correlation between two constructs should be less than their corresponding average variance extracted (AVE). In other way by comparing AVE values for any two constructs with the squared correlations estimate between these two constructs, the squared correlations should be lower than the AVE by a construct (Hair et al., 2010).

4.10.2.2.2 Convergent Validity

In IS research, measures must exhibit both convergent and discriminant validity. According to Janssens et al., (2008) convergent validity indicates the degree to which two different indicators of a latent variable confirm one another. Convergent validity exists when measures of the same concept have similar patterns of correlations with other variables (Weisberg et al., 1996). Fornell and Larcker, (1981) recommended the three criteria for establishing convergent validity. (i) All indicator factor loadings should be significant and exceed 0.707 (Gefen and Straub, 2005; Straub et al., 2004) but Hair et al., (2006) suggest factor loading >=0.60.
2004) (ii) Second is construct/composite reliabilities should exceed by 0.70, and (3) third is average variance extracted (AVE) by each construct should exceed by 0.50. Average variance extracted (AVE) can be calculated as {sum of (standardized loadings squared)} / {sum of (standardized loadings squared) + (sum of indicator measurement errors)}.

Hair et al., (2006) suggest different ways to determine convergent validity. (i) Critical ratio >1.96 is the first condition to confirm convergent validity in factor loading. (ii) Second important condition which confirms convergent validity is all standardized regression coefficients should be more than 0.50.

Table 4.9 shows the criteria suggested by various researchers for convergent validity.

Table 4.9 Criteria for convergent validity

Convergent validity criteria	Guideline	Source
Item/factor loading	>=0.60	Bradley et al., (2006); Hair et al., (2010)
Composite reliability	>=0.70	Hair et al., (2010)
Average Variance Extracted	>=0.50	Hair et al., (2010)
Cronbach Alpha Coefficient	>=0.70	Gefen and Straub, (2005)
Critical Ratio (t-value) for outer loading	>=1.96	Gefen and Straub, (2005); Hair et al., (2010)

4.11 Structural Model Assessment

Once the validation of measurement model is established then next step is to proceed to test and validate the structural model in order to evaluate the hypothesized relationships. Basically, structural model links the latent variables together (Kline, 2011). Using overall fit indices the overall fit structural model is evaluated. Later step involves the hypothesized dependence relationships in the proposed model which includes examination of standardized path coefficients, p-values, and variance explained for each equation (Wang and Liao, 2008). Structural model is tested to evaluate the inter relationship of the constructs and can be evaluated by the following two criteria.

a. The ability to explain variance in the dependent variables.

b. The significance of path coefficient

An estimate of variance explains the dependent variables provided by square multiple correlations (R^2) of the structural equation of the variables. (R^2) estimates how much of variability of a dependent variable is explained by independent variable (Hair et al., 2010)

4.12 Data Storage and Disposal

It has been stated before that data collection was done in the form of questionnaire and survey from the citizen's, and there was no violation of any copy right act. Since, the nature of e-government study includes (G2C) interaction so here the opinion of those citizens' was taken into the consideration that who has been using e-tax services. Simultaneously India e-tax service Website was studied thoroughly to obtain the e-tax filing procedure and associated e-tax documents. These documents are available for e-tax payers which any Indian citizen can download without any permission. These documents partially helped in designing the questionnaire and to know the present status of offered e-service functioning. Collected data has been stored at secured place. Once the use of data is over, it will be disposed off. All ethical concerns are related to the project carefully and it is carries out in a professional and ethical way.

4.13 Summary

The ultimate aim of the research methodology is to undertake a systematic and relevant research into the phenomena under investigation. Hence, the aim of this chapter was to provide an appropriate research methodology for the purpose to generate body of knowledge concerning to the research problem addressed. This chapter has provided an outline of the research methodology which was opted from the various alternatives available for carrying out the research. It also justifies the selection of the specific approach, strategy and methods applied. The methodology was based on positivism along with deductive approach for theory testing.

In order to achieve the research aim and achieve the objectives, the current scientific study focuses on measurement techniques to measure the effectiveness of e-government services from the citizens' perspective. Variables for the proposed framework E-GEEF were identified after thorough review of literature and specifically from DeLone and McLean, (2003) IS system success model and applied in the context of e-government. The proposed empirical research followed quantitative approach which was found suitable for answering the "what" and the "how" research questions. Survey method was applied for primary data collection. Structural equation modeling (SEM) technique was found suitable for testing the hypotheses and to confirm the proposed framework. Data was coded and analysed using two software packages: SPSS 20 and AMOS 21.

The next chapter shows the complete empirical analysis utilizing the analysis techniques addressed in research methodology chapter.

CHAPTER – 5

Data Analysis and Findings

The aim of this chapter is to illustrate that how the proposed framework E-GEEF is validated and the associated constructs supported the hypotheses. The illustration also shows that how the use of the framework may assist government agencies in defining the effectiveness evaluation criteria for e-government services evaluation. The analysis of collected data is being carried out in this Chapter. This Chapter commenced first with preliminary qualitataive study of Indian e-tax service from the citizens' perspective. Next stage included descriptive statistics and then, for the proposed scale refinement, each construct were assessed by means of confirmatory factor analysis. An instrument's validity analysis was accomplished for the proposed scale / instrument. Subsequently, structural equation modeling (SEM) technique was applied for hypotheses testing. Finally confirmation of proposed framework was accomplished using structural model fit method through AMOS 21. Figure 5.1 shows the schema of quantitative analysis. The chapter is presented in different sections:

- **Section (5.1):** Preliminary Qualitative Study
    - 5.1.1 Interviews for Preliminary Study
    - 5.1.2 Archival Records
- **Section (5.2):** Quantitative Data Analysis
- **Section (5.3):** Participants Profile
- **Section (5.4):** Data Cleaning and Preparation
- **Section (5.5):** Missing Values
- **Section (5.6):** Assessing Normality
    - 5.6.1 System Quality
    - 5.6.2 Information Quality
    - 5.6.3 Service Quality
    - 5.6.4 Citizens' Use
    - 5.6.5 Citizens' Satisfaction
    - 5.6.6 Citizens' Trust

5.6.7 Perceived E-Government Service Quality

5.6.8 Perceived Effectiveness

5.6.9 Histogram for Data Normality

- **Section (5.7):** Exploratory Factor Analysis
- **Section (5.8):** Reliability of Measurements' Constructs
- **Section (5.9):** Structural Equation Modeling

5.9.1 Confirmatory Factor Analysis (CFA)

5.9.1.1 CFA for System Quality

5.9.1.2 CFA for Information Quality

5.9.1.3 CFA for Service Quality

5.9.1.4 CFA for Citizens Use

5.9.1.5 CFA for Citizens' Satisfaction

5.9.1.6 CFA for Citizens Trust

5.9.1.7 CFA for Perceived E-government Service Quality

5.9.1.8 CFA for Perceived Effectiveness

5.9.2 Measurement Model Fit (with all constructs)

5.9.2.1 Goodness-of-fit (GOF) indices of proposed model

5.9.2.1.1 First Round Simulation for Model Fit

5.9.2.1.2 Second Round Simulation for Model Fit

5.9.2.1.3 Third Round Simulation for Model Fit

5.9.2.1.4 Fourth Round Simulation for Model Fit

5.9.2.1.5 Fifth Round Simulation for Model Fit

5.9.2.1.6 Proposed Revised Measurement Model Overall Fit

- **Section (5.10):** Reliability and Validity Analysis of Measurement Model

5.10.1 Constructs' Reliability

5.10.2 Constructs' Validity

5.10.2.1 Convergent Validity

5.10.2.2 Dicriminanat Validity

- **Section (5.11):** Structural Model and Hypotheses Testing
- **Section (5.12):** Proposed Modified Framework E-GEEF
- **Section (5.13):** Summary

5.1 Preliminary Qualitative Study

Data analysis is divided in two parts. First part includes preliminary study of Indian e-tax service by conducting few interviews with Indian e-tax paying citizens to know the present status of offered e-tax service and to know whether the chosen measurement items are relevant to the proposed framework. This study is qualitative in nature. Second part of the study is the validation of the framework E-GEEF which followed quantitative analysis.Several ways can be used to perform preliminary qualitative study. Combination of resources can be used for the collection of data. These include: interviews, archival records, documents, and direct observations (Creswell, 2009; Yin, 2009). For the present study, two approaches are adopted for qualitative study which includes interviews and archival records.

5.1.1 Interviews for Preliminary Study

In the initial stage of this study, the researcher conducted a preliminary qualitative study by conducting 10 interviews with Indian citizens paying their e-tax. The aim of the interview was to reveal the citizens' perception about Indian e-government e-tax service and to understand the e-government e-tax service status appropriately in the context of India. Further, interviews helped in confirming the appropriateness of identified measurement items which were proposed in E-GEEF from systematic literature review. After reviewing the literature, a framework E-GEEF has been developed. A total of eight dimensions and 46 measurement items were chosen from existing literature. Conducted interviews decided whether the items selected for the E-GEEF from literature were within the context of e-government e-tax service or not. Hence, these conducted interviews ensured that:

- All important dimensions and measurement items were included in the proposed framework.
- All the dimensions identified in the framework are applicable to the right context, as most of them were considered from information system and e-commerce literature.

Qualitative data analysis relied mainly on a content analysis, so transcribed interviews and archival records were examined carefully and relevant information was extracted for the study. Conducted preliminary study in this thesis is partially exploratory. However, the core part of analysis is the validation of the framework which followed quantitative analysis technique.

Appendix A shows the interview questions. Table 5.1 shows the results of preliminary qualitative study.

Table 5.1: Preliminary qualitative study and resultsmapping with E-GEEF

#	Questions	Yes	No	Needs Improvement	Remarks	Components	Mapping with E-GEEF
1	Do you have awareness of available online e-tax filing service?	√				Awareness	√
2	Do you always use Indian e-tax service and file your taxes online?	√				Use	√
3	Does the available internet speed support quick access to e-tax service online?			√	Connectivity depends on area	Accessibility	√
4	Can you access e-tax service system through website from any location?	√			Depends on Internet speed	Flexibility	√
5	Does e-tax service system available at any time for use?	√				Availability	√
6	Do you find that offered e-tax system is easy to use but needs lots of technical understanding while using.	√			Needs technical understanding	Ease of use	√
7	While using e-tax service website, can you easily move from page to page?	√				Navigation	√
8	Do find that e-tax service system offers all operational functions at e-tax web service portal?	√				Functionality	√
9	Do you find a reliable network to access e-tax service?			√	Not always	Network reliability	√
10	Does e-tax web service system works continuously without any interruption.	√			Improved in past few years	Continuity	√
11	Does e-tax service website update the web pages for any announcement?	√				Update	√
12	Does e-tax service website provide the latest and satisfactory information for the citizens?	√				Up-to-date information	√
13	Do you find error free information on the e-tax website?	√				Accuracy	√
14	Do you find information available on time at e-tax website?	√				Timeliness	√
15	Do you find precise information on e-tax service			√		Preciseness	√

#	Questions	Yes	No	Needs Improvement	Remarks	Components	Mapping with E-GEEF
	website?						
16	Do you find significant information through e-tax web service?	√				Significance	√
17	Do you fully trust on the information available through e-tax web service?			√	Sometimes avoid filing online e-tax	Trustworthiness	√
18	Do you consider that offered e-tax service maintains transparency?	√				Transparency	√
19	Is there any help videos or steps available for using the e-tax web service.		√			User training	
20	Does e-tax website provide linkage to other departments and ministries through e-tax web service portal?		√			Integration	√
21	Do think that e-tax website provides reliable service to their citizens?	√				Reliability	√
22	Do you receive prompt response of any inquiry you make through e-tax service?		√		Needs to visit e-tax office for clarifications	Responsiveness	√
23	Do you find e-tax service web site is interactive?			√	Needs improvement	Interactivity	√
24	If any transaction goes wrong then e-tax service offer online provision to rectify the transaction issues		√		Many times need to visit the e-tax office	Online support	√
25	Are citizens able to access online documents related to issues currently being decided?			√	On request	Documents availability	√
26	Do you use e-tax service on regular basis?	√				Frequency of use	√
27	Do you find e-tax service useful for filing e-tax?	√				Usefulness	√
28	Do you know how to use e-tax service and file your e-tax?	√				Awareness of usage	√
29	Do you find easy to perform number of transactions at any time.	√			Depends on Internet speed and area	Easy to use	√
30	Do you wish to continue the use of e-tax service for	√				Intension to use	√

#	Questions	Yes	No	Needs Improvement	Remarks	Components	Mapping with E-GEEF
	future transactions?						
31	Do you find all valuable information from e-tax service which gives you satisfaction with e-tax service?			√	Not always	Value	√
32	Do you experience sense of confidentiality while using e-tax service?	√				Confidentiality	√
33	Are you satisfied with the information being provided through e-tax service?			√	Identification of relevant information some time found difficult	Satisfaction	√
34	Do you find yourself fully satisfied with e-tax service systems?			√	Offer e-tax service could be simplified more	Satisfaction	√
35	Do you think that offered e-tax service is well organized?			√	Could be organized in more appropriate manner	Structured	√
36	Do you have reasonable trust in offered e-tax service?			√	Some time feeling of distrust occurs	Trustworthiness	√
37	Do you find reasonable level of security while performing transaction through e-tax service web site?	√				Security	√
38	Do you find privacy of your personal information at e-tax service website?	√				Privacy	√
39	Do you finish your e-tax filing work in minimum amount of time?				Depends on Internet connectivity	Timeliness	√
40	Do you think that the offered e-tax service gives speedy response while using.	√				Responsiveness	√
41	Do you find any ambiguity in the offered e-tax service?		√			Ambiguity	√
42	Any time you feel distrust while using e-tax service?				Some time	Distrust	√
43	Do you think that you receive the excellent quality of e-tax service?			√	Could be improved	E-tax service quality	√

#	Questions	Yes	No	Needs Improvement	Remarks	Components	Mapping with E-GEEF
44	Do you think that citizens receive high quality of information through e-tax service web?			√	Could be improved	High quality	√
45	Do you find that the e-tax service is reliable and available consistently in trustworthy manner?	√			Could be improved	Trustworthiness	√
46	Is there any feedback mechanism system available in e-tax service website by which the citizens can provide feedback after using online e-tax service?	√				Feedback	
47	Do you think that any improvement is required in offered e-tax service?	√			Could be made more interactive and user friendly		
48	Do you think that offered e-tax service is risk free in all the aspects?			√	Citizens' fear while using e-tax service may be eased by building confidence in them, which will enhance trust in offered e-tax service.	Risk free service	√
49	Is there any provision for monitoring and evaluation of e-tax service and its effectiveness?		√			Service evaluation	√
50	Has the e-government made any efforts to improve e-tax service efficiency?	√				Service efficiency	√
51	Do you find the e-tax service effective and fulfill your requirements?	√			Effectiveness may be increased	Service Effectiveness	√

- *Framework E-GEEF which was proposed in Chapter 3 with 48 measurement items and 8 dimension.*
- *This preliminary study included the interviews with 10 India e-tax payers to know about the present status of e-tax service and how citizens perceive.*
- *Preliminary qualitative study shows that the content analysis of transcribed interviews confirmed the appropriateness of all measurement items chosen for E-GEEF.*

5.1.2 Archival Records

Reviewing the archival records existing in e-tax service website particularly related to the usage of e-tax service by Indian citizens was found helpful. This helped in understanding the usage pattern of citizens visiting the organisation's website. Number of archival records has been studied carefully which are available at India e-tax filing website and finally the e-tax service growth in terms of citizens' usage was summarized in Table 5.2. Table 5.2 shows the summary of these archival records related. According to Directorate of Income Tax (https://incometaxindiaefiling.gov.in), the process of electronically filing income tax returns through the internet is known as e-Filing. Initially, e-filing of income tax was introduced in September, 2004 for the citizens to file their taxes on voluntary basis as it was under trial. But from July, 2006, it was made mandatory for all corporate firms to e-file their income tax returns. Further, from assessment years 2007 to 2008, e-filing of income tax return was made mandatory for all companies and from 2013 individuals having more than one million Indian rupee earnings per annum were made mandatory for filling income tax online. E-filing is a system for submitting tax to the income tax department through the internet, usually without the need to submit any paper document. Tax return preparation software with e-filing capabilities is available which can be accessed through website or e-tax filing professionals. E-filing is the term for electronic filing, or sending ITR (income tax return) from tax software via the Internet to the tax authority. Various types of ITR are available based upon the nature of taxes.

Out of 1.25 billion population of India only 35 million citizens pay their taxes. Every year in the month of March, every Indian taxpayer has to file his tax. Table 5.2 shows that the growth rate of e-tax payers from year 2010 to 2016 was 44.92%, 23.15%, 27.60%, 13.14%, and 21.15%. This growth chart shows that initially e-tax payers were motivated to file online e-taxes but there was a sharp decline in the growth rate. This clearly indicates that the online e-tax payers ratio is relatively low hence in-depth empirical research is needed for assessing the effectiveness of offered e-tax services and citizens' trust in Indian e-tax services.

Table 5.2 shows the comparison between the three years trend of tax payers' participation in paying their online e-taxes.

Table 5.2: Summary of archival records of e-tax filing statistics in India

S.N.	Form	FY (2010-11) (01/04/2010 to 31/03/2011)	FY (2011-12) (01/04/2011 to 31/03/2012)	FY (2012-13) (01/04/2012 to 31/03/2013)	FY (2013-2014) (01.04.2013 to 31.03.2014)	FY (2014-2015) (01.04.2014 to 31.03.2015)	FY (2015-2016) (01.04.2015 to 31.05.2016)
1	ITR-1	1983618	4439001	6409881	10676604	13010682	1,79,46,687
2	ITR-2 (Old)	1040281	1773659	2240995			22,36,078
3	ITR-2 (New)						-
4	ITR-2A				3213262	3614874	11,74,205
5	ITR-3 (Old)						8,88,598
6	ITR-3 (New)						-
7	ITR-3	327409	522579	625890	721831	769081	
8	ITR-4S	0	1628312	2947568	4250709	5450081	81,35,210
9	ITR-4	4552028	6712032	7772966	9035055	9343539	
10	ITR-4 (Old)						1,06,46,974
11	ITR-4 (New)						-
12	ITR-5	616007	765054	851327	960120	1065650	12,52,465
13	ITR-6	530899	593047	638184	713736	752070	7,78,069
14	ITR-7	0	0	0	110477	168017	2,85,451
Grand Total		**9050242**	**16433684**	**21486811**	**29681794**	**34173994**	**4,33,43,737**
Growth (%)		**-**	**44.92%**	**23.15%**	**27.60%**	**13.14%**	**21.15%**

(Source: www.incometaxindiaefiling.gov.in)

5.2 Quantitative Data Analysis

After performing the preliminary qualitative study, the quantitative data analysis was carried out in this stage. Quantitative data analaysis is a core part which is used for the validation of the framework E-GEEF. Using quantitative data analyais various hypothesized relationships were also confirmed. Figure 5.1 shows the schema of quantitative analysis.

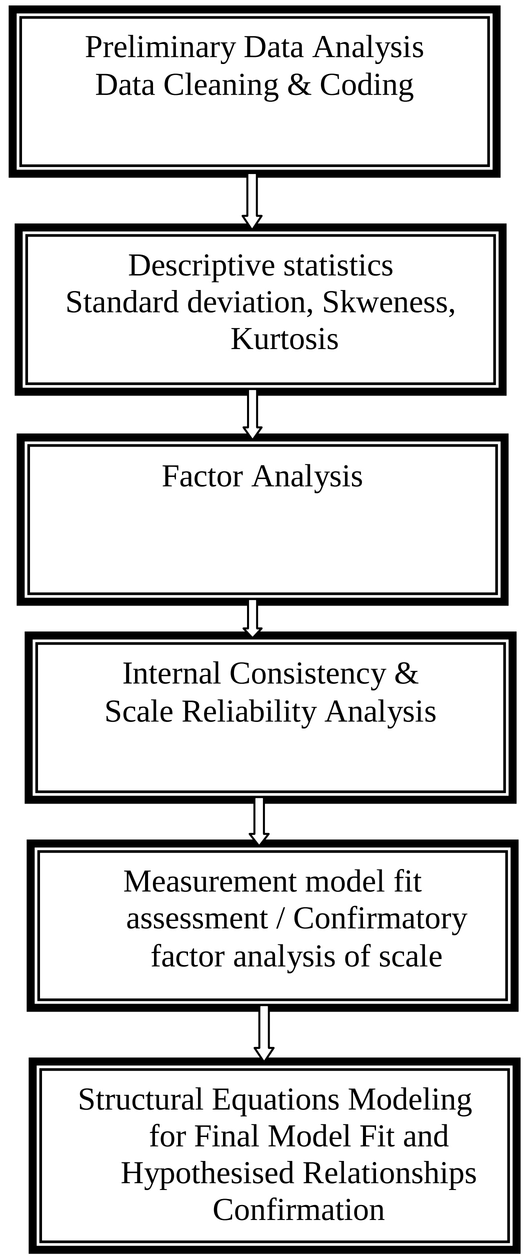


Figure 5.1: Schema of Quantitative Analysis

5.3 Participants Profile

This is the preliminary stage of data analysis which discusses participant and demographic profile of the country which was chosen to obtain the data for the present research.

Filing income tax online in India is a facility provided to the citizens but a mandatory process for employees and firms. Business / corporate houses file their taxes online by themselves or through income tax practitioners or by their in-house experienced professionals. There is a tremendous level of variation in the Indian society including variation in education, culture, age, and relation with technology. So the citizens’ experience of using online e-Tax services and filing their taxes is different from that of the corporate sector (Bhattacharya et al., 2012). In order to develop and evaluate the framework to determine the effectiveness of e-government e-tax service, the questionnaire was design and distributed to 550 Indian e-tax payers who file their e-taxes. Respondents of the survey were those participants who were Internet / Web savvy citizens and familiar with e-government transactions. 515 responds were found valid. Among 79.13% respondents were the male e-tax payers and 20.87% were female e-tax payers. Respondents were working in private and public sectors. From the received responses, it was found that 27 % respondents were between age of 30 and 40; 73% were between the age from 41 and 60 years.This meant that, out of 550 questionnaires, 515 utilizable responses were acquired and used for all consequent analysis. Obtained 93.63% response rate is considered a very good response rate within the field of IS research (Hala Al-Khatib, 2013).

Table 5.3 and figure 5.2 show the number of participants and percentages for the demographic variables.

Table 5.3 Respondents gender ratio

	Participants	Percent
Male	408	79.13%
Female	107	20.87%
Total	515	100.00%

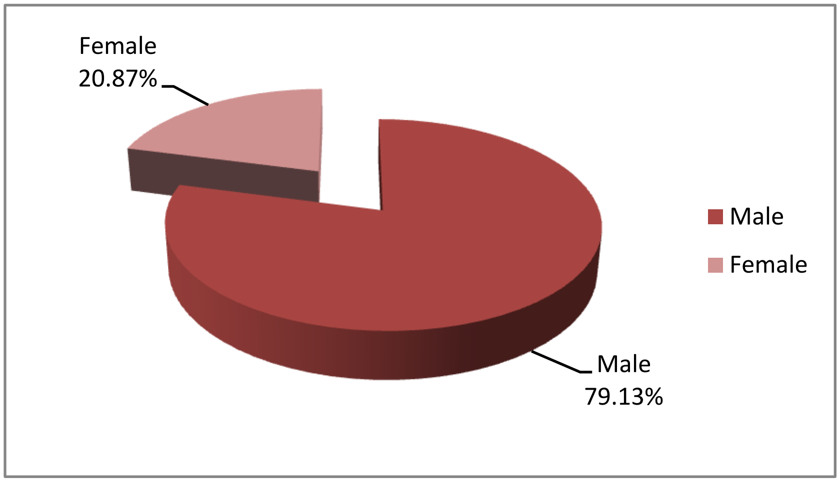


Figure 5.2: Respondents Gender Ratio

5.4 Data Cleaning and Preparation

Examination of the collected data is an initial step in any data analysis procedure which assures the researcher about the completeness and consistency of data prior to proceed for advanced analysis (Hair et al., 2010). Hence the preparation of data is an important step considered for the research. Collect the data, prepare code for data, set up structure of data, enter the data, and screen the data for errors are the steps for data preparation mentioned in various available SPSS manuals. Screening the data for identification and correction of errors was performed by using three main steps recommended by Pallant, (2010) includes checking for errors, locating the error in the data file, and correcting the error in the data.

As part of data preparation data screening and coding were important parts to ensure before proceeding to further statistical analysis. Right after the data collection, the next task was to prepare data file and decide how to code each question so that it can easily be seen which values should be entered into SPSS. Coding of data is a process to assigning a number to a particular response (Hair et al., 2010). Therefore, statistical values were allocated, related to the answers of questions on a questionnaire and organize the data on the data sheet using SPSS 20 to analyse the data. Each question from set of questionnaire was given variable name. These steps help the coding process to provide a permanent record of the coding of the dataset.

5.5 Missing Values

Missing values come up when information about any variable is missing during data collection. Many times it is observed that respondent while answering the questions in the questionnaire forgets to enter some values or entries of some sections (Hair et al., 2003). Such types of responses are usually considered as invalid or should be tackled using SPSS missing data utility. Carter, (2006) considers removing incomplete cases or discard records with missing data on any variable from the dataset. The method is simple and can be performed by discarding cases that are incomplete. If missing values are not extensive, then it is preferred to simply discard the respondents. If the large sample size is obtained then there is no problem in removing the records or delete the complete cases from the collected data (Hair et al., 2010). Multivariate analysis using SEM requires to have a complete set of data without any missing value otherwise missing data becomes a critical issue (Kline, 2011; Hair et al., 2010). As mentioned earlier that total number of responses after cleaning the data was 515. Considering the above arguments present study discards incomplete and missing responses from the collected data set and finally discarded responses were 3.26%. Theoretically, 10% elimination of the missing responses is acceptable (Hair et al, 2010).

5.6 Assessing Normality

According to Hair et al., (2010) normality assessment of the collected data is an essential step which needs to be followed prior to performing the advanced analysis such as SEM. Normality refers to the shape of the data distribution for each variable and confirm whether it is corresponding with normal distribution. Normality occurs when the individual variable or variables have normal shaped distribution. However, in SEM, a normality test is not mandatory, especially, when the sample size is large. In fact large sample size plays crucial role in promoting normality (Hair et al., 2010; Kline, 2011). Sample size in the present study is large enough 500 to avoid normality test but even normality test was performed to maintain appropriateness of data analysis.

To establish the normality of collected data whether the data is normally distributed or not, the descriptive statistics on data have been performed. Testing the assumption of normality usually involve obtaining the statistical tests such as skewness, kurtosis tests and visualizing the pie chart Skewness and kurtosis highlight any distraction occurs in the data. Skewness is a measure of symmetry whereas kurtosis is a measure of whether the data is peaked or flat relative to a normal distribution. Hence skewness and kurtosis tests are widely employed to test the normality (Hair et al., 2010). Consequently, normality of the data items was assessed by their skewness and kurtosis values obtained also assessed by visually examining the pie chart and the indices of skewness and kurtosis of acquired data items. According to Hair et al., (2010) the most commonly used value of skewness and kurtosis test ranges from – 2.58 to + 2.58. George and Mallery, (2010) suggest the range from – 2 to + 2 for skewness and kurtosis. Calculation of mean, standard deviations, skewness, and kurtosis were performed within descriptive statistics technique. These have been conducted to determine whether the normal distribution of data was achieved or not.

Below descriptive analysis includes the tables and pie chart which demonstrate the obtained results of mean, standard deviations, skewness and kurtosis. Normality assessment tests clearly indicate that the data distribution is found normal and within the specified range.

5.6.1 System Quality

The table 5.4 illustrates the obtained results of the descriptive statistics including standard deviation, mean, skewness, and kurtosis for each associated item assigned to evaluate the system quality construct. Accordingly the obtained values of skewness and kurtosis of various items within the system quality are within the range (- 2.58 to + 2.58). Observing the table, we do not obtain any item under the acceptable limits. Apart from that, we observe that the items record significant level of agreement from citizens at mean which is very close to value 4. Standard deviation which is measure of value around the mean is lower (Kline, 2011) which shows that no outliner cases exist.

Table 5.4: Descriptive statistics for system quality items

Descriptive Statistics					
	N	Mean	Std. Deviation	Skewness	Kurtosis
SysQ1	515	3.91	.773	-.294	-.345
SysQ2	515	3.90	.691	-.404	.562
SysQ3	515	3.98	.718	-.602	1.007
SysQ4	515	3.88	.793	-.319	-.341
SysQ5	515	3.91	.790	-.336	-.338
SysQ6	515	3.88	.729	-.423	.350
SysQ7	515	3.84	.734	-.275	-.115

To judge normality of the variable system quality as a whole, we constructed a summated scale composed of the items within the variable. The frequency table 5.5 and the pie chart of the resultant distribution appear below.

Table 5.5: Summated system quality

Descriptive Statistics					
System Quality	N	Mean	Std. Deviation	Skewness	Kurtosis
	515	3.89	.558	-.861	1.098

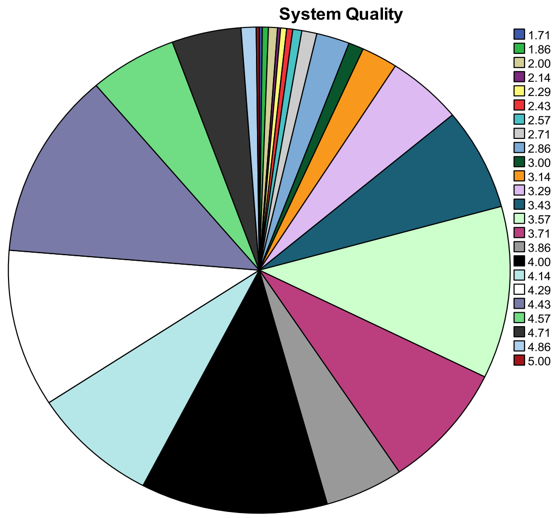


Figure 5.3: Frequency Distribution for System Quality

We can observe that the obtained mean score of the summated system quality is 3.89 along with a standard deviation 0.558. This is the indication of confirmatory response towards the items used in evaluating system quality. Pie chart illustrates that the majority of the values are gathered around 4. Obtained values of skewness and kurtosis are fit within the acceptable ranges. This indicates that data for the chosen system quality construct is normally distributed.

5.6.2 Information Quality

Table 5.6 illustrates the descriptive statistics for information quality construct calculated using seven items.

Table 5.6: Descriptive statistics for information quality items

Descriptive Statistics					
Valid	N	Mean	Std. Deviation	Skewness	Kurtosis
InfQ1	515	3.95	.754	-.347	-.195
InfQ2	515	3.84	.673	-.529	.678
InfQ3	515	4.01	.795	-.840	1.182
InfQ4	515	3.78	.787	-.366	-.182
InfQ5	515	3.78	.790	-.357	-.190
InfQ6	515	3.80	.741	-.323	-.041
InfQ7	515	3.80	.700	-.390	.245

The adequate limits of skewness and kurtosis for each items within the information quality construct appear in the above table. Overall, it appears that citizens inclined and agreed towards the items' questions framed to evaluate information quality. Means of all the items were found more than 3.75, and two items recorded a mean of above 4 (4.01) or very near 4 (3.95). No item recoded mean (< 3), indicating citizens' agreement towards information quality, but each item has shown varied degree of agreement. Neither skewness nor kurtosis values found above then the siginificant ranges for a normal distribution. Neither skewness nor kurtosis values were found above the significant ranges of normal distribution.

To judge normality of the variable information quality as a whole, we constructed a summated scale composed of the items within the construct. This summated scale of the items demonstrates an overview of the normality of information quality as a whole.

Table 5.7: Summated information quality

Descriptive Statistics					
Information Quality	N	Mean	Std. Deviation	Skewness	Kurtosis
	515	3.85	.562	-1.033	1.178

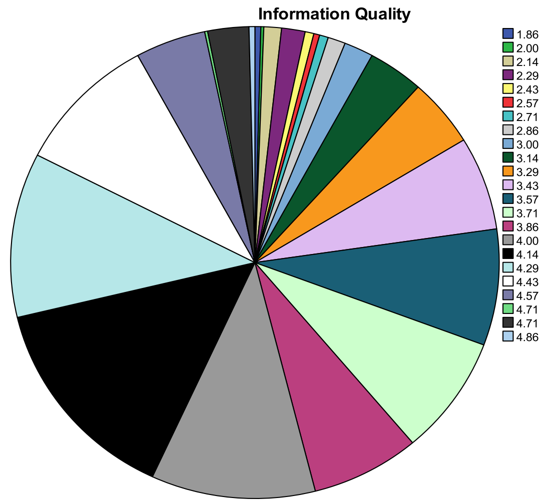


Figure 5.4: Frequency Distribution for Information Quality

The pie chart for information quality construct demonstrates that majority of citizens responded as “agree”, and fairly a good number of citizens confirm “strongly agree” to the item questions that measure information quality. Obtained low value of standard deviation 0.562 indicates greater adequacy of the data. Table 5.7 shows negatively skewed value but within the range. The distribution is normal with a negative skewed value (-1.033) shows left-skewness means the tail is little more stretched on the left side, indicates greater number of positive responses. Achived peak value of kurtosis at 1.178 is reasonably within the range and doesn not show an excessive deviation.

5.6.3 Service Quality

Table 5.8 illustrates the obtained results of descriptive statistics including standard deviation, mean, skewness, and kurtosis for each associated item assigned to measure the service quality construct. Mean values for each item represent the overall citizens’ agreement with the questions formualted to evaluate service quality construct which indicates a singinificant consensus. Most of the items’ mean was found close to the level of 4. Obtained values of skewness and kurtosis were found within adequate limits, where the skewness of all items is under the range; also the kurtosis value is well within range. These values do not indicate any diversion from the normal distribution of the data.

Table 5.8: Descriptive statistics for service quality items

Descriptive Statistics					
	N	Mean	Std. Deviation	Skewness	Kurtosis
SerQ1	515	3.89	.687	-.323	.190
SerQ2	515	3.90	.699	-.448	.407
SerQ3	515	3.94	.774	-.701	.915
SerQ4	515	3.89	.746	-.375	-.011
SerQ5	515	3.83	.730	-.566	.440
SerQ6	515	3.86	.729	-.466	.439
SerQ7	515	3.82	.718	-.284	-.014

Subsequently, to determine the normality of the service quality construct as a whole, we constructed a summated scale composed of the items within the construct.

The pie chart and descriptive statistics for service quality construct confirm the normal allocation of data on the summated scale. Most of the allocations are above 3.50 and falls in between 3.50 and 4.0, representing an overall constructive agreement The pie chart for service quality construct demonstrates that majority of citizens responded as “agree”, and fairly a good number of citizens confirm “strongly agree” to the item questions that measure information quality. Neither skewness nor kurtosis values were found above then the siginificant ranges for a normal distribution.Achieved peak value of kurtosis at 1.416 is reasonably within the range and does not show an excessive deviation which mainly occurs due to outliers values.

Table 5.9: Summated service quality

Descriptive Statistics					
Service Quality	N	Mean	Std. Deviation	Skewness	Kurtosis
	515	3.873	.558	-.998	1.416

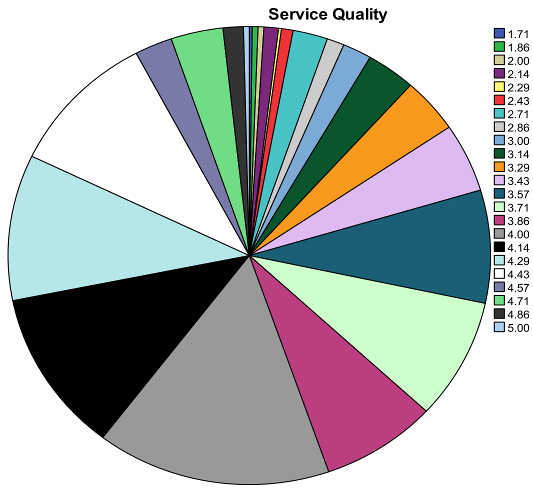


Figure 5.5: Frequency Distribution for Service Quality

5.6.4 Citizens' Use / Usefulness

Table 5.10 illustrates the obtained results of descriptive statistics including standard deviation, mean, skewness, and kurtosis for each associated item assigned to measure the construct citizens' use of government e-service.

Most of the mean values found above 3.7 are considered over the significant mean level, indicating citizens' compliance to the questions designed to determine citizens' use. The standard deviation (0.574) is found rational and indicates that there is a usual distribution of the data. Obtained values of skewness and kurtosis were found within the adequate limits. Thus, there is a strong level of agreement.

Table 5.10: Descriptive statistics for citizens' use items

Descriptive Statistics					
	N	Mean	Std. Deviation	Skewness	Kurtosis
CtU1	515	3.79	.741	-.182	-.260
CtU2	515	3.81	.728	-.533	.368
CtU3	515	3.77	.701	-.489	.363
CtU4	515	3.79	.774	-.272	-.251
CtU5	515	3.82	.687	-.432	.390

The pie chart and descriptive statistics for service quality construct confirm the normal allocation of data on the summated scale. Most of the allocations are above 3.7 and falls between 3.7 and 4.0 and peaked at 3.82. The mean lies at 3.77, and from the frequency distribution, we see that most of the frequencies occurred close to 4. Mean values for each item represents the overall citizens' agreement with the questions formualted to evaluate citizens' use construct which indicates a singinificant consensus. Obtained low value of standard deviation 0.574 indicates greater adequacy of the data. The skewness value -.644 and kurtosis value .521 for the summated scale are well within the ranges. This shows a normal distribution of citizens' use.

Table 5.11: Summated citizens' use

Descriptive Statistics					
Citizens' Use	N	Mean	Std. Deviation	Skewness	Kurtosis
	515	3.79	.574	-.644	.521

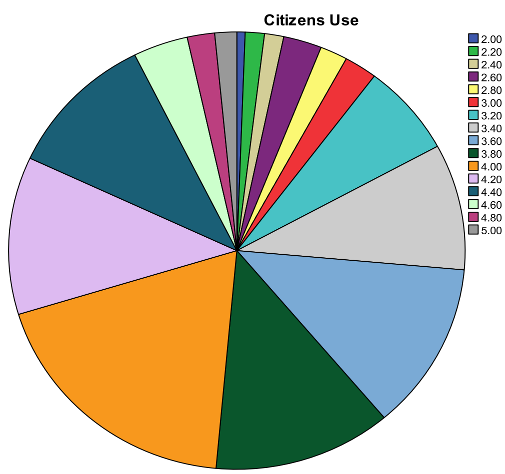


Figure 5.6: Frequency Distribution for Citizens' Use

5.6.5 Citizens' Satisfaction

Table 5.12 illustrates the obtained results of descriptive statistics including standard deviation, mean, skewness, and kurtosis for each associated item assigned to measure the citizens' satisfaction construct. Mean values above 3.75 for each item representing the overall citizens' agreement with the questions formualted to evaluate citizens' satisfaction construct which indicates a singinificant consensus. Standard deviation of the items used to assess the construct, shows that there is a rational allocation of the data corresponding to the mean. Obtained values of skewness and kurtosis were found within adequate limits, where the skewness of all items is under the range; also the kurtosis value is well within range. These values do not indicate any diverson from the normal distribution of the data. Subsequently, to determine the normality of the citizens' satisfaction construct as a whole, we constructed a summated scale composed of the items within the construct.

Table 5.12: Descriptive statistics for citizens' satisfaction items

Descriptive Statistics					
Valid	N	Mean	Std. Deviation	Skewness	Kurtosis
CtS1	515	3.79	.741	-.182	-.260
CtS2	515	3.81	.728	-.533	.368
CtS3	515	3.77	.701	-.489	.363
CtS4	515	3.79	.774	-.272	-.251
CtS5	515	3.82	.687	-.432	.390

Table 5.13: Summated citizens' satisfaction

Descriptive Statistics					
Citizens' satisfaction	N	Mean	Std. Deviation	Skewness	Kurtosis
	515	3.80	.555	-.566	.498

The pie chart and descriptive statistics for citizens' satisfaction construct confirm the normal distribution of data on the summated scale. Here, we see that most of the distributions are in the range from 3 to 4. Mean falls at 3.80, and from the frequency distribution, we see that the majority of frequencies occurred close to 4. Therefore, this indicates that large numbers of respondents have expressed opinion "agree" towards measuring the citizens' satisfaction. The concentration at 3.50 and 4 also explains the appropriate standard deviation observed in the range. The skewness value -0.566 and kurtosis value 0.498 for the proposed scale were found well within the limits. This shows a normal distribution of citizens' satisfaction.Neither skewness nor kurtosis values were found above the siginificant ranges for a normal distribution.Achieved peak value of kurtosis at 0.498 is reasonably within the range and does not show an excessive deviation which mainly occurs due to outliers values.

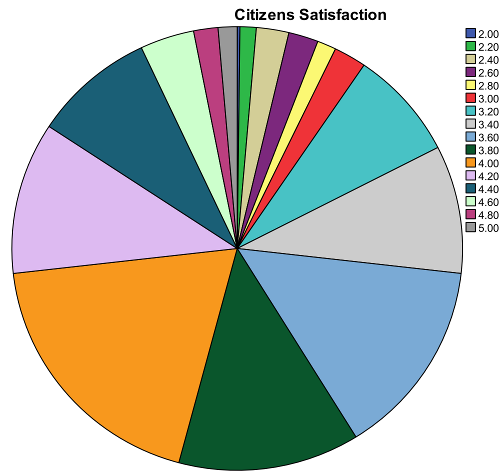


Figure 5.7: Frequency Distribution for Citizens' Satisfaction

5.6.6 Citizens' Trust

Table 5.14 illustrates the obtained results of descriptive statistics including standard deviation, mean, skewness, and kurtosis for each associated item assigned to measure the citizens' trust construct. Mean values for each items demonstrating that largely, citizens agree with the survey item in the form of questions created to assess citizens' trust. It shows a degree of agreement. Obtained mean values of all the items with in citizens' trust is close to 4. Table 5.14 clearly indicates that the skewness and kurtosis values are adequate and fall within the benchmark values, whereas the skewness of all items and kurtosis of all the items were found well within range. These obtained values do not show any divergence from normal distribution of the data. This mean normal distribution occur for each of the items.

Table 5.14: Descriptive statistics for citizens' trust items

Descriptive Statistics					
Valid	N	Mean	Std. Deviation	Skewness	Kurtosis
CtT1	515	3.92	.674	-.167	-.131
CtT2	515	3.83	.675	-.231	.063
CtT3	515	3.96	.763	-.562	.395
CtT4	515	3.87	.771	-.353	-.161
CtT5	515	3.85	.736	-.229	-.223
CtT6	515	3.96	.738	-.489	.387
CtT7	515	3.89	.609	-.302	.578

Subsequently, to determine the normality of the service quality construct as a whole, we constructed a summated scale composed of the items within the citizens' trust construct.

Table 5.15: Summated citizens' trust

Descriptive Statistics					
Citizens' trust	N	Mean	Std. Deviation	Skewness	Kurtosis
	515	3.89	.527	-.796	.812

As we observe in above table that the mean and standard deviation for summated citizens' trust is 3.89 and 0.527. This represents citizens' overall positive responses to the items used in assessing the citizens' trust. The pie chart shows a normal distribution in between 3.5 and 4. This confirms that majority of citizens have expressed their consents towards the questions created to measure citizens' trust in e-government service. The skewness and kurtosis values for the summated scale are well within the range. This indicates a normal division of data for citizens' trust. Negative value of skewness -0.796 representing a slight left-skewness of the data, which means that majority of responses are on the positive or right hand side. None of the skewness or kurtosis values by-pass the banchmark limits. Adequate value of kurtosis 0.812 suggests that the distribution for the overall score of the construst citizens' trust is normal.

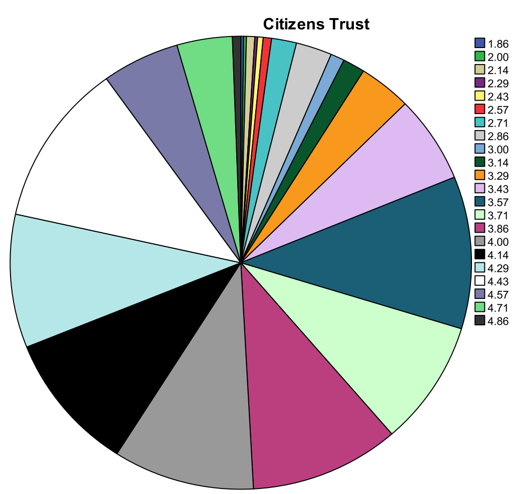


Figure 5.8: Frequency Distribution for Citizen's Trust

5.6.7 Perceived E-Government Service Quality

Table 5.16 illustrates the obtained results of descriptive statistics including standard deviation, mean, skewness, and kurtosis for each associated item assigned to evaluate the e-government service quality construct. Mean values above 3.90 for each item represent the overall citizens' acceptance with the questions formualted to evaluate e-government service quality construct which indicates a singinificant consensus. Standard deviation to the items used to assess the construct, represents that there is a rational allocation of the data. Accordingly, the obtained values of skewness and kurtosis of various items within the e-government service quality were found within the adeuqate limits (- 2.58 to + 2.58) . Observing the table, we do not obtain any item under the acceptable limits. Apart from that, we observe that the items record significant level of agreement from citizens at mean which is near to the value 4. These values do not indicate any diverson from the normal distribution of the data. Subsequently, to determine the normality of the e-government service quality construct as a whole, we constructed a summated scale composed of the items within the construct.

Table 5.16: Descriptive statistics for perceived e-government service quality items

Descriptive Statistics					
Valid	N	Mean	Std. Deviation	Skewness	Kurtosis
EGSQ1	515	3.96	.717	-.481	.527
EGSQ2	515	3.90	.708	-.483	.429
EGSQ3	515	3.93	.749	-.552	.635
EGSQ4	515	3.99	.718	-.466	.263

The pie chart and descriptive statistics for e-government service quality construct confirm that the normal distribution of data is achieved on the summated scale. Here, we see that most of the distributions are closed to 4. Mean falls at 3.90 and above, and from the frequency distribution, we see that the majority of frequencies occurred close to 4. The concentration of responses is observed between 3.9 and 4.0 which also explain that the appropriate standard deviation 0.588 is considered well within the limit. Therefore, this indicates that large numbers of respondents have expressed their opinion as agreement towards measuring the e-government service quality. The skewness value -0.865 and kurtosis value 1.312 for the proposed scale were found well within the limits. This shows a normal distribution of e-government service quality.Neither skewness nor kurtosis values were found above the siginificant ranges for a normal distribution.Achived peak value of kurtosis at 1.312 is reasonably within the range and does not show an excessive deviation which mainly occurs due to outliers values.

Table 5.17: Summated perceived e-government service quality

Descriptive Statistics					
Perceived E-Government Service Quality	N	Mean	Std. Deviation	Skewness	Kurtosis
	515	3.94	.588	-.865	1.312

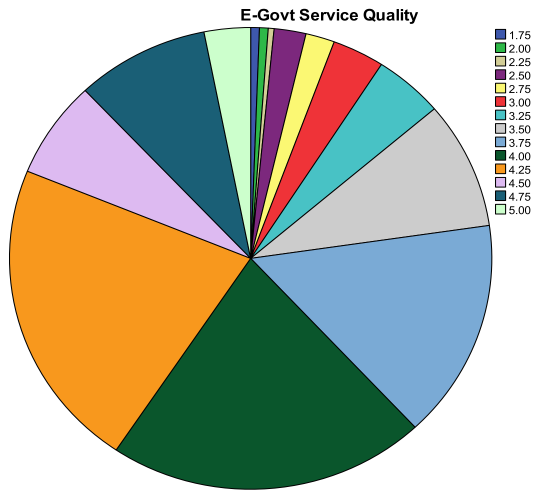


Figure 5.9: Frequency Distribution for Perceived E-government Service Quality

5.6.8 Perceived Effectiveness

Table 5.18 illustrates the obtained results of descriptive statistics including standard deviation, mean, skewness, and kurtosis for each associated item assigned to evaluate the perceived effectiveness of e-government service construct. Obtained mean value of all the items with in perceived effectiveness is close to 4. Mean values above 3.85 for each item represent the overall citizens’ acceptance with the questions formualted to evaluate perceived effectiveness of e-government servcie construct which indicates a singinificant consensus. Obtained values of skewness and kurtosis of various items within perceived effectiveness were found within the adeuqate limits. Apart from that, we observe that the items record significant level of agreement from citizens at mean which is near the value 4. These values do not indicate any diverson from the normal distribution of the data. This indicates normal distributions for each of the item. Standard deviation to the items was used to assess the construct, representing that there is a rational allocation of the data. Subsequently, to determine the normality of the perceived effectiveness of e-government service construct as a whole, we constructed a summated scale composed of the items within the construct.

Table 5.18: Descriptive statistics for perceived effectiveness items

Descriptive Statistics					
Valid	N	Mean	Std. Deviation	Skewness	Kurtosis
PE1	515	3.88	.694	-.464	.468
PE2	515	3.85	.717	-.478	.537
PE3	515	3.85	.729	-.577	.650
PE4	515	3.90	.697	-.347	.182

The pie chart and descriptive statistics for perceived effectiveness construct confirm the normal allocation of data on the summated scale. Most of the allocations are above 3.85 and falls between 3.85 and 4.0 and peaked at 3.90. The frequency distribution, we see that most of the frequencies occurred close to 4. Obtained low value of standard deviation 0.569 indicates greater adequacy of the data. The skewness value -.855 and kurtosis value 1.405 for the summated scale are well within the ranges. This shows a normal distribution of perceived effectiveness.

Table 5.19: Summated perceived effectiveness

Descriptive Statistics					
Perceived Effectiveness	N	Mean	Std. Deviation	Skewness	Kurtosis
	515	3.87	.569	-.855	1.405

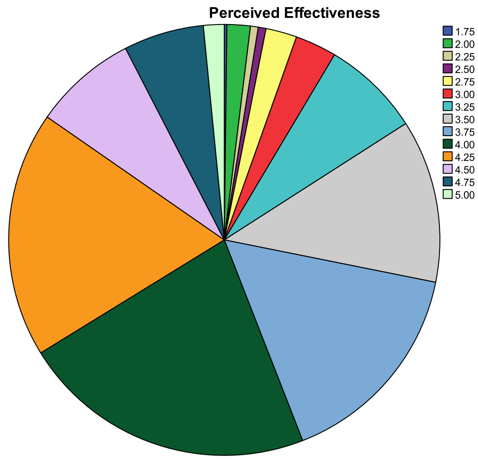


Figure 5.10: Frequency Distribution for Perceived Effectiveness

5.6.9 Histogram for Data Normality

To assess the data normality for each individual constructs with their items, descriptive statistics have been conducted. Further, to confirm the data normality, a descriptive statatisitcs using all the constructs was conducted. Noramality of collected data as a whole, we constructed a summated scale composed of the constructs and as result obtained histogram emerged as below.

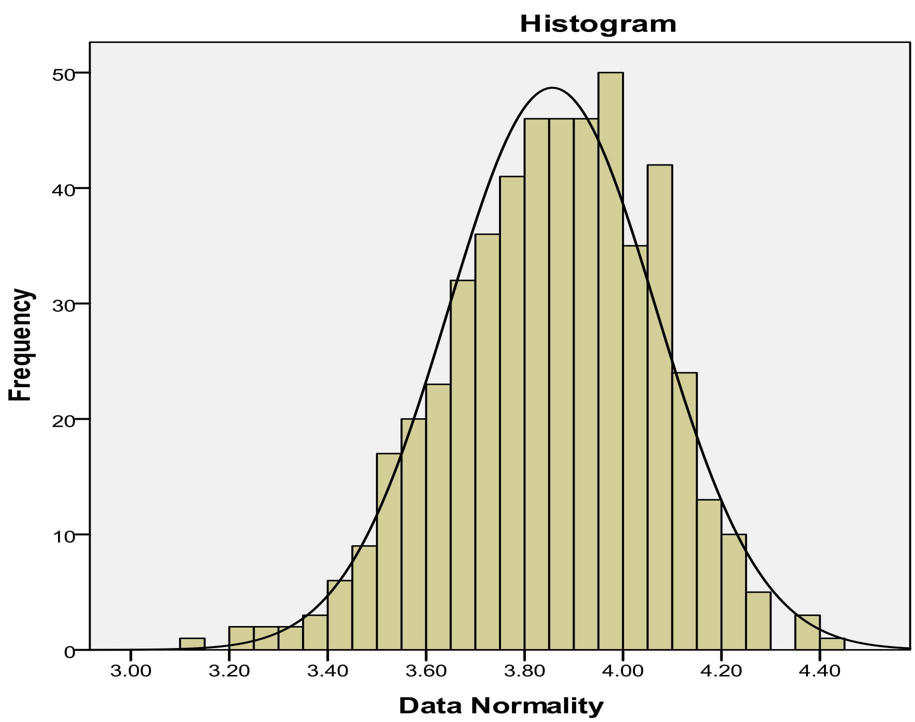


Figure 5.11: Data Normality Histogram

Bell shaped curve along with centrally peaked histogram shows a normal distribution of the data. Values of mean, skewness and kurtosis (3.85, - 0.326, 0.048) for the summated scale were found well within the acceptable ranges confirmed the normality of collected data.

5.7 Exploratory Factor Analysis

Exploratory factor analysis (EFA) is broadly applied statistical approach in information system. It is also considered as significant instrument for the refinement and evaluation of tests scales (Hair et al., 2010). Further, exploratory factor analysis is applied to a wide range of applications, including developing an instrument for the evaluation assessment of services quality dimensions of Internet retailing, e-commerce, e-service quality, Intranet adoption, assessing the motivation, survey instrument to examine consumer adoption, variables and patterns, and determining what types of services should be offered (Taherdoost et al., 2014). It is used to find an underlying structure between a set of observed variables without specifying a prior relationships. Frequently, these structures are used as constructs in sophisticated models displaying aspects of human behavior (Wang and Strong, 1996). In other way, exploratory factor analysis is frequently applied in order to discover patterns of multidimensional constructs, which are subsequently used for the development of measurement scales, especially when new frameworks or scales are developed. EFA is applied as a kind of pre-study to confirm the validity of the scales (Treiblmaie, and Filzmoser, 2009). Factor analysis offers not only the possibility of gaining a clear view of the data, but also the possibility of using the output in subsequent analysis (Field, 2009). According to Worthington and Whittaker, (2006) while developing new scales, researchers should perform an exploratory factor analysis and later conformatory factor analysis should be performed. Therefore, an exploratory factor analysis was conducted by utilising principal component analysis (PCA) with the varimax rotation method.

In EFA, a correlation matrix as one of the most accepted statistical techniques is used to determine the relationships between variables which recommended inspecting correlation coefficients over 0.30 for correlation matrix (Tabachnick and Fidell, 2007). In other words, loading of 0.3, indicates that the factors account for approximately 30% relationship within the data. Correlations loading is categorised as 0.30 = minimal, 0.40 = important, and 0.50 = practically (Tabachnick and Fidell, 2007; Hair et al., 2010). Some reserchers suggest the items loadings above (0.40), which is the minimum recommended value in IS research (Straub, 2004; Dwivedi et al.,2010). EFA was performed on all the items of construct and the results of factor analysis are presented in Table 5.20. Table 5.20 shows the factor loading for the 8 dimensions. All the items loaded above (0.40).

Dimensions / constructs system quality, information quality, service quality, and citizens' trust have set of seven items which were successfully loaded at factor (1,2,3,6). Coefficients for the first system quality construct varied between (0.683) to (0.803), for the information quality construct varied between (.647) to (.824), for the service quality construct varied between (.668) to (.844), and for the citizens' trust construct varied between (.697) to (.791). Then, all five items of the citizens' use, citizens' satisfaction constructs loaded at factor above (0.5). The coefficient for the citizens' use varied between (0.738) to (0.865) and for the citizens' satisfaction varied between (.721) to (.829). Finally all four items of the constructs e-government service quality and perceived effectiveness loaded at factor (0.7, 0.8). The coefficient for these costructs varies between (0.775) to (0.864) and (.772 to .831). The resultant factor analysis showed no low factor loadings (<.40). This means that the collected data and the findings that were obtained from this instrument are valid and reliable.

Second stage was the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy test which was the part of EFA. In SPSS a convenient option is offered to check whether the sample is big enough. The sample is adequate if the value of KMO is greater than 0.6 (Field, 2009). The obtained value of KMO was (.815) which was above 0.5 which clearly confirmed the sample adequacy. Furthermore findings from exploratory factor analysis confirm internal consistency of measures and construct validity.

Table 5.20 shows the exploratory factor analysis.

Table 5.20: Exploratory factor analysis

Items	SysQ (1)	InfQ (2)	SerQ (3)	CtU (4)	CtS (5)	CtT (6)	EGSQ (7)	PE (8)
SysQ1	.758							
SysQ2	.711							
SysQ3	.775							
SysQ4	.746							
SysQ5	.803							
SysQ6	.748							
SysQ7	.683							
InfQ1		.746						
InfQ2		.647						
InfQ3		.771						
InfQ4		.768						
InfQ5		.824						
InfQ6		.776						
InfQ7		.703						
SerQ1			.787					
SerQ2			.696					
SerQ3			.812					
SerQ4			.844					
SerQ5			.810					
SerQ6			.758					
SerQ7			.668					
CtU1				.772				
CtU2				.738				
CtU3				.865				
CtU4				.752				
CtU5				.831				
CtS1					.738			
CtS2					.783			
CtS3					.819			
CtS4					.721			
CtS5					.829			
CtT1						.718		
CtT2						.697		
CtT3						.757		
CtT4						.769		
CtT5						.791		
CtT6						.730		
CtT7						.729		
EGSQ1							.775	
EGSQ2							.864	
EGSQ3							.775	
EGSQ4							.840	
PE1								.772
PE2								.831
PE3								.779
PE4								.831
Kaiser-Meyer-Olkin Measure of Sampling Adequacy								.815

5.8 Reliability of Measurements' Contructs

Next step was to check the contructs' realibility. Constructs' measurements were tested for confirming the reliability of the research instrument. In order to establish the internal consistency of the measurement instrument, reliability analysis was conducted. It was established by calculating coefficient alpha, also known as Cronbach's alpha (α), to measure the internal consistency of the measurement scale. Hence the reliability analysis of 8 constructs was performed by using Cronbach's (α). Satisfactory level of reliability indicates that respondents are answering the questions in a consistent manner (Hair et al., 2010). Hinton et al., (2004) and Hair et al., (2010) have suggested four different criteria of reliability including excellent reliability ranges (0.90 and above), high reliability (0.70 – 0.90), high moderate reliability (0.50 – 0.70) and low reliability (0.50 and below). Hair et al., (2010) also suggest the values of Cronbach's alpha for strength of measurement of constructs: excellent (>=0.9), very good (0.8 to <0.9), good (0.7 to < 0.8), moderate (0.6 to < 0.7), and poor (<0.6). The reliability for each construct is illustrated in Table 5.21.

Table 5.21: Cronbach's alpha values for the dimensions/ constructs

Constructs with Items	Cronbach's α
System Quality	.867
Information Quality	.870
Service Quality	.885
Citizens' Use	.850
Citizens' Satisfaction	.835
Citizens' Trust	.863
E-Government Service Quality	.829
Perceived Effectiveness	.816

All the items have gone for reliability analysis using cronbach's aplha test. Above table shows that all the contructs and items are found (>0.8) which is considered as highly reliable. A high Cronbach's value for all constructs implies that they are internally consistent and measure the same content of the construct. Resulting value of all these items are in between (0.8 to 0 .9) which shows very good internal consistancy among the itmes and found good associations. Items- system quality (.864), information quality (.876), service quality (.888), citizens' use (.861), citizens' satisfaction (.859) and citizens' trust (.866), e-government service quality (.871) and perrceived effectiveness (.806) showed very good and high internal consistency of the various items in the scales.

As no item needs to be deleted from the scale, the measures of the study were sufficiently found reliable to conduct further analysis.

5.9 Structural Equation Modeling

During the preliminary phase of data analysis several issues were given considerable attention specifically data normality which is considered as sensitive for the structural equation modeling (Hair et al., 2010). Descriptive statistics and reliability test provided satisfactory results and confirmed that the data is symmetrical. Next step was to select appropriate estimation method for further data analysis using structural equation modeling (SEM).

According to Hooper et al., (2008) SEM has become one of the techniques of choice for researchers across the disciplines. SEM is principally a confirmatory technique that researchers mostly use to determine whether a certain model is valid.

There is two steps approach to perform SEM analysis (Hair et al., 2010). The first step is consisted of the measurement model; therefore, the first step provided a basis for assessing the validity of the structural theory and was performed using confirmatory factor analysis (CFA). CFA confirms the interrelationships between observed variables / indicators and latent variables. Whereas the second step in structural modeling is related test the hypotheses specified in the model of the study.

5.9.1 Confirmatory Factor Analysis (CFA)

Confirmatory Factor Analysis (CFA) is part of the structural equation modeling (SEM) and plays an essential role in measurement model validation in path or structural analysis (Brown, 2006; MacCallum and Austin, 2000). CFA explicitly tests the relations between observed variables and latent variables. It is also an analytic tool for developing and refining measurement instruments (Brown, 2006). So the next step involves an additional assessment of factor structure along with their validation. Therefore, in this process, confirmatory factor analysis was employed to assess the factor structure of each of our latent constructs. Then CFA was carried out for each construct to improve the instrument. This indicates that how the various hypothesised items precisely evaluate the constructs identified with the proposed research framework. CFA was applied using AMOS 21 software for validating the measurement model. For the confirmation of adequate loading of the items on to their respective construct, CFA was applied on all the constructs individually and also checked whether adequate model fit results were achieved for the confirmatory model. After the model run step, the derived findings provided a means for refining steadily the factor structure. In order to test the perceived effectiveness of e-government services, 8 dimensions / constructs were identified which held 46 items. Table 5.22 demonstrates the latent variables and the items used in CFA and later sub-section show the results when CFA was employed for each individual construct along with their associated items.

Table 5.22 Identified dimensions/constructs and associated items for analysis

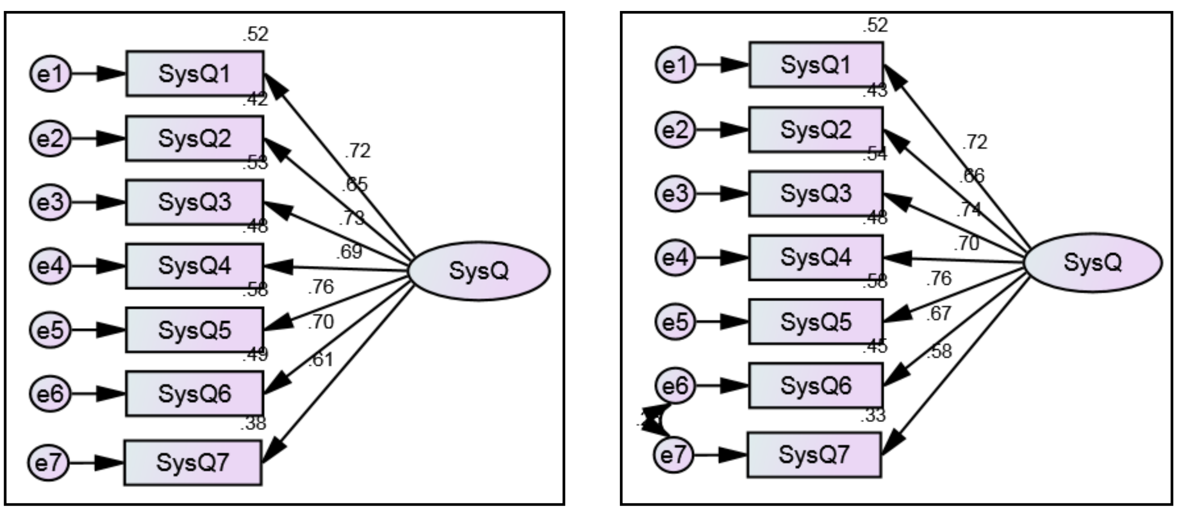
Constructs / Latent Variable	**Items**	**Code for Items**
System Quality	7	SysQ1, SysQ2, SysQ3, SysQ4, SysQ5, SysQ6, SysQ7
Information Quality	7	InfQ1, InfQ2, InfQ,3 InfQ,4, InfQ5, InfQ6, InfQ7
Service Quality	7	SerQ1, SerQ2, SerQ3, SerQ4, SerQ5, SerQ6, SerQ7
Citizens' Use	5	CtU1, CtU2, CtU3, CtU4, CtU5
Citizens' Satisfaction	5	CtS1, CtS2, CtS3, CtS4, CtS5
Citizens' Trust	7	CtT1, CtT2, CtT3, CtT4, CtT5, CtT6, CtT7
Perceived E-government Service Quality	4	EGSQ1, EGSQ2, EGSQ3, EGSQ4
Perceived Effectiveness	4	PE1, PE2, PE3, PE4

In chapter 4 (research methodology), different guidelines were proposed by Hair et al., (2010) to determine the overall model fit. Various statistical measures for model fit indices such as (Chi-square, the relative chi-square (CMIN/DF) = (chi-square/degree of freedom), Goodness of Fit Index (GFI), Tucker-Lewis Index (TLI), Comparative Fit Index (CFI), Root Mean Square Residual (RMR), and Root Mean Square of Error Approximation (RMSEA) and maximum likelihood estimates (standardized regression weights and squared multiple correlations) are the minimum requirements to evaluate the model fit. Modification indices also checked to confirm the model fit. According to Hair et al., (2010) and Janssens et al. (2008) all of the latent variable measures should have a high factor loadings more than (0.50) and should be significant at (critical ratio = C.R. = t-value > 1.96). The following section includes the assessment of each individual construct and the loadings of their associated items so standardized regression weight (factor loadings >0.50) and squared multiple correlations

(>.30) are considered as sufficient criteria. When we combine all the constructs and present it as whole model along with their associated items then all the guidelines recommended by Hair et al., (2010) should be followed.

5.9.1.1 CFA for System Quality

System quality construct was measured using seven items which were identified from previous studies. To measure the system quality, seven items were identified from the previous studies. Confirmatory factor analysis was applied to find out whether these seven items load adequately to measure the system quality construct or not. After performing the first attempt of CFA, it was observed that all these seven items loaded satisfactorily to measure system quality construct as standardized regression weights (.720, .650, .729, .690, .761, .696, .612) > (0.50) also squared multiple correlations (.518, .422, .532, .476, .579, .489, .375) >(0.30) that confirmed the model fit. This also shows that the items chosen for measuring the system quality, accurately measure the system quality construct. Standardized regression weight or factor loadings (>0.50) and squared multiple correlation (>0.30) for each item were found very good and well within the range. For individual construct these two conditions were sufficient to confirm satisfactory model fit as items loaded satisfactorily on their respective variable or construct. Figure 5.12 (a) shows first iteration with all 7 constructs.



a. Model fit estimates I – instance b. Model fit estimates II – instance

Figure 5.12: CFA for System Quality

Table 5.23: Fit indices values for system quality

Model	CMIN / DF (χ 2/df)	GFI	AGFI	RMSEA	RMR	CFI	TLI
Model fit – I time	6.479	.954	.908	.103	.022	.946	.919
Model fit – II time	4.778	.967	.930	.086	.018	.966	.944
I round model fit run: Chi-square =90.702, Degrees of freedom = 14 p=.000 II round model fit run: Chi-square = 62.115, Degrees of freedom = 13 p=.000							

Figure 5.12 (a) and table 5.23 (Model fit – I time) show various estimates. All of the criteria along with factor loadings and squared multiple correlations (R^2) that establish the overall model fit criteria particularly GFI (.938), AGFI (.908), RMR (.022), CFI (.946), and TLI (.919) were found within acceptable range. Value of RMSEA (.103) was close to the marginal value hence considered as model fit was slightly poor.

To improve the model fit it was necessary to investigate the reasons of poor model fit. After careful observation of various other estimates it was noticed that in the modification indices the covariance between some error terms were bit higher. As per the solution of this minor issue either drops the particular items which had higher covariance or correlate the error terms using covariance utility provided in AMOS. Dropping certain particular items which had higher covariance was the solution of this minor problem or correlates the error terms using covariance utility provided in AMOS. So figure 5.12 (b) shows that instead of dropping the items, first we tried to achieve model fit by correlating (e6, e7) error terms, then again second time CFA was employed. Second time CFA fairly improved the estimates responsible for model fit and none of the items needed to be dropped from the system quality construct. Tables 5.23 and 5.24 show the estimates. The goodness of fit model index GFI (.967), AGFI (.930), RMSEA (.086), RMR (.018), CFI (.966), and TLI (.944) were found within well acceptable range. An important criterion is root mean square error of approximation (RMSEA), Hair et al., (2010) suggest RMSEA (<.05 is good, >.05 to <.10 is moderate and >.10 is poor model fit). Result after first iteration shows the Chi-Square per degree of freedom (CMIN/DF) which is 6.479 which later in second CFA run changed to 4.778 and found within accepted range.

Table 5.24: MLE for system quality (II – time CFA)

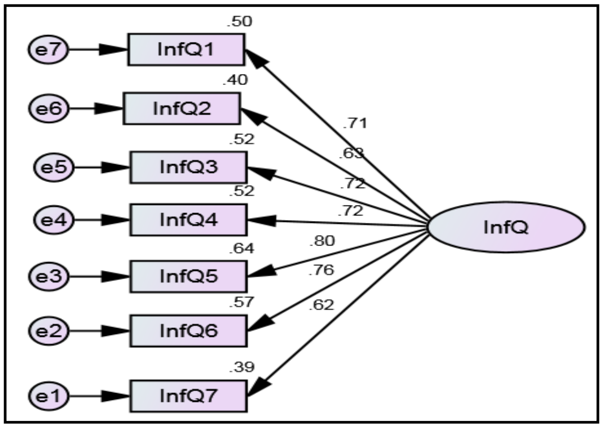
Structural Relationship			Estimate Regression Weight	Standard Error (S.E.)	Critical Ratio (C.R.)	P	Standardized Regression Weight	Squared Multiple Correlation
SysQ1	<---	SysQ	0.56	0.031	17.90	***	0.723	0.523
SysQ2	<---	SysQ	0.454	0.029	15.795	***	0.658	0.433
SysQ3	<---	SysQ	0.527	0.029	18.383	***	0.738	0.544
SysQ4	<---	SysQ	0.548	0.032	17.007	***	0.696	0.485
SysQ5	<---	SysQ	0.601	0.031	19.22	***	0.762	0.58
SysQ6	<---	SysQ	0.49	0.03	16.209	***	0.673	0.453
SysQ7	<---	SysQ	0.422	0.032	13.321	***	0.577	0.333

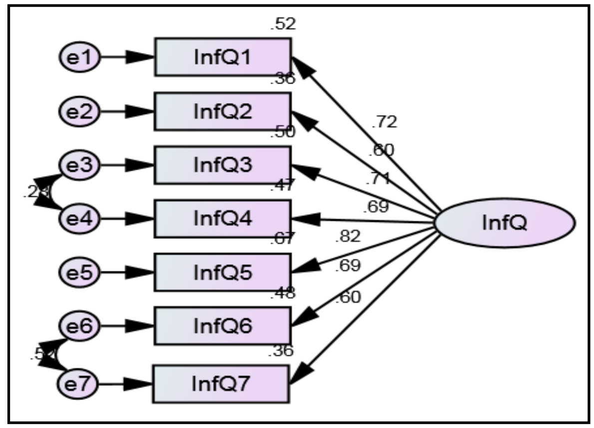
After applying the second round of CFA, the model fit improved considerably and model fit indices were obtained at adequate level. Table 5.24 shows that all of the critical ratios were (>=1.96), and items loadings were within acceptable range. Structural relationship between each items and system quality (SysQ) shows various estimated values. As all obtained values including critical ratio for each item was (>=1.96), standardized regression weight values were high (>.05), and squared multiple correlation values were over (0.30). Based on above analysis, it was decided to include all seven items for system quality construct. Second time CFA shows that all the items with system quality construct (SysQ) were well associated and show good model fit.

5.9.1.2 CFA for Information Quality

To measure the information quality, seven items were identified from the previous studies.

Confirmatory factor analysis was applied to determine whether these seven items load adequately to measure the information quality construct or not. After performing the first attempt of CFA, it was observed that all these seven items loaded satisfactorily to measure information quality construct as standardized regression weights (.710, .585, .720, .704, .799, .737, .666) > (0.50) also squared multiple correlations (.504, .342, .519, .496, .638, .543, .443) >(0.30) that confirmed the model fit. This also shows that the items chosen for measuring the information quality, accurately measure the information quality construct. Figure 5.13 (a) shows CFA for first round of model fit. Table 5.25 shows various model fit estimates. As stated before that for individual construct measurement, standardized regression weight criteria and squared multiple correlations are sufficient conditions but to further confirm the model fit, we considered additional criteria also. Other criteria to determine the overall model fit particularly GFI (.875), AGFI (.750), RMSEA (.175), RMR (.037), CFI (.866), TLI (.800), and CMIN/DF (16.771) were not found within the acceptable range and hence further investigation was needed.





a. Model fit estimates I – instance b. Model fit estimates II – instance

Figure 5.13: CFA for Information Quality

Table 5.25: Fit indices values for information quality

Model	CMIN / DF (χ 2/df)	GFI	AGFI	RMSEA	RMR	CFI	TLI
Model fit – I time	16.771	.875	.750	.175	.037	.866	.800
Model fit – II time	5.973	.966	.921	.088	.021	.971	.950
I round model fit run: Chi-square = 234.799, Degrees of freedom = 14, p=.000 II round model fit run: Chi-square = 56.671, Degrees of freedom = 12, p=.000							

To improve the model fit, it was necessary to investigate the reasons of partial model fit. After careful observation of various other estimates, it was noticed that in the modification indices the covariance between some error terms (e3, e4) and (e6, e7) were bit higher. So figure 5.13 (b) shows that instead of dropping the items, first we tried to achieve model fit by correlating (e3, e4) and (e6, e7) error terms, then again second time CFA was employed. Second time CFA fairly improved the estimates responsible for model fit and none of the items needed to be drop from the information quality construct. Tables 5.25 and 5.26 show the estimates. The goodness of fit index GFI (.966), AGFI (.921), RMSEA (.088), RMR (.021), CFI (.971), and TLI (.950) were found within well acceptable range. Result after first iteration shows the Chi-Square per degree of freedom (CMIN/DF) which is 16.771 which later in second CFA run changed to 5.973 and was found within acceptable range.

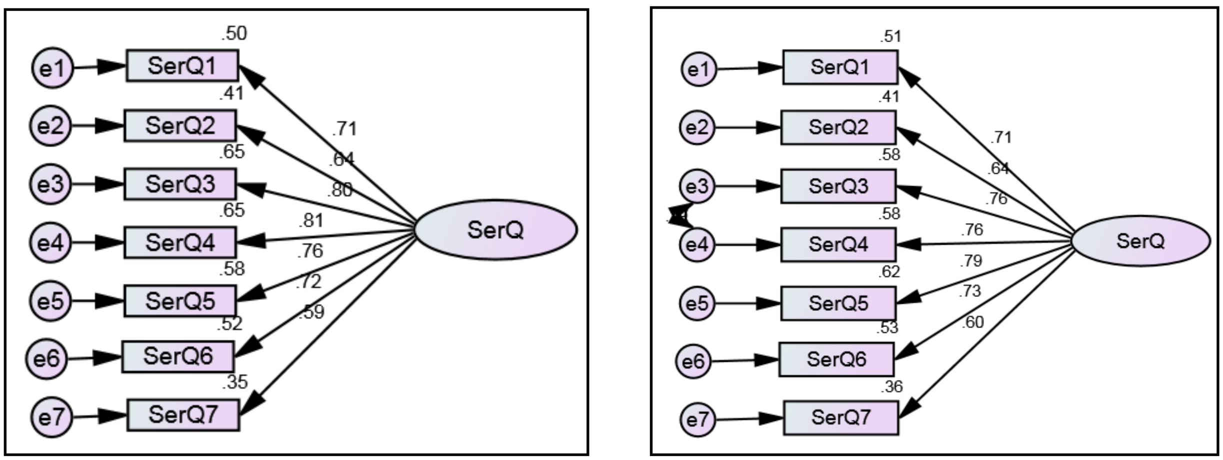
Table 5.26: MLE for information quality (II time CFA)

Structural Relationship			Estimate Regression Weight	Standard Error (S.E.)	Critical Ratio (C.R.)	P	Standardized Regression Weight	Squared Multiple Correlation
InfQ1	<---	InfQ	0.550	0.031	17.633	***	0.718	0.515
InfQ2	<---	InfQ	0.406	0.029	13.983	***	0.599	0.359
InfQ3	<---	InfQ	0.565	0.033	17.095	***	0.706	0.498
InfQ4	<---	InfQ	0.539	0.033	16.509	***	0.688	0.473
InfQ5	<---	InfQ	0.651	0.031	21.216	***	0.821	0.675
InfQ6	<---	InfQ	0.501	0.03	16.694	***	0.690	0.475
InfQ7	<---	InfQ	0.424	0.031	13.875	***	0.598	0.358

After applying the second round of CFA, the model fit improved considerably and model fit indices were obtained at adequate level. Table 5.26 shows that all of the critical ratios were (>=1.96), and items loadings were within acceptable range. Structural relationship between each items and information quality (InfQ) shows various estimated values. As all obtained values including critical ratio for each item was (>=1.96), standardized regression weight values were more than (0.50) and squared multiple correlation values were more than (0.30). Based on above analysis it was decided to include all seven items for information quality construct. Second time CFA shows that all the items with information quality construct (InfQ) are well associated and show good model fit.

5.9.1.3 CFA for Service Quality

To measure the service quality, seven items were identified from the previous studies. Confirmatory factor analysis was applied to determine whether these seven items load adequately to measure the service quality construct. After performing the first attempt of CFA, it was observed that all the items were loaded satisfactorily to measure service quality construct. After applying first time CFA with seven items, it was determined that standardized regression weights (.710, .637, .803, .807, .764, .718, .592)> (.50) and squared multiple correlations (.504, .406, .645, .651, .583, .350, .51) > (.30) were well within the range which indicated that the model was fit and acceptable. When we looked into other estimates then we found some of the estimates did not fall within the suggested range so it was considered that the model was not completely fit. Obtained values of GFI (.954), AGFI (.908), RMR (.019), CFI (.956), and TLI (.934) were found within acceptable range, while RMSEA (.101) and CMIN / DF (χ 2/df = 6.201) were found slightly higher. Obtain value of RMSEA (.101) is the border line value which is acceptable. Figure 5.14 (a&b) shows the CFA for service quality.



a. Model fit estimates I – instance b. Model fit estimates II – instance

Figure 5.14: CFA for Service Quality

For achieving better model fit, it was necessary to investigate the reasons. After careful observation of various other estimates, it was identified that in the modification indices the covariance between some error terms were quite higher. So figure 5.14 (b) shows that instead of dropping the items, first we tried to achieve model fit by correlating (e3, e4) error terms, then again second time CFA was employed. Second time CFA fairly improved the estimates responsible for model fit and none of the items needed to be dropped from the service quality construct. Tables 5.27 and 5.28 show the estimates. The goodness of fit index GFI (.968), AGFI (.931), RMSEA (.085), RMR (.017), CFI (.971), and TLI (.953) were found within well acceptable range. Result after first iteration shows the Chi-Square per degree of freedom

(CMIN/DF) which is 6.209 which later in second CFA run changed to 4.692 and found within acceptable range. Table 5.27 shows fit indices for service quality construct.

Table 5.27: Fit indices values for service quality

Model	CMIN / DF (χ 2/df)	GFI	AGFI	RMSEA	RMR	CFI	TLI
Model fit – I time	6.209	.954	.908	.101	.019	.956	.933
Model fit – II time	4.692	.968	.931	.085	.017	.971	.953
I round model fit run: Chi-square = 86.928, Degrees of freedom = 14, p=.000 II round model fit run: Chi-square = 61.00, Degrees of freedom = 13, p=.000							

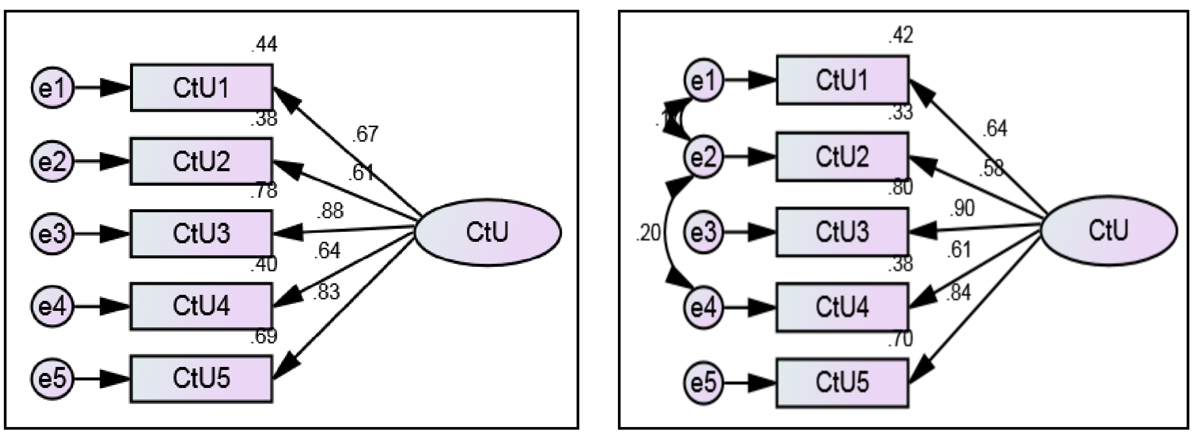
Table 5.28: MLE for service quality (II time CFA)

Structural Relationship			Estimate Regression Weight	Standard Error (S.E.)	Critical Ratio (C.R.)	P	Standardized Regression Weight	Squared Multiple Correlation
SerQ1	<---	SerQ	0.497	0.028	17.688	***	0.713	0.508
SerQ2	<---	SerQ	0.446	0.029	15.385	***	0.641	0.410
SerQ3	<---	SerQ	0.586	0.031	19.203	***	0.761	0.579
SerQ4	<---	SerQ	0.593	0.031	19.299	***	0.764	0.583
SerQ5	<---	SerQ	0.575	0.028	20.425	***	0.79	0.624
SerQ6	<---	SerQ	0.529	0.029	18.315	***	0.731	0.534
SerQ7	<---	SerQ	0.433	0.03	14.295	***	0.604	0.365

After applying second time model fit assessment, the model fit improved considerably. Model fit indices were researched at adequate levels of acceptance. Table 5.28 shows that all of the critical ratios were (>=1.96), and items loadings were within acceptable range. Structural relationship between each items and service quality (SerQ) shows various estimated values. As all obtained values including critical ratio for all associated items was (>=1.96), standardized regression weight values were higher than (0.50), and squared multiple correlation values were higher than (0.30). Based on above analysis it was decided to include all seven items for service quality construct. Second time CFA shows that all the items with service quality construct are well associated and show good model fit.

5.9.1.4 CFA for Citizens' Use / Usefulness

To measure the citizens' use / usefulness, five items were identified from the previous studies. CFA was conducted to determine whether these seven items load satisfactorily to measure the construct "citizens' use". Confirmatory factor analysis was applied to determine whether these five items load adequately to measure the citizens' use construct. After performing the first attempt of CFA, it was observed that all the items loaded adequately to determine this construct but model fit was poor. The criteria that determine the overall fit of the model GFI (.962), RMR (.023), CFI (.963), and TLI (.926) were acceptable, but the values of AGFI (.886), RMSEA (.126), and CMIN/DF (9.113) were slightly out of range hence indicated poor model fitting. Also figure 5.15 (a) shows the standardized regression weights (.666, .614, .882, .636, .831) and squared multiple correlations (.443, .377, .778, .404, .691) which were found well within the range. It was necessary to investigate the cause of slightly poor model fitting so modification indices were observed carefully and found that error terms (e1, e2), and (e2, e4) were quite higher.



a. Model fit estimates I – instance b. Model fit estimates II – instance

Figure 5.15: CFA for Citizens' Use

To resolve this issue, covariance applied between higher error terms (e1, e2) and (e2, e4) and ran the CFA again. When second time CFA was employed then obtained results was found satisfactory and reached to the specified criteria and model fit was achieved. Model fit criteria including GFI (.991), AGFI (.929), RMSEA (.085), RMR (.013), CFI (.990), and TLI (.966) were found within well acceptable range**.** Chi-square value also dropped to (4.706). Table 5.29 shows fit indices for citizens' use construct.

Table 5.29: Fit indices values for citizens' use

Model	CMIN / DF (χ 2/df)	GFI	AGFI	RMSEA	RMR	CFI	TLI
Model fit – I time	9.113	.962	.886	.126	.023	.963	.926
Model fit – II time	4.706	.991	.929	.085	.013	.990	.966
I round model fit run: Chi-square = 112.938, Degrees of freedom = 5, p=.000 II round model fit run: Chi-square = 14.118, Degrees of freedom = 3, p=.003							

Table 5.30: MLE for citizens' use (II time CFA)

Structural Relationship			Estimate Regression Weight	Standard Error (S.E.)	Critical Ratio (C.R.)	P	Standardized Regression Weight	Squared Multiple Correlation
CtU1	<---	CtU	0.478	0.031	15.543	***	0.645	0.416
CtU2	<---	CtU	0.419	0.031	13.459	***	0.577	0.333
CtU3	<---	CtU	0.627	0.026	24.184	***	0.896	0.803
CtU4	<---	CtU	0.474	0.033	14.575	***	0.613	0.375
CtU5	<---	CtU	0.576	0.026	22.053	***	0.839	0.704

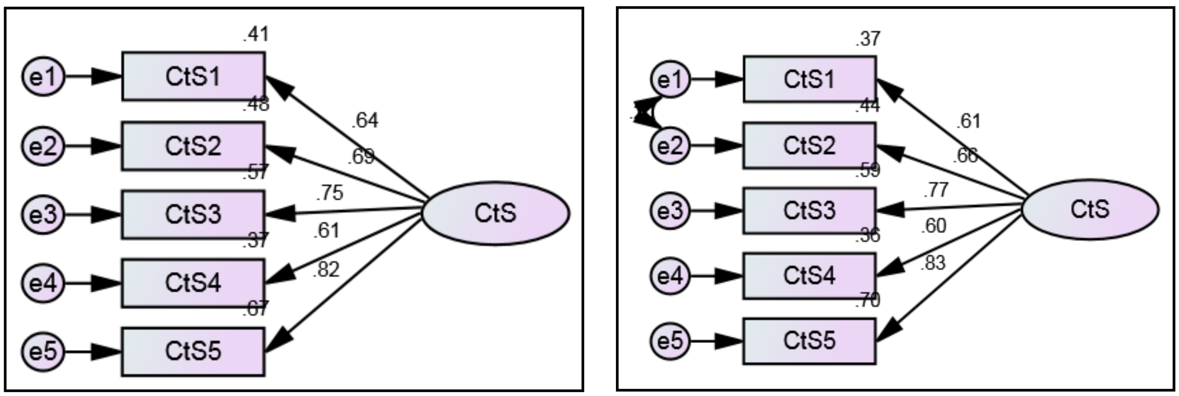
Second time CFA shows that all the items with citizens' use construct were well. Above analysis confirmed the model fit as model fit indices were found at acceptable levels. Table 5.30 shows that all obtained values including critical ratio for each item was (>=1.96), values of standardized regression weight (>0.50) and squared multiple correlation were over (0.30). Structural relationship between each items and citizens' use (CtU) shows various estimated values. Based on above analysis it was decided to include all five items for citizens' use construct. Second time CFA shows that all the items with citizens' use construct (CtU) are well associated and show good model fit.

5.9.1.5 CFA for Citizens' Satisfaction

To measure the citizens' satisfaction in offered e-services, five items were identified from the previous studies. Confirmatory factor analysis was applied to determine whether these five items loaded adequately to measure the service quality construct. After performing the first attempt of CFA, it was observed that all the items were loaded satisfactorily to measure citizens' satisfaction construct.

Confirmatory analysis of citizens' satisfaction results revealed that model fit was poor. Overall model fit criteria including GFI (.974), AGFI (.922), RMR (.017), CFI (.970), and TLI (.939) was acceptable, but the value of RMSEA (.103) value is the border line value. Figure 5.16 (a) shows the standardized regression weights (.641, .695, .754, .605, .818) and squared multiple correlations (.411, .483, .568, .366, .670) which were found well within the range. It was necessary to investigate the cause of slightly poor model fitting so modification indices were observed carefully and found that error terms (e1, e2) were quite higher.

Figure 5.16 shows the resulting values after first and second iteration.



a. Model fit estimates I – instance b. Model fit estimates II – instance

Figure 5.16: CFA for Citizens' Satisfaction

After careful investigation of various other estimates, it was identified that in the modification indices the covariance between some error terms were quite higher. So figure 5.16 (b) shows that to achieve model fit error terms (e2, e4), (e2, e5), and (e4, e5) were correlated, then again second time CFA was employed. Second time CFA fairly improved the estimates responsible for model fit. Tables 5.31 and 5.32 show the estimates. The goodness of fit index GFI (.974), AGFI (.922), RMSEA (.103), RMR (.017), CFI (.970), and TLI (.939) were found within well acceptable range. Result after first iteration shows the Chi-Square per degree of freedom (CMIN/DF) which was 6.470 later in second CFA run was changed to 4.438 and found within acceptable range. Table 5.31 shows fit indices for citizens' satisfaction construct.

Table 5.31: Fit indices values for citizens' satisfaction

Model	CMIN / DF (χ 2/df)	GFI	AGFI	RMSEA	RMR	CFI	TLI
Model fit – I time	6.470	.974	.922	.103	.017	.970	.939
Model fit – II time	4.438	.987	.950	.082	.014	.985	.962
I round model fit run: Chi-square = 32.348, Degrees of freedom = 5, p=.000 II round model fit run: Chi-square = 17.752, Degrees of freedom = 4, p=.001							

Table 5.32: MLE for citizens' satisfaction (II time CFA)

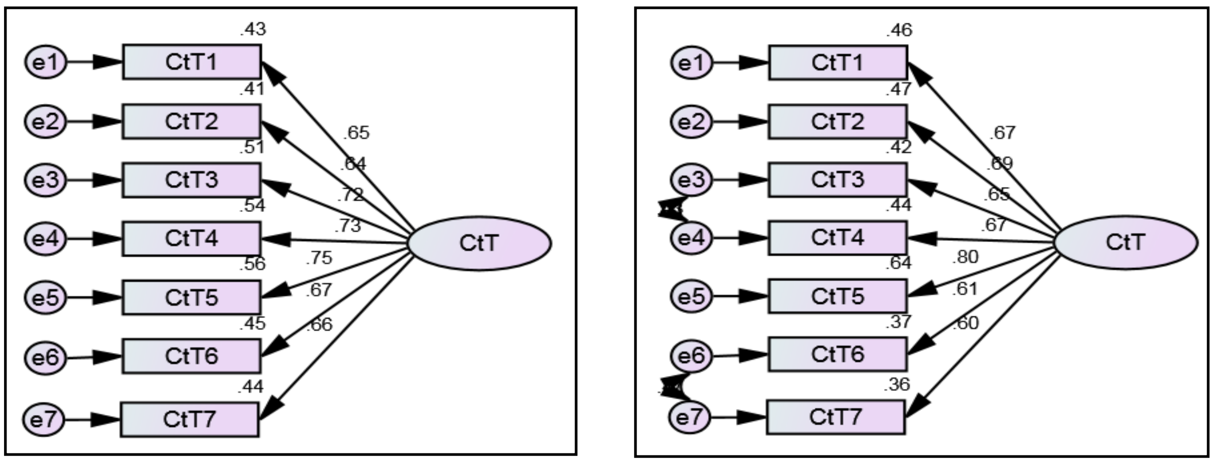
Structural Relationship			Estimate Regression Weight	Standard Error (S.E.)	Critical Ratio (C.R.)	P	Standardized Regression Weight	Squared Multiple Correlation
CtS1	<---	CtS	0.451	0.033	13.850	***	0.606	0.367
CtS2	<---	CtS	0.468	0.030	15.543	***	0.663	0.439
CtS3	<---	CtS	0.526	0.028	18.953	***	0.769	0.591
CtS4	<---	CtS	0.441	0.032	13.780	***	0.598	0.357
CtS5	<---	CtS	0.567	0.027	21.051	***	0.834	0.696

Second time CFA shows that all the items with citizens' satisfaction construct (CtS) were well associated. Above analysis confirmed the model fit as model fit indices found at acceptable levels. Table 5.32 shows that obtained critical ratio for each item was (>=1.96), and items loadings were within acceptable range. Structural relationship between each items and citizens' use (CtS) shows various estimated values. As all obtained values including critical ratio for all items were higher (>=1.96), standardized regression weight values were higher (>.05), and squared multiple correlation values were over (0.30). Based on above analysis it was decided to include all five items for citizens' satisfaction construct.

5.9.1.6 CFA for Citizens' Trust

To measure the citizens' trust in offered e-services, seven items were identified from the previous studies. While concluding the confirmatory factor analysis, we observed that chosen seven items loaded adequately to measure the citizens' trust construct. After applying first time CFA with seven items, it was observed that standardized regression weights (.654, .644, .716, .732, .749, .669, .662) > (.50) and squared multiple correlations (.428, .415, .512, .535, .561,

.448, .439) > (.30) were well within the range which indicated that the model was fit and acceptable. When we looked into other estimates then we found some of the estimates did not fall within the suggested range so it was considered that the model was not completely fit. Some other important criteria that establish the model fit particularly GFI (.880), AGFI (.759), RMSEA (.177), RMR (.034), CFI (.852), TLI (.779), and CMIN/DF (18.379) were not found within acceptable range, which indicated that model fit was poor. Table 5.33 shows various model fit estimates. Figure 5.17 (a &b) show the CFA for citizens' trust.



a. Model fit estimates I – instance b. Model fit estimates II – instance

Figure 5.17: CFA for Citizens' Trust

Table 5.33: Fit indices values for citizens' trust

Model	CMIN / DF (χ 2/df)	GFI	AGFI	RMSEA	RMR	CFI	TLI
Model fit – I time	17.146	.880	.769	.177	.034	.852	.779
Model fit – II time	4.995	.970	.929	.088	.019	.969	.945
I round model fit run: Chi-square = 240.045, Degrees of freedom = 14, p=.000 II round model fit run: Chi-square = 59.934, Degrees of freedom = 12, p=.000							

It was necessary to investigate the cause of slightly poor model fitting so modification indices were observed carefully. After careful observation of various other estimates, it was identified that in the modification indices, the covariance between some error terms (e3, e4) and (e6, e7) were quite higher. So figure 5.17 (b) shows that instead of dropping the items, first we tried to achieve model fit by correlating (e3, e4) and (e6, e7) error terms, then again second time CFA was employed. Second time CFA fairly improved the estimates responsible for model fit and none of the items were needed to be dropped from the citizens' trust construct. Tables 5.33 and 5.34 show the estimates. The goodness of fit index GFI (.970), AGFI (.929), RMSEA (.088), RMR (.019), CFI (.969), and TLI (.945) were found within well acceptable range. Result after first iteration shows the Chi-Square per degree of freedom (CMIN/DF) which was 17.146 which later in second CFA changed to 5.226 and found within acceptable range. Table 5.34 shows fit indices for citizens' trust construct.

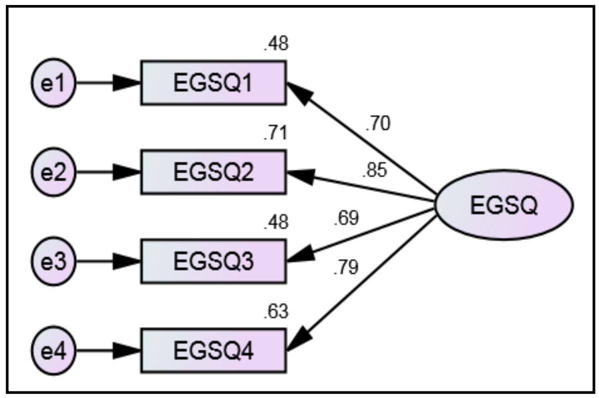
Table 5.34: MLE for citizens' trust (II time CFA)

Structural Relationship			Estimate Regression Weight	Standard Error (S.E.)	Critical Ratio (C.R.)	P	Standardized Regression Weight	Squared Multiple Correlation
CtT1	<--	CtT	0.454	0.028	16.044	***	0.675	0.455
CtT2	<--	CtT	0.464	0.028	16.438	***	0.687	0.473
CtT3	<--	CtT	0.493	0.033	15.092	***	0.647	0.418
CtT4	<--	CtT	0.514	0.033	15.711	***	0.667	0.444
CtT5	<--	CtT	0.589	0.029	20.121	***	0.801	0.641
CtT6	<--	CtT	0.448	0.032	14.002	***	0.607	0.369
CtT7	<--	CtT	0.365	0.026	13.786	***	0.600	0.360

Second round of CFA shows the structural relationship between each items and citizens' trust construct. At this point table 5.34 shows that all obtained standardized regression weight were higher than (.50), squared multiple correlations were higher than (0.30), and also the critical ratios were greater than (1.96). Therefore all seven items from citizens' trust were decided to be included.

5.9.1.7 CFA for Perceived E-government Service Quality

To measure the perceived e-government service quality, four items were identified from the previous studies. Confirmatory factor analysis was applied to determine whether these four items load adequately to measure the perceived e-government service quality construct. After performing the first attempt of CFA, it was observed that all the items were loaded satisfactorily to measure perceived e-government service quality construct. It was determined that standardized regression weights (.695, .845, .691, .791) > (.50), squared multiple correlations (.483, .714, .478, .626) > (.30), and critical ratio (>1.96) were found well within the range that indicated the model was fit and acceptable. Table 5.35 shows maximum likelihood estimates. Other criteria that establish the model fit particularly GFI (.986), AGFI (.932), RMSEA (.106), RMR (.012), CFI (.986), TLI (.958), and CMIN/DF (6.776) were found within acceptable range and indicated that model fit was good. Figure 5.18, table 5.35, and table 5.36 show the obtained results after running first time CFA. In the case of "single construct" standardized regression weight and squared multiple correlation are considered for model fit so both of them were found well within the range that confirm the model fit of construct EGSQ.



(Model fit estimates I- instance)

Figure 5.18: CFA for Perceived E-government Service Quality

Table 5.35: Fit indices values for perceived e-government service quality

Model	CMIN / DF (χ 2/df)	GFI	AGFI	RMSEA	RMR	CFI	TLI
Model fit – I time	6.776	.986	.932	.106	.012	.986	.958
I round model fit run: Chi-square = 13.551, Degrees of freedom = 2, p=.001							

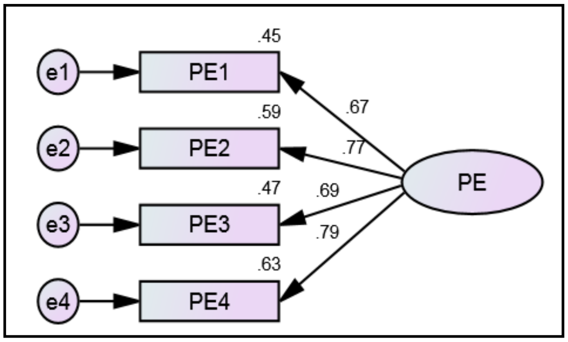
Table 5.36: MLE for perceived e-government service quality (I time CFA)

Structural Relationship			Estimate Regression Weight	Standard Error (S.E.)	Critical Ratio (C.R.)	P	Standardized Regression Weight	Squared Multiple Correlation
EGSQ1	<---	EGSQ	0.501	0.03	16.828	***	0.695	0.483
EGSQ2	<---	EGSQ	0.612	0.028	21.819	***	0.845	0.714
EGSQ3	<---	EGSQ	0.523	0.031	16.704	***	0.691	0.478
EGSQ4	<---	EGSQ	0.573	0.029	19.964	***	0.791	0.626

Structural relationship between each items and perceived e-government service quality shows various estimated values were found well within the range. Therefore all four items from perceived e-government service quality were decided to be included.

5.9.1.8 CFA for Perceived Effectiveness

To evaluate the perceived effectiveness of offered e-government services, four items were identified from the previous studies. After running the first time CFA with four items, we found that all four items were adequately loaded to assess perceived effectiveness of e-government service construct. It was determined that standardized regression weights (.671, .770, .688, .794) > (.50), squared multiple correlations (.450, .593, .473 .631) > (.30), and critical ratio (>1.96) were found well within the range that indicated the model was fit and acceptable. Table 5.33 shows maximum likelihood estimates. Criteria that establish the whole model fit particularly GFI (.992), AGFI (.958), RMSEA (.084), RMR (.010), CFI (.990), TLI (.969), and CMIN/DF (4.618) were found within acceptable range and indicated that model fit was good. Figure 5.19, table 5.37, and table 5.38 show obtained results after first time CFA.



(Model fit estimates I- instance)

Figure 5.19: CFA for Perceived Effectiveness

Table 5.37: Fit indices values for perceived effectiveness

Model	CMIN / DF (χ 2/df)	GFI	AGFI	RMSEA	RMR	CFI	TLI
Model fit – I time	4.618	.992	.958	.084	.010	.990	.969
I round model fit run: Chi-square = 9.235, Degrees of freedom = 2, p=.010							

Table 5.38: MLE for perceived effectiveness (I time CFA)

Structural Relationship			Estimate Regression Weight	Standard Error (S.E.)	Critical Ratio (C.R.)	P	Standardized Regression Weight	Squared Multiple Correlation
PE1	<--	PE	0.466	0.030	15.760	***	0.671	0.450
PE2	<--	PE	0.555	0.030	18.756	***	0.770	0.593
PE3	<--	PE	0.503	0.031	16.262	***	0.688	0.473
PE4	<--	PE	0.554	0.028	19.517	***	0.794	0.631

Structural relationship between each items and perceived effectiveness e-government service shows various estimated values were found well within the range. Therefore all four items from perceived effectiveness were decided to be included.

5.9.2 Measurement Model Fit (with all constructs)

Next step is to validate thefitness of measurement model. To assess the measurement model, two main approaches were used: (i) GOF criteria indices; and (ii) Evaluating validity and reliability of the measurement model. There are several and varied fit measures used to verify to what degree the hypothetical model fits to the data. These fit measures are grouped together based on their characteristics and measure the fitness of model. Each category of goodness-of-fit (GOF) measures assesses the model fit from different perspectives (Hair et al., 2010). After confirming the GOF the later step performed the reliability and validity of proposed model with all identified constructs.

5.9.2.1 Goodness-of-fit (GOF) Indices of Proposed Model

Before moving towards estimating the hypothesized structural model, first we conducted the confirmatory factor analysis for all latent variables including system quality, information quality, service quality, citizens' satisfaction, citizens' use, citizens' trust, e-government service quality, perceived effectiveness to validate the factor structure for each individual construct. Hence, confirmatory factor analysis was performed on each individual constructs to ensure that the items load adequately on the individual construct, also whether they give adequate model fit results.

The primary task of model fit process is to determine the GOF between the hypothesised model and the sample data (Byrne, 2010). In other words, the model was specified first and then the sample data was used to test it. The measurement model was estimated using the maximum likelihood (ML) estimation technique provided by AMOS 21. To evaluate overall goodness of model fit for CFA, eight common model-fit measures were used. Brown, (2006) considers RMSEA, RMR, CFI, and TLI fit indices for satisfactory performance. Kline, (2011) confirms by identifying the four statistical fit indices (chi-square, RMSEA, CFI, and RMR) to report model fit and considered it as a common practice for measuring model fit. Whereas Hair et al., (2010) consider that other than factor loading, absolute fit and two from comparative fit indices (Chi-square, p-value, GFI, AGFI, RMESA, RMR, CFI, and TLI) is a minimum requirement to evaluate the model fit.

Based on above discussion and in order to measure the GOF of the proposed model present study considers statistical measurements such as the chi-square test, the relative chi-square (CMIN/DF) = (chi-square/degree of freedom), p-value, Goodness of Fit Index (GFI), Adjusted Goodness of Fit Index (AGFI), Tucker-Lewis Index (TLI), Comparative Fit Index (CFI), Root Mean Square Residual (RMR), and Root Mean Square of Error Approximation (RMSEA).

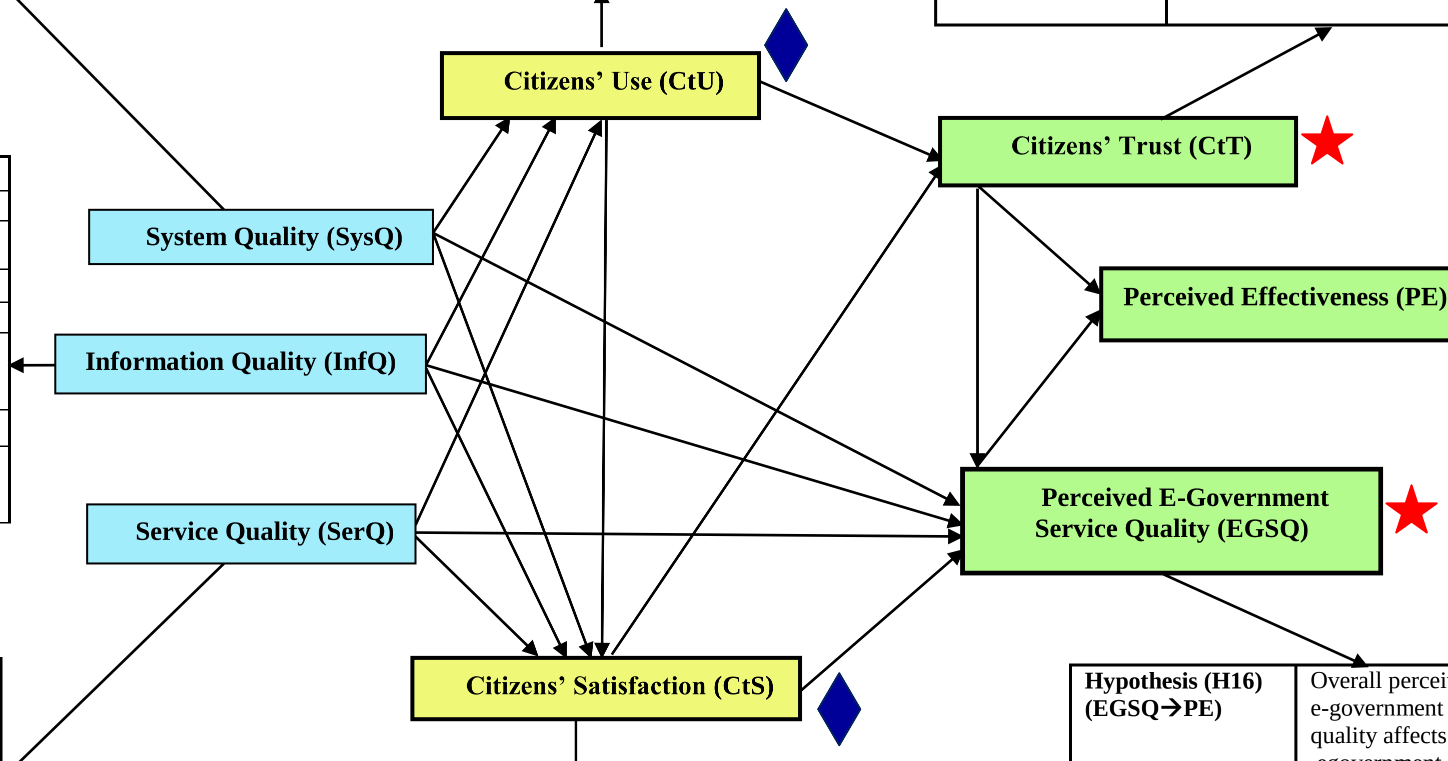
Figure 5.20 (a) “Measurement Framework E-GEEF with All Dimensions & Hypotheses” shows various dimensions and hypotheses proposed in the framework E-GEEF. However, for the analysis and to measure the “Goodness-of-Fit (GOF) indices” of proposed framework E-GEEF, figure 5.20 (b) “Proposed Measurement Model with All Constructs in AMOS” is designed using AMOS 21 software. For confirming the associations of proposed dimensions and testing the hypothesized relationship, structural equation modeling technique is applied using AMOS 21 software and various rounds of simultations are being performed.

Hypothesis		Items	SysQ
Hypothesis (H1) (SysQ →CtU)	System quality is positively related and affects the citizens' use / usefulness of e-tax service in the G2C e-government perspective	Accessibility Flexibility	SysQ1 SysQ2
Hypothesis (H2) (SysQ →EGSQ)	System quality is positively related and affects perceived e-government service quality in G2C e-government (e-tax service) perspective.	Functionality Reliability Easy to use	SysQ3 SysQ4 SysQ5
Hypothesis (H3) (SysQ → CtS)	System quality is positively related and affects citizens' satisfaction with e-tax service in the G2C e-government perspective.	Integration Navigation	SysQ6 SysQ7

Hypothesis		Items	CtU
Hypothesis (H10) (CtU→CtS)	Citizens' Use /Usefulness positively affect the citizens' satisfaction in G2C e-government (e-tax service) perspective	Frequency of use Intension to reuse	CtU1 CtU2
Hypothesis (H11) (CtU→CtT)	Citizens' Use / Usefulness positively affect citizens' trust in G2C e-government (e-tax service) perspective.	Nature of use Interactivity Number of transaction	CtU3 CtU4 CtU5

Hypothesis		Items	CtT
Hypothesis (H14) (CtT →EGSQ)	Citizens' trust positively affects the perceived e-government service quality in G2C e-government (e-tax service) perspective.	Usability Privacy	CtT1 CtT2
Hypothesis (H15) (CtT→PE)	Citizens' trust positively affects the perceived effectiveness of e-government service in G2C e-government (e-tax service) perspective.	Security Transaction Transparency Unambiguous Responsiveness Tangible	CtT3 CtT4 CtT5 CtT6 CtT7

Hypothesis		Items	InfQ
Hypothesis (H4) (InfQ →CtU)	Information quality is positively related and affects the citizens' use / usefulness in G2C e-government (e-tax service) perspective	Accuracy Relevance	InfQ1 InfQ2
Hypothesis (H5) (InfQ →EGSQ)	Information quality is positively related and affects perceived e-government service quality in the G2C e-government (e-tax service) perspective	Completeness Trustworthiness Availability	InfQ3 InfQ4 InfQ5
Hypothesis (H5) (InfQ →CtS)	Information quality is positively related and affects the citizens' satisfaction in G2C e-government (e-tax service) perspective.	Timeliness Consistency	InfQ6



Items	PE
Overall citizens' trust	PE1
Overall e-government service quality	PE2
Overall risk	PE3
Overall e-service effectiveness	PE4

Hypothesis		Items	SerQ
Hypothesis (H7) (SerQ →CtU)	Service quality is positively related and affects the citizens' use / usefulness in G2C e-government (e-tax service) perspective	Assurance Flexibility	SerQ1 SerQ2
Hypothesis (H8) (SerQ →EGSQ)	Service quality positively affects perceived e-government service quality in the G2C e-government (e-tax service) perspective.	Reliability Tangibility Transparent	SerQ3 SerQ4 SerQ5
Hypothesis (H9) (SerQ →CtS)	Service quality is positively related and affects the citizens' satisfaction in G2C e-government (e-tax service) perspective.	Sufficiency Responsiveness	SerQ6 SerQ7

Hypothesis		Items	CtS
Hypothesis (H12) (CtS →CtT)	Citizens' satisfaction positively affects and forms citizens' trust in e-government service in G2C e-government (e-tax service) perspective	Efficiency Valuable	CtS1 CtS2
Hypothesis (H13) (CtS →EGSQ)	Citizens' satisfaction has positive effect on perceived e-government service quality in G2C e-government (e-tax service) perspective.	Adequacy System Satisfaction Information Satisfaction	CtS3 CtS4 CtS5

Hypothesis		Items	EGSQ
Hypothesis (H16) (EGSQ→PE)	Overall perceived e-government service quality affects the government perceived effectiveness in G2C e-government (e-tax service) perspective.	Service Functionality Reliability Citizens' support Service Satisfaction	EGSQ1 EGSQ2 EGSQ3 EGSQ4

New Dimensions
Revised Dimensions

Figure 5.20 (a): Proposed Measurement Framework (E-GEEF) with All Dimensions & Hypotheses

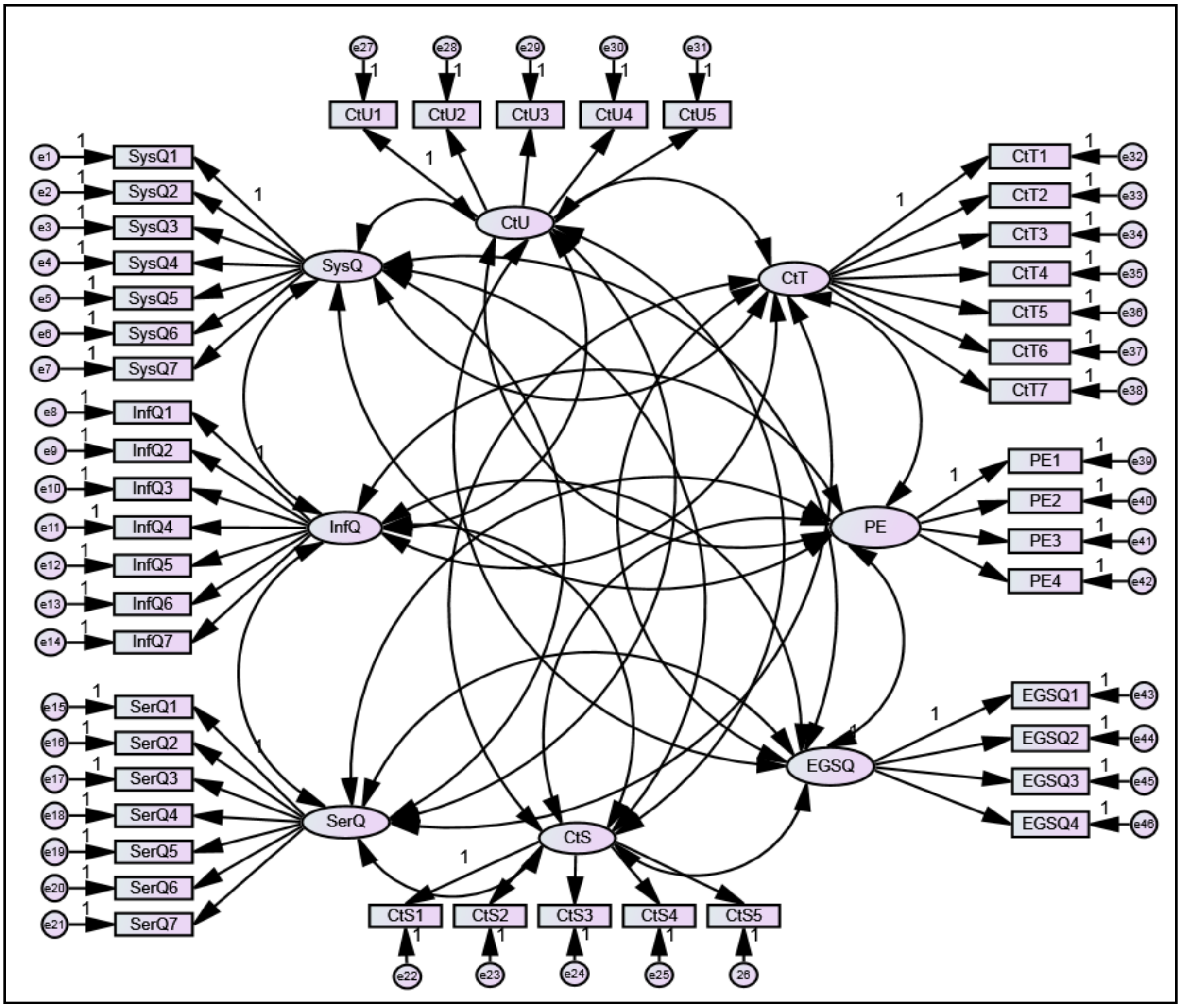


Figure 5.20 (b): Measurement Model with All Constructs in AMOS

5.9.2.1.1 First Round Simulation for Model Fit

First time CFA was performed on all the constructs together and after running first time simulation model, the proposed model did not fit the data well as some of the obtained values were found comparatively low. Criteria that establish the overall fit of the model particularly Chi-square (1813.601), degree of freedom (df=961), p=.000, CMIN/DF (1.887), RMSEA (.042), (.021), CFI (.915), and TLI (.908) were found within acceptable range except GFI (.866) and AGFI (.849) which pointed towards the poor model fit. However, other maximum likelihood estimates were found within the acceptable range. This includes standardized regression weights / factor loadings of the items associated with latent variables were found more than (0.50) also squared multiple correlations found more than (0.30).

It was necessary to investigate the cause of poor model fitting so modification indices were observed carefully and found that error terms (e6, e7), (e9, e11), (e10, e11), (e13, e14), (e15, e18), (e33, e37), (e34, 35), and (e37, e38) values were quite high. To resolve this issue, covariance between high error terms were applied and one item CtT7 was dropped and second time simulation for model fit was performed.

Model fit statistics and indices for the proposed measurement model after running first simulation are summarised in Table 5.39 and Table 5.40, while first simulation of the proposed measurement model is depicted in figure 5.21.

Table 5.39: Model Fit Indices after First Round Simulation

(With measurement model with all constructs)

Chi-square = 1813.601, Degrees of freedom = 961 (CMIN / DF or χ 2/df =1.887) p=000						
Model	**GFI**	**AGFI**	**RMSEA**	**RMR**	**CFI**	**TLI**
Obtained values	.866	.849	0.042	0.021	.915	.908

Note:

Chi-square = χ2; degree of freedom= df; Normed chi-square or ratio of likelihood (χ2) to degrees of freedom= χ 2/df; GFI = Goodness of fit index (>-0.90); AGFI: Adjusted goodness of fit index (>=0.80) acceptable but >=(0.90) good fit; RMSEA = Root mean square error of approximation (Value (<.06) Good model fit,(<.08) Reasonable fit (<.10) Poor fit); RMR= Root Means Square Residual (<=0.05); CFI = Comparative fit index (>=.90) ; TLI= Tucker–Lewis Index (>=.90).

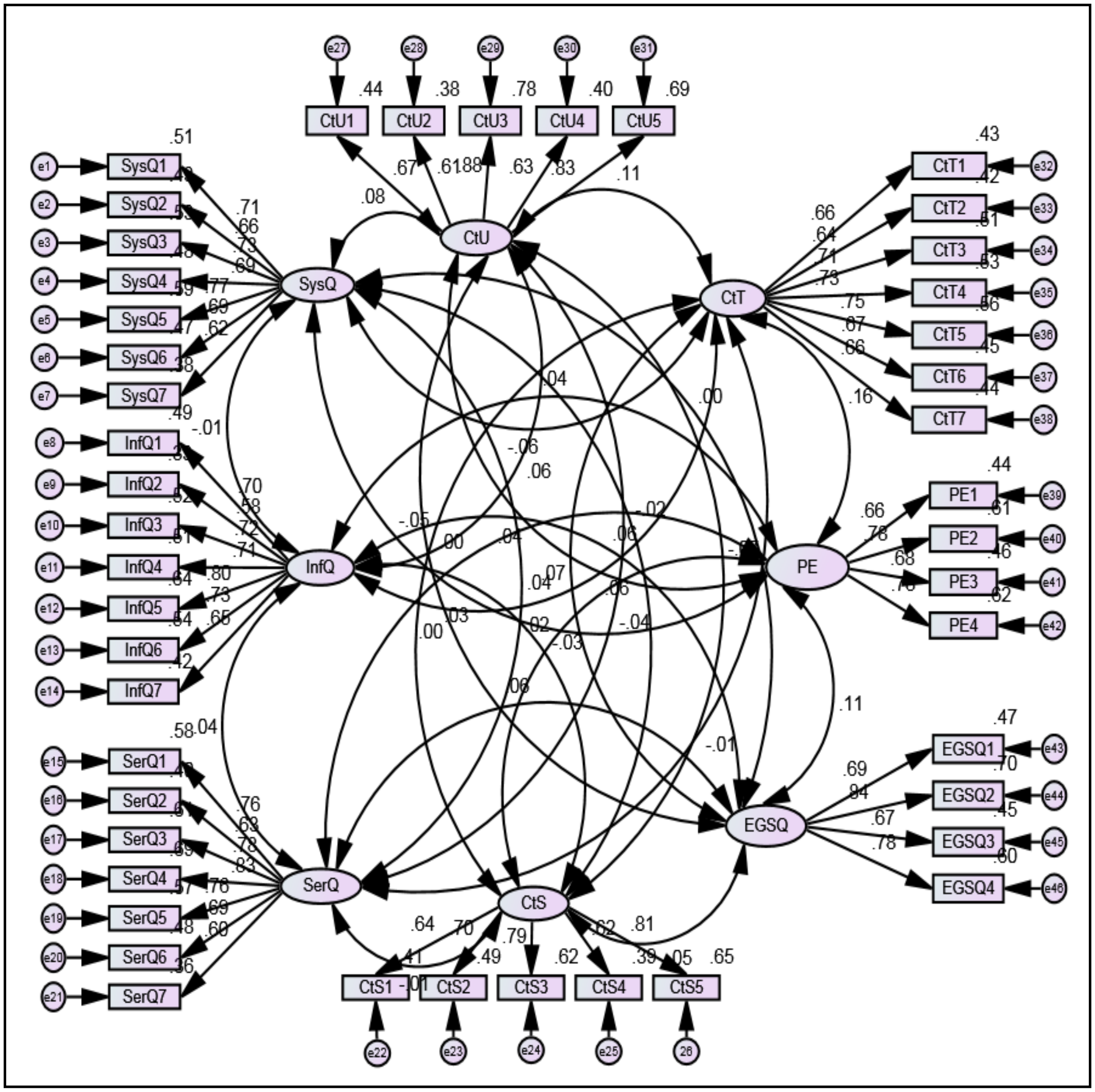


Figure 5.21: First Round Simulation for Proposed Measurements Model

Table 5.40 illustrates the obtained values after running first time simulation for the model fit.

Table 5.40: Other Estimates of Model Fit Indices

Structural Relationship			Standardized Regression Weight	C.R.	P	Squared Multiple Correlations
SysQ1	<---	SysQ	0.713	17.65	***	0.509
SysQ2	<---	SysQ	0.658	15.85	***	0.432
SysQ3	<---	SysQ	0.730	18.20	***	0.532
SysQ4	<---	SysQ	0.695	17.03	***	0.483
SysQ5	<---	SysQ	0.769	19.59	***	0.592
SysQ6	<---	SysQ	0.688	16.80	***	0.473
SysQ7	<---	SysQ	0.616	14.59	***	0.380
InfQ1	<---	InfQ	0.697	17.18	***	0.486
InfQ2	<---	InfQ	0.578	13.54	***	0.334
InfQ3	<---	InfQ	0.721	17.99	***	0.520
InfQ4	<---	InfQ	0.712	17.68	***	0.507
InfQ5	<---	InfQ	0.802	20.89	***	0.643
InfQ6	<---	InfQ	0.732	18.33	***	0.535
InfQ7	<---	InfQ	0.645	15.52	***	0.416
SerQ1	<---	SerQ	0.764	19.71	***	0.584
SerQ2	<---	SerQ	0.634	15.35	***	0.402
SerQ3	<---	SerQ	0.778	20.23	***	0.605
SerQ4	<---	SerQ	0.833	22.38	***	0.693
SerQ5	<---	SerQ	0.757	19.46	***	0.573
SerQ6	<---	SerQ	0.694	17.26	***	0.482
SerQ7	<---	SerQ	0.599	14.29	***	0.359
CtU1	<---	CtU	0.666	16.23	***	0.444
CtU2	<---	CtU	0.614	14.65	***	0.378
CtU3	<---	CtU	0.881	23.90	***	0.776
CtU4	<---	CtU	0.634	15.24	***	0.402
CtU5	<---	CtU	0.833	22.01	***	0.693
CtS1	<---	CtS	0.641	15.12	***	0.410
CtS2	<---	CtS	0.699	16.91	***	0.488
CtS3	<---	CtS	0.788	19.86	***	0.621
CtS4	<---	CtS	0.624	14.62	***	0.389
CtS5	<---	CtS	0.807	20.53	***	0.651
CtT1	<---	CtT	0.657	15.78	***	0.431
CtT2	<---	CtT	0.644	15.40	***	0.415
CtT3	<---	CtT	0.714	17.60	***	0.509
CtT4	<---	CtT	0.729	18.12	***	0.531
CtT5	<---	CtT	0.750	18.85	***	0.563

Structural Relationship			Standardized Regression Weight	C.R.	P	Squared Multiple Correlations
CtT6	<---	CtT	0.671	16.21	***	0.450
CtT7	<---	CtT	0.662	15.93	***	0.438
EGSQ1	<---	EGSQ	0.686	16.41	***	0.470
EGSQ2	<---	EGSQ	0.837	21.26	***	0.700
EGSQ3	<---	EGSQ	0.672	16.01	***	0.452
EGSQ4	<---	EGSQ	0.777	19.30	***	0.604
PE1	<---	PE	0.664	15.53	***	0.441
PE2	<---	PE	0.779	19.00	***	0.608
PE3	<---	PE	0.676	15.86	***	0.456
PE4	<---	PE	0.784	19.15	***	0.615

Notes: $p < .05$, ** $p < .01$, *** $p < .001$.
C.R. : Critical Ratio / t – Value
R^2*:* Square multiple correlations

5.9.2.1.2 Second Round Simulation for Model Fit

When first round of simulation for model fit was performed on all the constructs then most of the obtained results were found appropriate except GFI (.866), AGFI (.849), and some of the modification indices. As mentioned in the first round of model fit simulation, some of the modification indices indicated quite high error terms including (e6, e7), (e9, e11), (e10, e11), (e13, e14), (e15, e18), (e33, e37), (e34, 35), and (e37, e38). Hence, for resolving this issue first an item CtT7 was dropped. In some high error terms including (e13, e14), (e33, e37), and (e34, 35) covariance was provided to improve the poor model fit and second time simulation was performed.

When second round simulation for model fit was performed on all the constructs then obtained results were found inappropriate. Hence, the proposed model as model fit was not achieved.

Criteria that establish the whole model fit in second round simulation particularly Chi-square (1398.659), degree of freedom (df=914), p=.000, CMIN/DF (1.530), RMSEA (.032), RMR (.020), CLI (.950), and TLI (.945) were found within acceptable range. Other model fit criteria GFI (.892) and AGFI (.877) also improved but still not achieved the desired level of acceptance hence in second round of simulation the model fit was not good. However, other maximum likelihood estimates were found within the acceptable range. This includes standardized regression weights / factor loadings of the items associated with latent variables which were found more than (0.50) also squared multiple correlations were found more than (0.30). The proposed measurement model is depicted in figure 5.22 while the fit statistics and indices for the proposed measurement model are summarised in Table 5.41 and Table 5.42. Tables 5.41 and 5.42 illustrate the obtained values after running first simulation for the model fit.

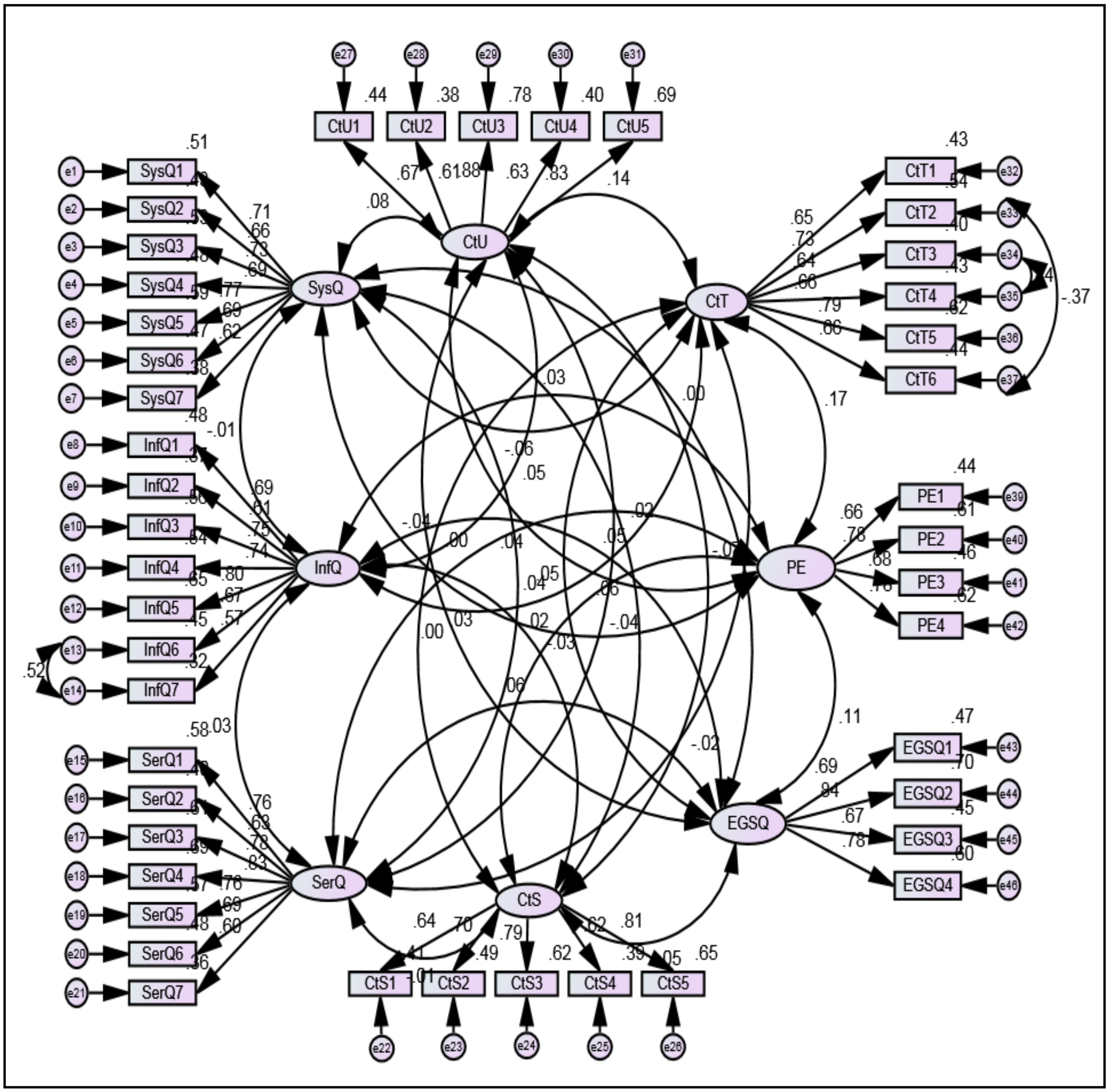


Figure 5.22: Second Round Simulation for Measurement Model Fit

Table 5.41: Model Fit Indices after Second Round Simulation

Chi-square = 1398.659, Degrees of freedom = 914 (CMIN / DF or χ 2/df =1.530) p=.000						
Model	**GFI**	**AGFI**	**RMSEA**	**RMR**	**CFI**	**TLI**
Obtained values	.892	.877	0.032	0.020	.950	.945

Note:

Chi-square = χ2; degree of freedom= df; Normed chi-square or ratio of likelihood (χ2) to degrees of freedom= χ 2/df; GFI = Goodness of fit index (>-0.90); AGFI: Adjusted goodness of fit index (>=0.80) acceptable but >=0.90 good fit; RMSEA = Root mean square error of approximation (Value (<.06) Good model fit,(<.08) Reasonable fit (<.10) Poor fit); RMR= Root Means Square Residual (<=0.05); CFI = Comparative fit index (>=.90) ; TLI= Tucker–Lewis Index (>=.90).

Table 5.42: Other Estimates of Model Fit Indices in Second Round Simulation

Structural Relationship			**Standardized Regression Weight**	**C.R.**	**P**	**Squared Multiple Correlations**
SysQ1	<---	SysQ	0.713	17.655	***	0.509
SysQ2	<---	SysQ	0.658	15.853	***	0.432
SysQ3	<---	SysQ	0.73	18.206	***	0.532
SysQ4	<---	SysQ	0.695	17.044	***	0.483
SysQ5	<---	SysQ	0.769	19.591	***	0.592
SysQ6	<---	SysQ	0.687	16.799	***	0.473
SysQ7	<---	SysQ	0.616	14.596	***	0.380
InfQ1	<---	InfQ	0.694	16.957	***	0.481
InfQ2	<---	InfQ	0.605	14.247	***	0.366
InfQ3	<---	InfQ	0.747	18.758	***	0.558
InfQ4	<---	InfQ	0.738	18.425	***	0.544
InfQ5	<---	InfQ	0.803	20.775	***	0.645
InfQ6	<---	InfQ	0.668	16.132	***	0.446
InfQ7	<---	InfQ	0.566	13.071	***	0.320
SerQ1	<---	SerQ	0.764	19.719	***	0.584
SerQ2	<---	SerQ	0.634	15.354	***	0.402
SerQ3	<---	SerQ	0.778	20.239	***	0.605
SerQ4	<---	SerQ	0.833	22.382	***	0.693
SerQ5	<---	SerQ	0.757	19.467	***	0.574
SerQ6	<---	SerQ	0.694	17.267	***	0.482
SerQ7	<---	SerQ	0.599	14.294	***	0.359

Structural Relationship			Standardized Regression Weight	C.R.	P	Squared Multiple Correlations
CtU1	<---	CtU	0.667	16.247	***	0.444
CtU2	<---	CtU	0.614	14.643	***	0.377
CtU3	<---	CtU	0.880	23.898	***	0.775
CtU4	<---	CtU	0.634	15.231	***	0.402
CtU5	<---	CtU	0.833	22.030	***	0.694
CtS1	<---	CtS	0.640	15.119	***	0.410
CtS2	<---	CtS	0.699	16.908	***	0.488
CtS3	<---	CtS	0.788	19.868	***	0.621
CtS4	<---	CtS	0.623	14.619	***	0.389
CtS5	<---	CtS	0.807	20.536	***	0.651
CtT1	<---	CtT	0.653	15.620	***	0.427
CtT2	<---	CtT	0.734	17.509	***	0.538
CtT3	<---	CtT	0.635	15.012	***	0.404
CtT4	<---	CtT	0.659	15.736	***	0.434
CtT5	<---	CtT	0.788	19.969	***	0.621
CtT6	<---	CtT	0.664	15.266	***	0.441
EGSQ1	<---	EGSQ	0.685	16.406	***	0.470
EGSQ2	<---	EGSQ	0.836	21.258	***	0.700
EGSQ3	<---	EGSQ	0.673	16.017	***	0.452
EGSQ4	<---	EGSQ	0.777	19.304	***	0.604
PE1	<---	PE	0.664	15.538	***	0.441
PE2	<---	PE	0.779	18.985	***	0.606
PE3	<---	PE	0.676	15.881	***	0.457
PE4	<---	PE	0.785	19.166	***	0.616

Notes: $*p < .05$, $** p < .01$, $*** p < .001$.
C.R. : Critical Ratio / t – Value
R^2*:* Square multiple correlations

As model was not achieved, therefore it was important to investigate the other possibilities which interrupted the model fit. To find out the grounds for model misspecification, it was necessary to look carefully into the modification indices. After looking at the modification indices, the covariance between some error terms (e2, e3), (e6, e7), (e9, e11), (e10, e11), (e15, e18) and (e28, e30) were quite high. To resolve this issue covariance between high error terms were applied and one item SerQ4 was dropped and third time simulation for model fit was performed.

5.9.2.1.3 Third Round Simulation for Model Fit

Second round of simulation for model fit was performed on all the constructs but obtained results indicated the poor model fit. Therefore, the possibilities which interrupted the model fit were investigated. To identify the reason for model misspecification, elevated modification indices error term particularly (e2, e3), (e6, e7), (e9, e11), (e10, e11), (e15, e18) and (e28, e30) were considered. For resolving this issue, first correlations were applied between the error terms (e2, e3), (e10, e11) and (e28, e30) and also SerQ4 item was dropped and then third time simulation for model fit was performed.

Figure 5.23 shows how various error terms are correlated in the proposed model.

Possible criteria that establish the whole model fit in third round simulation particularly Chi-square (1224.007), degree of freedom (df=868), p=.000, CMIN/DF (1.410), GFI (.903), RMSEA (.028), RMR (.020), CFI (.961), and TLI (.957) were found within acceptable range. Other model fit criteria AGFI (.889) improved but still not achieved the desired level of acceptance hence in third round of simulation the model fit was not reasonably achieved. However, other maximum likelihood estimates were found within the acceptable range. This includes standardized regression weights / factor loadings of the items associated with latent variables which were found more than (0.50) and squared multiple correlations were found more than (0.30). The proposed measurement model is depicted in figure 5.23 while the fit statistics and indices for the proposed measurement model are summarised in Table 5.43 and Table 5.44.

Table 5.43: Model Fit Indices after Third Round Simulation

Chi-square = 1224.007 Degrees of freedom = 868 (CMIN / DF or χ 2/df =1.410) p=.000						
Model	**GFI**	**AGFI**	**RMSEA**	**RMR**	**CFI**	**TLI**
Obtained values	.903	.889	0.028	0.020	.961	.957

Note:

Chi-square = χ2; degree of freedom= df; Normed chi-square or ratio of likelihood (χ2) to degrees of freedom= χ 2/df; GFI = Goodness of fit index (>-0.90); AGFI: Adjusted goodness of fit index (>=0.80) acceptable but >=0.90 good fit; RMSEA = Root mean square error of approximation (Value (<.06) Good model fit,(<.08) Reasonable fit (<.10) Poor fit); RMR= Root Means Square Residual (<=0.05); CFI = Comparative fit index (>=.90) ; TLI= Tucker–Lewis Index (>=.90).

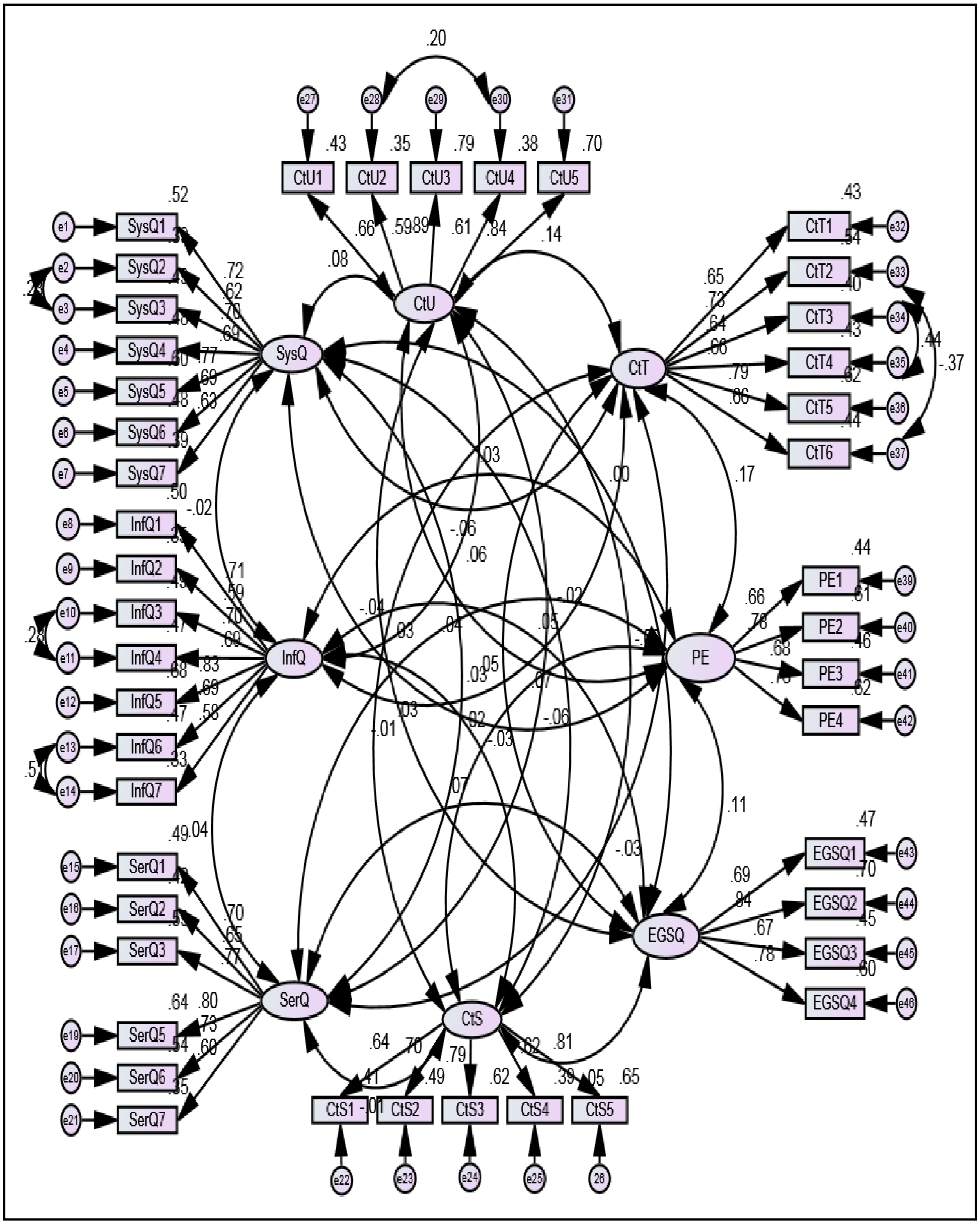


Figure 5.23: Third Round Simulation for Measurement Model Fit

Table 5.44: Other Estimates of Model Fit Indices in Third Round Simulation

Structural Relationship			Standardized Regression Weight	C.R.	P	Squared Multiple Correlations
SysQ1	<---	SysQ	0.724	17.915	***	0.524
SysQ2	<---	SysQ	0.625	14.652	***	0.390
SysQ3	<---	SysQ	0.703	17.154	***	0.495
SysQ4	<---	SysQ	0.694	16.931	***	0.482
SysQ5	<---	SysQ	0.774	19.644	***	0.599
SysQ6	<---	SysQ	0.693	16.890	***	0.480
SysQ7	<---	SysQ	0.628	14.879	***	0.394
InfQ1	<---	InfQ	0.710	17.354	***	0.504
InfQ2	<---	InfQ	0.590	13.720	***	0.348
InfQ3	<---	InfQ	0.701	16.924	***	0.491
InfQ4	<---	InfQ	0.688	16.513	***	0.473
InfQ5	<---	InfQ	0.827	21.410	***	0.684
InfQ6	<---	InfQ	0.689	16.68	***	0.475
InfQ7	<---	InfQ	0.577	13.267	***	0.333
SerQ1	<---	SerQ	0.700	17.136	***	0.489
SerQ2	<---	SerQ	0.646	15.449	***	0.417
SerQ3	<---	SerQ	0.766	19.389	***	0.586
SerQ5	<---	SerQ	0.799	20.588	***	0.638
SerQ6	<---	SerQ	0.733	18.259	***	0.538
SerQ7	<---	SerQ	0.595	13.947	***	0.354
CtT1	<---	CtT	0.653	15.620	***	0.427
CtT2	<---	CtT	0.734	17.509	***	0.538
CtT3	<---	CtT	0.635	15.010	***	0.403
CtT4	<---	CtT	0.659	15.734	***	0.434
CtT5	<---	CtT	0.788	19.968	***	0.621
CtT6	<---	CtT	0.664	15.275	***	0.441
CtU1	<---	CtU	0.659	16.003	***	0.434
CtU2	<---	CtU	0.592	13.955	***	0.351
CtU3	<---	CtU	0.889	24.078	***	0.790
CtU4	<---	CtU	0.613	14.568	***	0.376
CtU5	<---	CtU	0.839	22.176	***	0.705
CtS1	<---	CtS	0.640	15.118	***	0.410
CtS2	<---	CtS	0.698	16.905	***	0.488
CtS3	<---	CtS	0.788	19.868	***	0.621
CtS4	<---	CtS	0.623	14.618	***	0.389

Structural Relationship			Standardized Regression Weight	C.R.	P	Squared Multiple Correlations
CtS5	<---	CtS	0.807	20.539	***	0.652
EGSQ1	<---	EGSQ	0.685	16.405	***	0.470
EGSQ2	<---	EGSQ	0.836	21.247	***	0.699
EGSQ3	<---	EGSQ	0.673	16.025	***	0.453
EGSQ4	<---	EGSQ	0.778	19.311	***	0.605
PE1	<---	PE	0.664	15.534	***	0.441
PE2	<---	PE	0.779	18.998	***	0.607
PE3	<---	PE	0.676	15.873	***	0.457
PE4	<---	PE	0.785	19.168	***	0.616

Notes: $p < .05$, ** $p < .01$, *** $p < .001$.
C.R. : Critical Ratio / t – Value
R^2*:* Square multiple correlations

As GFI (.903) improved but still model was not achieved, therefore it was important to investigate the other possibilities which interrupted the model fit. To find out the grounds for model misspecification, it was necessary to look carefully into the modification indices. Observing carefully the modification indices, the covariance between some error terms (e6, e7), (e9, e11), (e22, e23), and (e27, e28) were found quite high. To resolve this issue, covariance between high error terms were applied and one item SysQ6 was dropped and fourth time simulation for model fit was performed.

5.9.2.1.4 Fourth Round Simulation for Model Fit

Third round simulation for model fit was performed on all the constructs and most of the obtained results were found appropriate except AGFI (.889) hence the proposed model as model fit was not achieved. To identify the reason for model poor fit, elevated modification indices error term considered to investigate. Carefully observing the modification indices, the covariance between some error terms were high (>10). So for achieving the model fit, correlation was applied between the error terms (e9, e11), (e22, e23), and (e27, e28), further an item SysQ6 was dropped then fourth time simulation for model fit was performed. Figure 5.24 shows various error terms are correlated in the proposed model.

All of the criteria that determine the overall model fit in fourth round simulation particularly Chi-square (1094.435), degree of freedom (df=824), p=.000, CMIN/DF (1.328), GFI (.911), RMR (.019), RMSEA (.025), CLI (.969), and TLI (.966) were found well within acceptable range also GFI improved and reached to the acceptable range. Other model fit criteria AGFI (.897) improved but still behind the desired level of acceptance hence in fourth round of simulation, the model fit was not reasonably achieved. However, other maximum likelihood estimates were found within the acceptable range. This includes standardized regression weights / factor loadings of the items associated with latent variables were found more than (0.50) also squared multiple correlations found more than (0.30). The proposed measurement model depicted in figure 5.24 while the fit statistics and indices for the proposed measurement model are summarised in Table 5.45 and Table 5.46.

Table 5.45: Model Fit Indices after Fourth Round Simulation

Chi-square = 1094.435, Degrees of freedom = 824 (CMIN / DF or χ 2/df =1.328) p=.000						
Model	**GFI**	**AGFI**	**RMSEA**	**RMR**	**CFI**	**TLI**
Obtained values	.911	.897	0.025	0.019	.969	.966

Note:

Chi-square = $\chi 2$; degree of freedom= df; Normed chi-square or ratio of likelihood ($\chi 2$) to degrees of freedom= χ 2/df; GFI = Goodness of fit index (>-0.90); AGFI: Adjusted goodness of fit index (>=0.80) acceptable but >=0.90 good fit; RMSEA = Root mean square error of approximation (Value (<.06) Good model fit,(<.08) Reasonable fit (<.10) Poor fit); RMR= Root Means Square Residual (<=0.05); CFI = Comparative fit index (>=.90) ; TLI= Tucker–Lewis Index (>=.90).

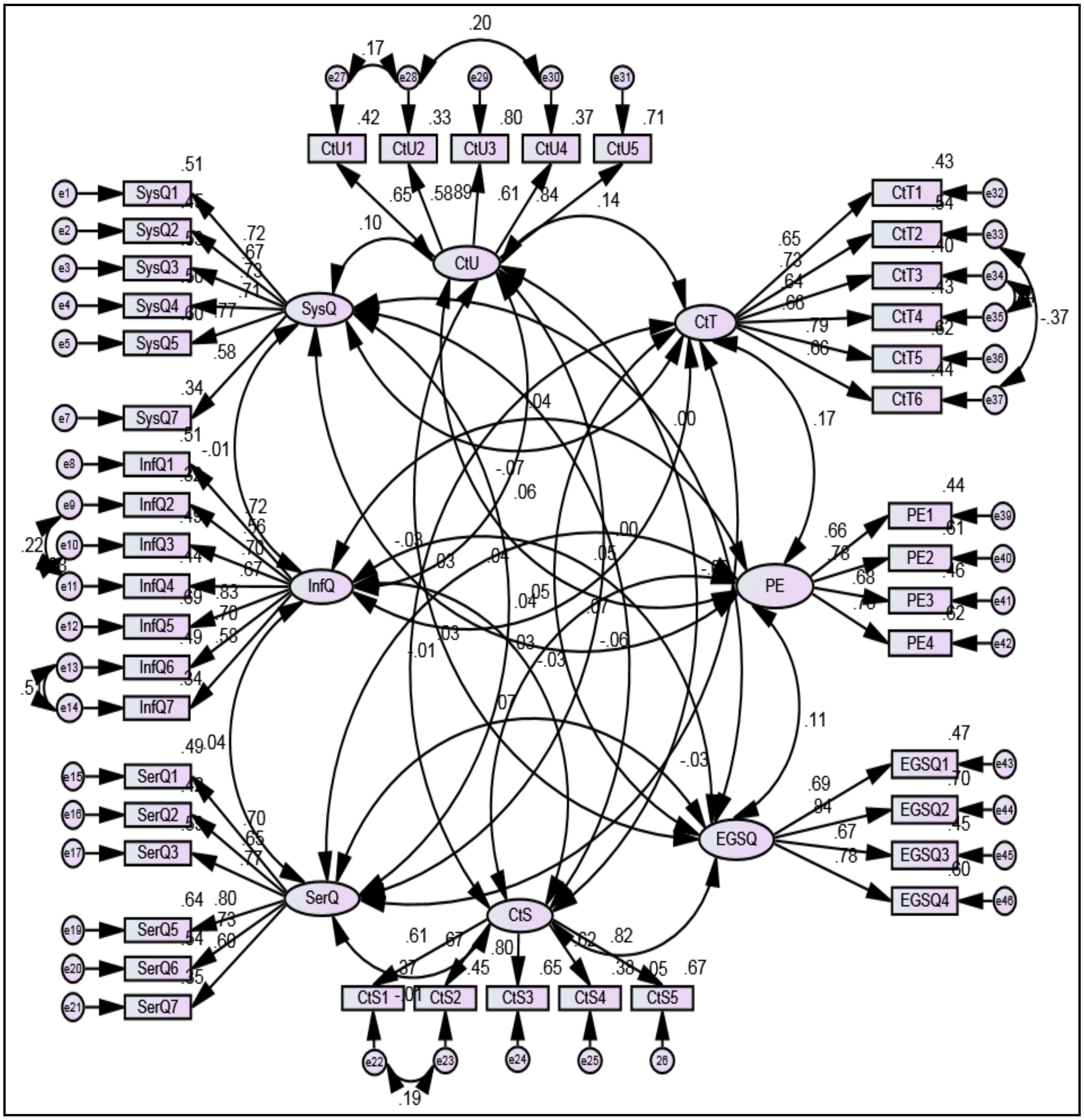


Figure 5.24: Fourth Round Simulation for Measurement Model Fit

Table 5.46: Other Estimates of Model Fit Indices in Fourth Round Simulation

Structural Relationship			Standardized Regression Weight	C.R.	P	Square Multiple Correlation
SysQ1	<---	SysQ	0.716	17.545	***	0.513
SysQ2	<---	SysQ	0.667	15.995	***	0.445
SysQ3	<---	SysQ	0.728	17.942	***	0.530
SysQ4	<---	SysQ	0.706	17.226	***	0.499
SysQ5	<---	SysQ	0.773	19.496	***	0.598
SysQ7	<---	SysQ	0.581	13.450	***	0.338
InfQ1	<---	InfQ	0.716	17.507	***	0.512
InfQ2	<---	InfQ	0.564	12.916	***	0.318
InfQ3	<---	InfQ	0.698	16.846	***	0.487
InfQ4	<---	InfQ	0.666	15.766	***	0.444
InfQ5	<---	InfQ	0.832	21.480	***	0.692
InfQ6	<---	InfQ	0.699	16.936	***	0.488
InfQ7	<---	InfQ	0.580	13.322	***	0.337
SerQ1	<---	SerQ	0.699	17.136	***	0.489
SerQ2	<---	SerQ	0.646	15.452	***	0.417
SerQ3	<---	SerQ	0.766	19.390	***	0.586
SerQ5	<---	SerQ	0.799	20.587	***	0.638
SerQ6	<---	SerQ	0.733	18.261	***	0.538
SerQ7	<---	SerQ	0.595	13.945	***	0.354
CtT1	<---	CtT	0.653	15.616	***	0.426
CtT2	<---	CtT	0.734	17.513	***	0.538
CtT3	<---	CtT	0.635	15.011	***	0.403
CtT4	<---	CtT	0.659	15.735	***	0.434
CtT5	<---	CtT	0.788	19.966	***	0.621
CtT6	<---	CtT	0.664	15.277	***	0.441
CtU1	<---	CtU	0.646	15.584	***	0.418
CtU2	<---	CtU	0.578	13.476	***	0.334
CtU3	<---	CtU	0.893	24.119	***	0.798
CtU4	<---	CtU	0.611	14.528	***	0.373
CtU5	<---	CtU	0.842	22.188	***	0.709
CtS1	<---	CtS	0.607	13.952	***	0.369
CtS2	<---	CtS	0.669	15.834	***	0.448
CtS3	<---	CtS	0.804	20.261	***	0.647
CtS4	<---	CtS	0.620	14.481	***	0.385
CtS5	<---	CtS	0.816	20.662	***	0.666

Structural Relationship			Standardized Regression Weight	C.R.	P	Square Multiple Correlation
EGSQ1	<---	EGSQ	0.685	16.405	***	0.470
EGSQ2	<---	EGSQ	0.836	21.249	***	0.699
EGSQ3	<---	EGSQ	0.673	16.024	***	0.453
EGSQ4	<---	EGSQ	0.778	19.309	***	0.605
PE1	<---	PE	0.664	15.533	***	0.441
PE2	<---	PE	0.779	18.998	***	0.607
PE3	<---	PE	0.676	15.872	***	0.457
PE4	<---	PE	0.785	19.168	***	0.616
Notes: $p < .05$, ** $p < .01$, *** $p < .001$. *C.R. :* Critical Ratio / t – Value R^2*:* Square multiple correlations						

AGFI (.897) improved in fourth round of model fit simulation and the obtained value of AGFI reached close to the standard value of AGFI (.900). Therefore it was important to investigate the other possibilities which interrupted the model fit. To find out the causes for model misspecification, it was necessary to look carefully into the modification indices. Observing carefully the modification indices, it was found that the covariance between some error terms (e1, e2) and (e2, e3) was quite high. To resolve this issue, covariance was applied in these error terms and simulation was run fifth time.

5.9.2.1.5 Fifth Round Simulation for Model Fit

Fourth round simulation for model fit was performed on all the constructs and most of the obtained results were appropriate but still AGFI (.897) was partially behind the accepted limit hence the criteria of proposed model as model fit was not reasonably achieved. However, some of the researchers recommend the range of AGFI (>=.800) for model fit. As present research considered AGFI (>0.900), accordingly obtained AGFI (.897) was very close to the accepted range. Three other main criteria were also considered for model fit. First, only indicator variables with standardised factor loadings >=.50 were retained. Second, indicator variables whose squared multiple correlations (SMC) were < .30 were dropped. Third, modification indices with high error terms of items / variables were deleted (Hair et al., 2010). However, obtained results satisfied reasonably these three suggested criteria for model fit.

To identify the cause for slight model miss-fit, it was necessary to look carefully into the modification indices. Hence modification indices were considered and covariance between two high (>10) error terms (e1, e2) and (e2, e3) were applied. After running the fifth round of simulation, model fit was improved and achieved. All the specified values met the standard criteria and found well within the range.

Criteria which establish the whole model as model fit in fifth round simulation including Chi-square (1063.192), degree of freedom (df=822), p=.000, CMIN/DF (1.293), GFI (.913), AGFI (.900), RMSEA (.024), RMR (.019), CLI (.973), and TLI (.970) were found well within acceptable range. AGFI (.900) improved and reached to the benchmark value. Other maximum likelihood estimates also found within the acceptable range. Standardized regression weights / factor loadings of the items associated with latent variables were found more than (0.50) also squared multiple correlations were found more than (0.30). Hence all the obtained results reasonably met the specified criteria for achieving the model fit.

The proposed measurement model is depicted in figure 5.25 while the fit statistics and indices for the proposed measurement model are summarised in Table 5.47 and Table 5.48.

Table 5.47: Model Fit Indices after Fifth Round Simulation

Chi-square = 1063.192, Degrees of freedom = 822 (CMIN / DF or χ 2/df =1.293) p=.000						
Model	**GFI**	**AGFI**	**RMSEA**	**RMR**	**CFI**	**TLI**
Obtained values	.913	.900	0.024	0.019	.973	.970

Note:

Chi-square = χ2; degree of freedom= df; Normed chi-square or ratio of likelihood (χ2) to degrees of freedom= χ 2/df; GFI = Goodness of fit index (>-0.90); AGFI: Adjusted goodness of fit index (>=0.80) acceptable but >=0.90 good fit; RMSEA = Root mean square error of approximation (Value (<.06) Good model fit,(<.08) Reasonable fit (<.10) Poor fit); RMR= Root Means Square Residual (<=0.05); CFI = Comparative fit index (>=.90) ; TLI= Tucker–Lewis Index (>=.90).

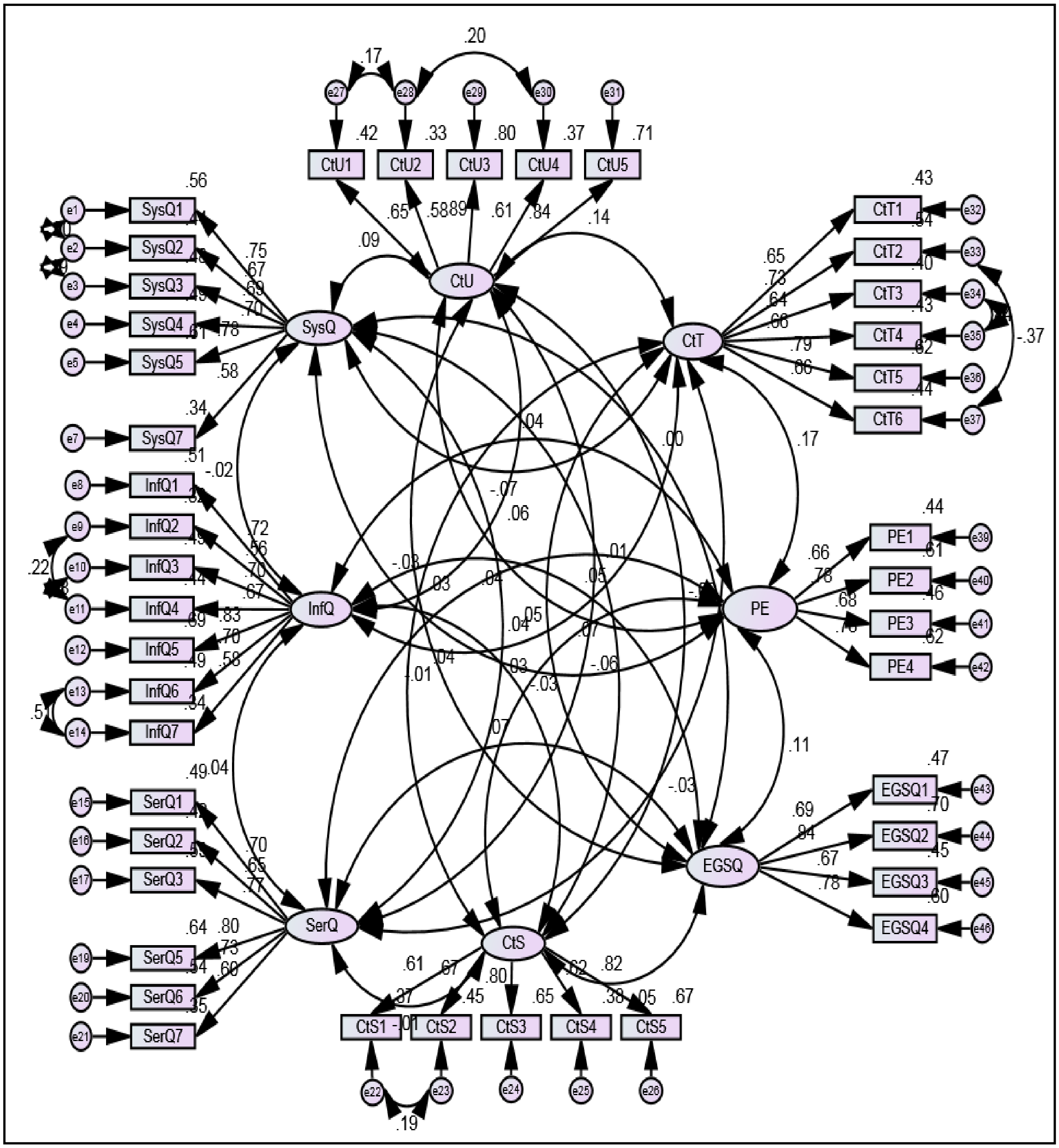


Figure 5.25: Fifth Round Simulation for Measurement Model Fit

Table 5.48: Other Estimates of Model Fit Indices in Fifth Round Simulation

Structural Relationship			**Standardized Regression Weight**	**C.R.**	**P**	**Square Multiple Correlation**
SysQ1	<---	SysQ	0.749	18.346	***	0.560
SysQ2	<---	SysQ	0.665	15.121	***	0.442
SysQ3	<---	SysQ	0.694	16.607	***	0.482
SysQ4	<---	SysQ	0.701	17.042	***	0.491
SysQ5	<---	SysQ	0.779	19.626	***	0.607
SysQ7	<---	SysQ	0.583	13.522	***	0.340
InfQ1	<---	InfQ	0.716	17.508	***	0.513
InfQ2	<---	InfQ	0.564	12.914	***	0.318
InfQ3	<---	InfQ	0.697	16.846	***	0.486
InfQ4	<---	InfQ	0.666	15.765	***	0.444
InfQ5	<---	InfQ	0.832	21.483	***	0.692
InfQ6	<---	InfQ	0.699	16.934	***	0.488
InfQ7	<---	InfQ	0.580	13.321	***	0.337
SerQ1	<---	SerQ	0.700	17.137	***	0.489
SerQ2	<---	SerQ	0.646	15.451	***	0.417
SerQ3	<---	SerQ	0.766	19.39	***	0.586
SerQ5	<---	SerQ	0.799	20.587	***	0.638
SerQ6	<---	SerQ	0.733	18.260	***	0.538
SerQ7	<---	SerQ	0.595	13.944	***	0.354
CtT1	<---	CtT	0.653	15.617	***	0.426
CtT2	<---	CtT	0.734	17.512	***	0.538
CtT3	<---	CtT	0.635	15.01	***	0.403
CtT4	<---	CtT	0.659	15.735	***	0.434
CtT5	<---	CtT	0.788	19.965	***	0.621
CtT6	<---	CtT	0.664	15.278	***	0.441
CtU1	<---	CtU	0.646	15.584	***	0.418
CtU2	<---	CtU	0.578	13.476	***	0.334
CtU3	<---	CtU	0.893	24.114	***	0.798
CtU4	<---	CtU	0.611	14.527	***	0.373
CtU5	<---	CtU	0.842	22.192	***	0.709
CtS1	<---	CtS	0.607	13.948	***	0.368
CtS2	<---	CtS	0.669	15.829	***	0.448
CtS3	<---	CtS	0.805	20.267	***	0.647
CtS4	<---	CtS	0.620	14.480	***	0.384
CtS5	<---	CtS	0.816	20.662	***	0.666
EGSQ1	<---	EGSQ	0.685	16.405	***	0.470

Structural Relationship			Standardized Regression Weight	C.R.	P	Square Multiple Correlation
EGSQ2	<---	EGSQ	0.836	21.249	***	0.699
EGSQ3	<---	EGSQ	0.673	16.024	***	0.453
EGSQ4	<---	EGSQ	0.777	19.309	***	0.605
PE1	<---	PE	0.664	15.529	***	0.441
PE2	<---	PE	0.779	18.995	***	0.607
PE3	<---	PE	0.676	15.874	***	0.457
PE4	<---	PE	0.785	19.175	***	0.616

Notes: $p < .05$, ** $p < .01$, *** $p < .001$.
C.R. : Critical Ratio / t – Value
R^2*:* Square multiple correlations

5.9.2.1.6 Proposed Revised Measurement Model Overall Fit

To validate the measurement model, confirmatory factor analysis is an essential procedure. Once measurement model is validated then only hypothesis testing step could be performed. Further, this process is essential to clear the model from low factor loadings and establish the constructs validity (Hair et al., 2010). Hence, confirmatory factor analysis was performed on the whole measurement model to evaluate the measurement model as model fit. The initial model included forty six items describing eight latent variables including system quality, information quality, service quality, citizens' use, citizens' satisfaction, citizens' trust, perceived e-government service quality, and perceived effectiveness of e-government services. After performing various rounds of simulations forty three items were left as (SysQ6, SerQ4, and CtT7) were dropped.

Since the GFI and AGFI values were below the acceptable scale so measurement model was revised. Five various rounds of simulation for model fit evaluation took place which brought out the measurement model in final stage as fit. In each stage model fit criteria fit indices was followed carefully. In fifth round of simulation, the normed chi-square was (<3), GFI, AGFI, CFI, TLI values were (> .900) above the acceptable range also RMSEA (<.08) and RMR (<.05) were found as per acceptable benchmarks. Additionally, all standardised loadings of items were (>=0.50), squared multiple correlation were (>0.30) and all items' critical ratios (*t*-value) were (>= 1.96) (Hair et al., 2010). However, in each stage due to model misspecification minor amendments incorporated and moved to the next round for model fit simulation. Accordingly, modification was based on three criteria. First, only indicator variables with standardised factor loadings above (>=.50) were retained (Hair et al., 2010). Second, as per Hair et al., (2010), indicator variables whose squared multiple correlations were below (<.30) were dropped. Third, variables' indicators with high modification indices (SysQ6, SerQ4, and CtT7) were deleted. All this indicated that the variables were cross-loading onto other constructs and their error terms values were high (Byrne, 2010). Based on these criteria model was revised and finally the revised model fits the data well. Figure 5.26 shows the proposed revised measurement model. Fit indices for the final model are summarised in Table 5.49. Table 5.50 shows modification indices of revised measurement model after the deletion of some items.

Table 5.49: Model Fit Indices of Proposed Revised Model

Chi-square = 1063.192, Degrees of freedom = 822 (CMIN / DF or χ 2/df =1.293) p=.000						
Model	**GFI**	**AGFI**	**RMSEA**	**RMR**	**CFI**	**TLI**
Obtained values	.913	.900	0.024	0.019	.973	.970

Note:

Chi-square = χ2; degree of freedom= df; Normed chi-square or ratio of likelihood (χ2) to degrees of freedom= χ 2/df; GFI = Goodness of fit index (>-0.90); AGFI: Adjusted goodness of fit index (>=0.80) acceptable but >=0.90 good fit; RMSEA = Root mean square error of approximation (Value (<.06) Good model fit,(<.08) Reasonable fit (<.10) Poor fit); RMR= Root Means Square Residual (<=0.05); CFI = Comparative fit index (>=.90) ; TLI= Tucker–Lewis Index (>=.90).

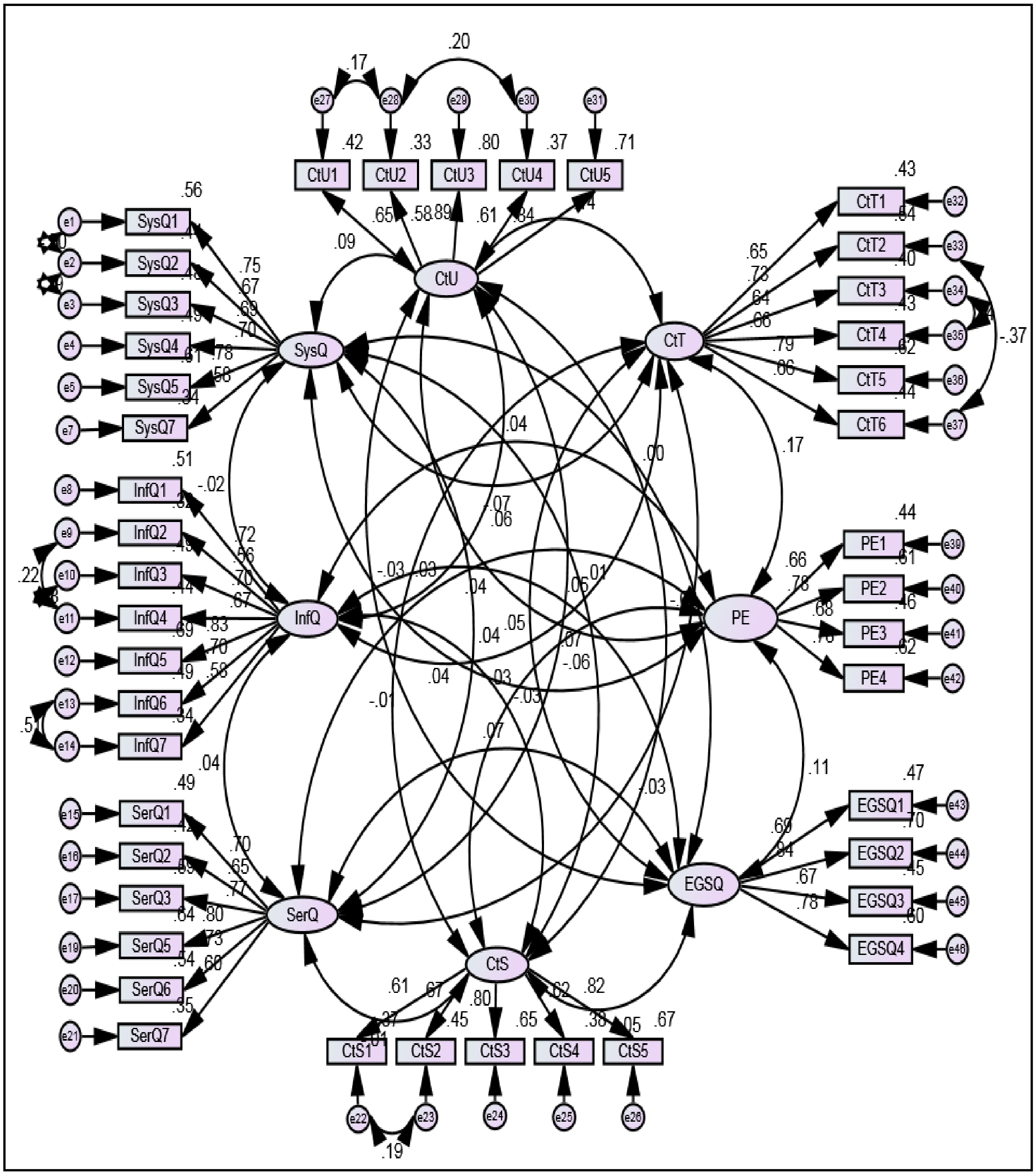


Figure 5.26: Proposed Revised Measurement Model Fit

Table 5.50: Modification Indices of Revised Measurement Model after Items Deletions

Items	Standardized Regression Weight	C.R.	SMC	Item Deleted	Correlated Error Terms
SysQ1	0.749	18.34	0.560		e1<-->e2
SysQ2	0.665	15.12	0.442		e2<-->e3
SysQ3	0.694	16.60	0.482		
SysQ4	0.701	17.04	0.491		
SysQ5	0.779	19.62	0.607		
				SysQ6	
SysQ7	0.583	13.55	0.340		
InfQ1	0.716	17.50	0.513		e9<-->e11
InfQ2	0.564	12.91	0.318		
InfQ3	0.697	16.84	0.486		e10<-->e11
InfQ4	0.666	15.76	0.444		
InfQ5	0.832	21.48	0.692		
InfQ6	0.699	16.93	0.488		e13<-->e14
InfQ7	0.580	13.32	0.337		
SerQ1	0.700	17.13	0.489		
SerQ2	0.646	15.45	0.417		
SerQ3	0.766	19.39	0.586		
				SerQ4	
SerQ5	0.799	20.58	0.638		
SerQ6	0.733	16.26	0.538		
SerQ7	0.595	13.94	0.354		
CtT1	0.653	15.61	0.426		
CtT2	0.734	17.51	0.538		e33<-->e37
CtT3	0.635	15.01	0.403		e34<-->e35
CtT4	0.659	15.73	0.434		
CtT5	0.788	19.96	0.621		
CtT6	0.664	15.27	0.441		
				CtT7	
CtU1	0.646	15.58	0.418		e27<-->e28
CtU2	0.578	13.47	0.334		e28<-->e30
CtU3	0.893	24.11	0.798		
CtU4	0.611	14.52	0.373		
CtU5	0.842	22.19	0.709		
CtS1	0.607	13.94	0.368		e22<-->e23
CtS2	0.669	15.82	0.448		

Items	Standardized Regression Weight	C.R.	SMC	Item Deleted	Correlated Error Terms
CtS3	0.805	20.26	0.647		
CtS4	0.620	14.48	0.384		
CtS5	0.816	20.66	0.666		
EGSQ1	0.685	16.40	0.470		
EGSQ2	0.836	21.24	0.699		
EGSQ3	0.673	16.04	0.453		
EGSQ4	0.777	19.30	0.605		
PE1	0.664	15.52	0.441		
PE2	0.779	18.99	0.607		
PE3	0.676	15.87	0.457		
PE4	0.785	19.17	0.616		

Notes:
C.R. : Critical Ratio / t – Value (>=1.96)
Standardised Regression Weights (>=0.50)
SMC Square multiple correlations (>0.30)

5.10 Reliability and Validity Analysis of Measurement Model

Once the measurement model was achieved and ran with all of the latent constructs then next step was to determine construct reliability, convergent validity and discriminant validity prior to assess the structural model fit. According to Straub et al., (2004) reliability and construct validity are obligatory validities for measurement model fit assessment. While reliability is concerned of measurement within a construct and construct validity has to do with measurement between constructs. To achieve the validity of assessment instruments, results should be reliable and valid for study. Consequently, reliability and validity should be examined for each measures of assessment model and the measurement model should indicate good quality of reliability and validity including convergent validity and discriminant validity.

5.10.1 Constructs' Reliability

Reliability of the construct is used to assess the internal consistency of the constructs by utilizing the Chronbach's Alpha (α) techniques in SPSS (Straub et al., 2004). The reliability for each construct is already illustrated in Table 5.21 which is obtained by applying Chronbach's Aplha (α) to the constructs to measure the internal consistency. After successfully achieving the measurement model we again ran Chronbach's Aplha without using the deleted items of constructs. Table 5.49 shows the obtained Chronbach's Aplha values found (>.80) for each contruct after deleting some items. Composite reliability and average variance extractions are further tests to confirm the constructs' reliability.

Hair et al., (2010) suggest that conducting the reliability test of constructs should take place prior to the constructs validity test. Composite reliability and calculation of average variance extraction is considered as a common procedure in SEM for evaluating the reliability. Thus, Cronbach's alpha, the composite reliability and the average variance extracted were used to measure the reliability of the constructs. Composite reliability should be .70 and above also and the average variance extracted should be .50 or above (Hair et al., 2010; Baker et al., 2007). Table 5.49 shows that all estimations of the constructs reliability were above the suggested cut-off point. Composite reliabilities exceeded the criterion of .70 and average variance extracted values were all above .50, indicating strong reliability and high internal consistency in measuring relationships in the model. As a result, all constructs were found reliable. Table 5.51 shows the constructs reliability.

Table 5.51 Constructs' reliability

Constructs	Composite Reliability (C.R)	Average Variance Extracted (AVE)	Items Deleted	Chronbach's α After deletion of items
System Quality (SysQ)	0.940	0.723	SysQ6	.848
Information Quality (InfQ)	0.947	0.719		.870
Service Quality (SerQ)	0.944	0.737	SerQ4	.856
Citizens' Use (CtU)	0.847	0.533		.850
Citizens' Satisfaction (CtS)	0.833	0.503		.835
Citizens' Trust (CtT)	0.924	0.670	CtT7	.846
E-Government Service Quality (EGSQ)	0.833	0.557		.829
Perceived Effectiveness (PE)	0.821	0.535		.811

Formula used for calculating the composite reliability and average variance extracted:

(1) Composite reliability = (Square of sum of standardized factor loadings) / [(Square of sum of standardized factor loadings) + (Sum of error)]

(2) Average variance extracted =

(Sum of the square of standardized factor loadings) /

[(Sum of the square of standardized factor loadings) + (Sum of error)]

5.10.2 Constructs' Validity

Construct validity measures the hypothetical constructs under investigation (Kline, 2011). Construct validity encompasses convergent validity and discriminant validity further the test of both validities have to be carried out for evaluation of construct validity (Hair et al. 2010). One of the main advantages of CFA is its ability to assess the construct validity of the proposed measurement theory (Kline, 2011; Hair et al., 2010).

5.10.2.1 Convergent Validity

According to Gaffen and Straub (2005) convergent validity refers to what extent the proposed measures within the construct are strongly correlated. Three various procedures may be used to determine convergent validity. By determining the standardized factor loading, average variance extracted, and calculating construct reliability convergent validity can be examined.

Assessment standards include: (a) the standardized regression or factor loadings of the indicators should be significant (>=0.50); (b) The composite reliability of various dimensions is higher than 0.70; (c) Average Variance Extracted (AVE) is higher than 0.50 but we can accept 0.40 because Fornell and Larcker (1981) mentioned that if AVE is less than 0.50, but composite reliability is higher than 0.60, the convergent validity of the construct is still adequate. Few other criteria are also considered to determine convergent validity. Hair et al., (2010) suggest various compute convergent validity. The following benchmark values suggested by various researchers for convergent validity are mentioned in table 5.52.

Table 5.52 Criteria for convergent validity

Convergent validity criteria	Cut-off	Source
Items' standardized factor loading	>=0.50 or >=.60	(Janssens et al., 2008; Hair et al., 2010)
Composite reliability	>=0.70	
Average Variance Extracted	>=0.50	
Cronbach Alpha Coefficient	>=0.70	
Critical Ratio (t-value) (Weak condition)	>=1.96	

Standardized regression coefficients should be greater than 0.50 is the first essential condition and all critical ratio (>= 1.96) is considered as second condition which is a weak condition to confirm convergent validity (Janssen et al., 2008).

Referring to Table 5.53, we can observe that all factor loadings are above 0.50; however, majority of the values are significantly higher than 0.70, and relative critical ratios are above 1.96. Critical ratio lies in between 12.035 to 26.898. Convergent validity criteria for standardized regression weights and critical ratio indicate reasonable score achieved as the obtained values are above the range. Hence, above mentioned both the conditions for convergent validity are satisfied. Next item average variance extracted (AVE) can be determined as the sum of squared multiple correlations divided by the number of factors. Principally obtained value of AVE should be greater than 0.5. AVE results are as follows.

Table 5.53 Obtained convergent validity

Constructs	**Number of items**	**Factor loadings**	**C.R. (Critical Ratio)**	**AVE (Average Variance Extracted)**	**C.R. (Composite Reliability)**
System Quality (SysQ)	SysQ1	0.749	18.34	0.723	0.940
	SysQ2	0.665	15.12		
	SysQ3	0.694	16.60		
	SysQ4	0.701	17.04		
	SysQ5	0.779	19.62		
	SysQ7	0.583	13.55		
Information Quality (InfQ)	InfQ1	0.716	17.50	0.719	0.947
	InfQ2	0.564	12.91		
	InfQ3	0.697	16.84		
	InfQ4	0.666	15.76		
	InfQ5	0.832	21.48		
	InfQ6	0.699	16.93		
	InfQ7	0.580	13.32		
Service Quality (SerQ)	SerQ1	0.700	17.13	0.737	0.944
	SerQ2	0.646	15.45		
	SerQ3	0.766	19.39		
	SerQ5	0.799	20.58		
	SerQ6	0.733	16.26		
	SerQ7	0.595	13.94		
Citizens' Use	CtU1	0.646	15.58	0.533	0.847

Constructs	Number of items	Factor loadings	C.R. (Critical Ratio)	AVE (Average Variance Extracted)	C.R. (Composite Reliability)
(CtU)	CtU2	0.578	13.47		
	CtU3	0.893	24.11		
	CtU4	0.611	14.52		
	CtU5	0.842	22.19		
Citizens' Satisfaction (CtS)	CtS1	0.607	13.94	0.503	0.833
	CtS2	0.669	15.82		
	CtS3	0.805	20.26		
	CtS4	0.620	14.48		
	CtS5	0.816	20.66		
Citizens' Trust (CtT)	CtT1	0.653	15.61	0.670	0.924
	CtT2	0.734	17.51		
	CtT3	0.635	15.01		
	CtT4	0.659	15.73		
	CtT5	0.788	19.96		
	CtT6	0.644	15.27		
Perceived E-government Service Quality (EGSQ)	EGSQ1	0.685	16.40	0.557	0.833
	EGSQ2	0.836	21.24		
	EGSQ3	0.673	16.04		
	EGSQ4	0.777	19.30		
Perceived Effectiveness (PE)	PE1	0.664	15.52	0.535	0.821
	PE2	0.779	18.99		
	PE3	0.676	15.87		
	PE4	0.785	19.17		

5.10.2.2 Dicriminanat Validity

Discriminant validity is the extent to which a construct is truly distinct from other constructs (Hair et. al. 2006). Fornell and Larcker, (1981) suggested that "the square of the correlation between two constructs should be less than their corresponding average variance extracted (AVE)". Discriminant validity was examined by comparing the squared correlation (also shared variance) between constructs with the average variance extracted of the individual construct (Fornell and Larcker, 1981). Analysis showed the squared correlation between constructs were lower than the average variance extracted of the individual construct, which confirmed the discriminant validity. Table 5.54 shows the discriminant validity.

Table 5.54: Measurement of discriminant validity

	PE	SysQ	SerQ	CtS	CtU	EGSQ	InfQ	CtT
PE	0.731							
SysQ	-0.072	0.850						
SerQ	-0.074	0.592	0.858					
CtS	0.019	0.040	0.029	0.710				
CtU	0.060	-0.057	-0.157	-0.066	0.730			
EGSQ	0.108	-0.013	0.036	0.052	-0.002	0.746		
InfQ	0.122	-0.589	-0.555	-0.054	0.161	0.051	0.848	
CtT	0.213	-0.582	-0.554	-0.054	0.212	0.049	0.583	0.819

5.11 Structural Model and Hypotheses Testing

Once the validity of the constructs was assessed and proposed measurement model achieved and model fit was confirmed then the next step was to test the hypothesized relationships among the constructs using structural model. In other way, when a measurement model fulfills the model fit criteria then hypothesized relations between constructs can be confirmed by building a structural model. According to Hair et al., (2010) *"A structural model represents the theory with a set of structural equations and is usually depicted with a visual diagram"*. After confirming the measurement model as model fit, the hypotheses were tested by investigating the strengths of proposed relationships among its constructs. This includes testing the hypothesised theoretical framework and the relationships between latent constructs. Latent constructs are unobserved variables measured by their respective items or indicators. Endogenous and exogenous are the two types of latent variables (Kline, 2011; Hair et al., 2010). CtU, CtS, CtT, EGSQ, and PE are endogenous variables and SysQ, InfQ, and SerQ are exogenous variable in this study.

For testing of the proposed hypotheses, structural model was tested using all eight constructs which were used in measurement model. However three items (SysQ6, SerQ4, and CtT7) were dropped in measurement model. In measurement model, constructs were associated using two sided arrows "covariance" ($\leftrightarrow$) whereas in structural model, constructs were associated using single sided arrow ($\rightarrow$) which represents the "path relationship" between the constructs (Hair et al., 2010). In structural equation modeling (SEM), structural model assessment results produce estimated path coefficient (regression weights), standard errors, critical ratio (C.R.) or t-values, and p-values. The t-values is the critical ratio (C.R.) achieved by dividing path coefficient by standard errors. Hypothesized relationship is considered significant when C.R. or t-value (>=1.96). Non significant path coefficient can be considered unimportant in the model and can be eliminated from the model (Hair et al., 2010).

Figure 5.27 depicts the output of SEM and the graphic representation of structural model. SEM output provides the results of hypotheses testing.

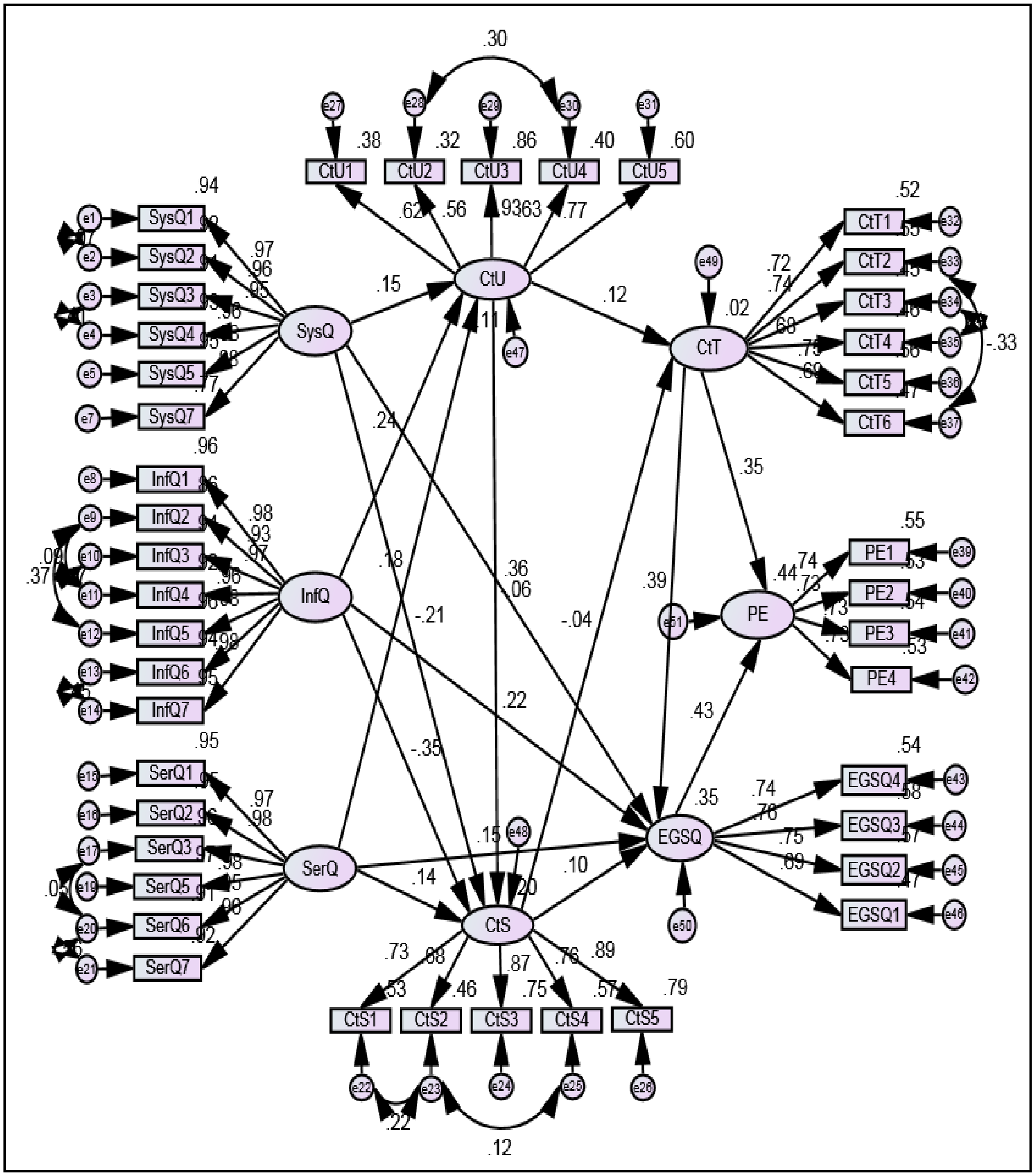


Figure 5.27: Structural Model with All Constructs

Table 5.55 shows the 16 hypothesized relationships represented by underlying paths that were used to test the relationships between the latent constructs.

Table 5.55: Results of Hypotheses Testing from Structural Model

Hypothesized Path / Relationship			**Path Coefficient (β)**	**C.R. (t-Value)**	**P**	**Hypothesis Supported**
SysQ	→	CtU	0.15	3.320	***	Yes /Accepted
InfQ	→	CtU	0.24	5.305	***	Yes /Accepted
SerQ	→	CtU	0.18	4.087	***	Yes /Accepted
InfQ	→	CtS	-0.35	-8.089	***	Yes /Accepted (Negatively Correlated)
SerQ	→	CtS	0.14	3.297	***	Yes /Accepted
CtU	→	CtS	-0.06	-1.295	0.195	No/Rejected
SysQ	→	CtS	0.18	-5.047	***	Yes /Accepted (Negatively Correlated)
CtU	→	CtT	0.12	2.442	0.015**	Yes /Accepted
CtS	→	CtT	-0.04	-0.835	0.404	No/ Rejected
SerQ	→	EGSQ	0.15	3.576	***	Yes /Accepted
InfQ	→	EGSQ	0.22	4.718	***	Yes /Accepted
SysQ	→	EGSQ	0.36	8.136	***	Yes /Accepted
CtS	→	EGSQ	0.10	1.962	0.05*	Yes /Accepted
CtT	→	EGSQ	0.39	8.490	***	Yes /Accepted
CtT	→	PE	0.35	7.665	***	Yes /Accepted
EGSQ	→	PE	0.43	8.960	***	Yes /Accepted

In order to test the hypotheses of the framework, the path analysis was performed. Figure 5.24 shows standardized path coefficients, critical ratios (t-values), and p-values of equations in the hypothesized framework. Path coefficients for each hypothesized path and the corresponding *t*-values >=1.96 represent significance levels *** p<=0.001, ** p<=0.01, * p<=0.05 indicate significance of the coefficients. From the analysis of proposed e-government framework, 51% of the variance on e-government service effectiveness was observed.Figure 5.24 shows 14 hypothesised paths (SysQ→CtU; InfQ→CtU; SerQ→CtU; InfQ→CtS; SerQ→

CtS; SysQ→CtS; CtU→CtT; SerQ→EGSQ; InfQ→EGSQ; SysQ→EGSQ; CtS→EGSQ; CtT →EGSQ; CtT→PE; EGSQ→PE) out of 16 were rightly predicted and found statistically significant. However, underlying path between citizens' use and citizens' satisfaction (CtU→CtS) also citizens' satisfaction and citizens' trust (CtS→CtT) were found statistically insignificant. The relationship between citizens' use and citizens' satisfaction (CtU→CtS) was insignificant, as obtained critical ratio/t-values is -1.295, which is (< 1.96), and also the p-value = .195 is insignificant. Consequently, this hypothesized relationship is found to be invalid in this perspective. Second, the association between citizens' satisfaction and citizens' trust (CtS→CtT) is also insignificant as the critical ratio is -0.835, which is (< 1.96), and the p-value= .404. Therefore, this hypothesis is set at rejection. The information quality and citizens' satisfaction (InfQ → CtS) were found negatively correlated as the obtained critical ratio is -8.089 < (-1.96) at p-value = (***) is significant. Similarly system quality and citizens' satisfaction (SysQ→CtS) were found negatively correlated as the obtained critical ratio is – 5.047 < (- 1.96) at p-value = (***) is significant.

Table 5.55 shows that system quality, information quality and service quality show significant effect on citizens' use or usefulness of e-government services. Hypothesized relationships between system quality and citizens' use (SysQ→CtU), information quality and citizens' use (InfQ→CtU), and service quality and citizens' use (SerQ→CtU) were found to be significant as their critical ratios (3.32, 5.305, and 4.087) were found greater than 1.96 also p-values (***) were found less than .001. Hence the hypothesized relationships (SysQ→CtU; InfQ→CtU; SerQ→CtU) were significant and confirmed the proposed hypotheses H1, H4, and H6.

As discussed before that system quality and information quality were found negatively correlated with citizens' satisfaction; however service quality and citizens' satisfaction were found positively correlated and confirmed the hypothetical relationship among them. In relationship between (SerQ →CtS), the critical ratio / t-value is 3.297 which is greater than 1.96 at p-value = (***) confirmed significant relationship and hypothesis H9.

System quality, information quality, and service quality constructs are positively correlated and show significant effect on overall perceived e-government service quality. This means that for assessing the overall e-government service quality of e-government; the system quality, information quality, and service quality are major contributory constructs. Table 5.55

shows that system quality, information quality and service quality show significant effect on overall perceived e-government service quality of e-government services. Hypothesized relationships between system quality and overall perceived e-government service quality (SysQ→EGSQ), information quality and overall perceived e-government service quality (InfQ→EGSQ), and service quality and overall perceived e-government service quality (SerQ→EGSQ) were found to be significant as their critical ratios (8.136, 4.718, and 3.576) were found greater than 1.96 also p-values (***) were found less than .001 hence the hypothesized relationships (SysQ→EGSQ; InfQ→EGSQ; SerQ→EGSQ) were significant and confirmed the proposed hypotheses (H2, H5, and H8). Hypothesised relationship between citizens' use and citizens' satisfaction (CtU→CtS) was found negative and insignificant due to low β, t, and p values (-0.06,-1.295, 0.195). These results reject the hypothesis H10. Similarly, hypothesised relationship between citizens' satisfaction and citizens' trust (CtS→CtT) was found negative and insignificant due to low β, t, and p values (-0.04, -0.835, 0.404). These results reject the hypothesis H12. Hypothesised relationships between citizens' satisfaction and perceived e-government service quality (CtS→EGSQ) was found significant as their critical ratios (1.962) are greater than 1.96 also p-values (*) is less than .05. Hence, this confirmed the proposed hypothesis H13. Hypothesised relationships between citizens' trust and perceived e-government service quality (CtT→EGSQ) and the hypothesised relationship between citizens' trust and perceived effectiveness (CtT→PE) were found significant as their critical ratios (8.490 and 7.665) are greater than 1.96 also p-values (***) is less than .001. Hence, this confirmed the proposed hypotheses H14 and H15.

Finally, hypothesised relationships between perceived e-government service quality and perceived effectiveness of e-government service (EGSQ→PE) was found significant as their critical ratios (8.960) is greater than 1.96 also p-values (***) is less than .001. Hence, this confirmed the proposed hypothesis H16. Results obtained from the SEM established that majority of the hypothesized relationships are adequately supported.

With the results, it is confirmed that the combined effects of system quality, information quality, and service quality with variance 0.73 on e-government service quality show the significance of various quality constructs in assessing overall e-government service quality. In addition, the impact of citizens' trust on perceived e-government service quality shows the variance 0.39 with confirms the significance of citizens' trust in assessing e-government service quality. Similarly, citizens' trust and perceived e-government service quality show stronger impact on perceived effectiveness of e-government service with variance 0.35 and 0.43. This indicates that for assessing the effectiveness of e-government services; citizens' trust and overall e-government service quality are strong antecedents.

From the structural equation model and hypotheses analysis, It is found that most of the hypothesized relationships are supported by the empirical data and confirmed the findings of the proposed study.

5.12 Proposed Modified Framework (E-GEEF)

Figure 5.28 shows the modified framework drawn based upon the hypotheses confirmed after data analysis. Following is the presentations of the results are arranged in order of hypothesis.

Hypothesis H1 (SysQ→CtU): System quality is positively related to and affects the citizens' use /usefulness of e-tax service in the G2C e-government perspective.

(Accepted)

Hypothesis H2 (SysQ→EGSQ): System quality positively related to and affects perceived e-government service quality in G2C e-government (e-tax service) perspective.

(Accepted)

Hypothesis H3 (SysQ→CtS): System quality positively related to and affects citizens' satisfaction with e-tax service in the G2C e-government perspective.

(Rejected/Negatively Correlated)

Hypothesis H4 (InfQ→CtU): Information quality is positively related and affects the citizens' use / usefulness in G2C e-government (e-tax service) perspective.

(Accepted)

Hypothesis H5 (InfQ→EGSQ): Information quality positively related and affects perceived e-government service quality in the G2C e-government (e-tax service) perspective.

(Accepted)

Hypothesis H6 (InfQ→CtS): Information quality is positively related and affects the citizens' satisfaction in G2C e-government (e-tax service) perspective.

(Rejected/Negatively Correlated)

Hypothesis H7 (SerQ→CtU): Service quality is positively related and affects the citizens' use /usefulness in G2C e-government (e-tax service) perspective.

(Accepted)

Hypothesis H8 (SerQ→EGSQ): Service quality positively affects perceived e-government service quality in the G2C e-government (e-tax service) perspective.

(Accepted)

Hypothesis H9 (SerQ→CtS): Service quality is positively related and affects the citizens' satisfaction in G2C e-government (e-tax service) perspective.

(Accepted)

Hypothesis H10 (CtU→CtS): Citizens' Use /Usefulness positively affect the citizens' satisfaction in G2C e-government (e-tax service) perspective.

(Rejected)

Hypothesis H11 (CtU→CtT): Citizens'Use /Usefulness positively affect citizens' trust in G2C e-government (e-tax service) perspective.

(Accepted)

Hypothesis H12 (CtS→CtT): Citizens' satisfaction positively affects and forms citizens' trust in e-government service in G2C e-government (e-tax service) perspective.

(Rejected)

Hypothesis H13 (CtS→EGSQ): Citizens' satisfaction has positive effect on perceived e-government service quality in G2C e-government (e-tax service) perspective.

(Accepted)

Hypothesis H14 (CtT→EGSQ): Citizens' trust positively affects the perceived e-government service quality in G2C e-government (e-tax service) perspective.

(Accepted)

Hypothesis H15 (CtT→PE): Citizens' trust positively affects the perceived effectiveness of e-government service in G2C e-government (e-tax service) perspective.

(Accepted)

Hypothesis H16 (EGSQ→PE): Overall perceived e-government service quality affects the e-government perceived effectiveness in G2C e-government (e-tax service) perspective.

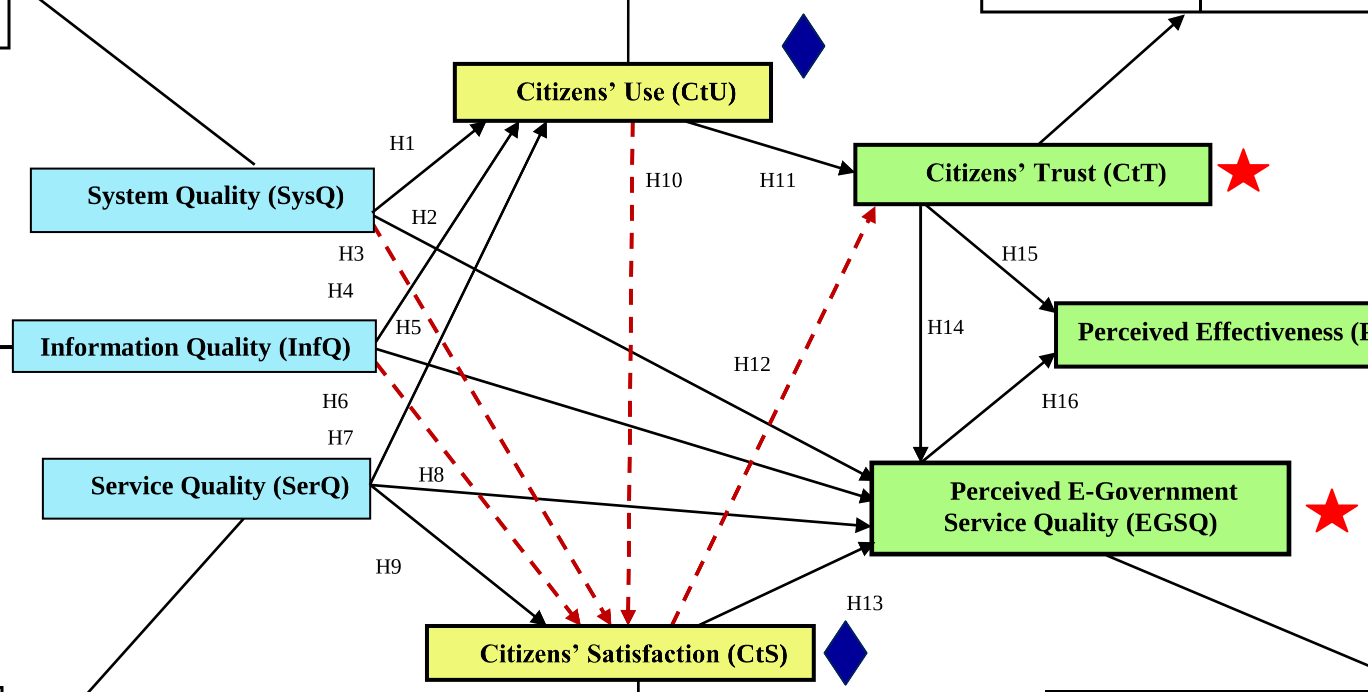
(Accepted)

Accessibility	Government e-tax system is accessible 24 hours online every day whenever I need to access I can access it	SysQ1
Flexibility	E-tax website offers flexibility to use it anywhere	SysQ2
Functionality	E-tax website is easy in its functionality that allows user to browse different pages and does not stuck while using	SysQ3
Reliability	E-tax website is available all the time and quality of contents is appropriate, error free, precise and related to the subject according to the citizen's need	SysQ4
Easy to use	E-tax website allows citizens to use e-government system that enables citizen to accomplish tasks more easily and quickly	SysQ5
Nevigation	It is easy to navigate within this website which allows citizen to go back and forth between pages	SysQ7
Hypothesis (H1) (SysQ →CtU)	System quality is positively related and affects the citizens' use / usefulness of e-tax service in the G2C e-government perspective	
Hypothesis (H2) (SysQ →EGSQ)	System quality is positively related and affects perceived e-government service quality in G2C e-government (e-tax service) perspective.	
Hypothesis (H3) (SysQ → CtS)	System quality is positively related and affects citizens' satisfaction with e-tax service in the G2C e-government perspective.	

Frequency of use	I regularly use government e-tax service and whenever I need to file my tax online I choose to file through e-tax website	CtU1
Intension to reuse	I have intension to use government e-tax service again in the future	CtU2
Nature of use	Effectively I can use and perform a variety of e-tax related operations and tasks using government e-tax service	CtU3
Interactivity	It is easy to intreract efficiently while navigating within the government e-tax website and use e-services	CtU4
Number of Transaction	Using the government e-tax service makes it easier to do my task and I can perform number of transactions	CtU5
Hypothesis (H10) (CtU→CtS)	Citizens' Use /Usefulness positively affect the citizens' satisfaction in G2C e-government (e-tax service) perspective	
Hypothesis (H11) (CtU→CtT)	Citizens' Use / Usefulness positively affect citizens' trust in G2C e-government (e-tax service) perspective.	

Usability	Based on my experience with e-tax service, I found that there is usable trustworthy e-tax service is being offered	CtT1
Privacy	Based on my experience I found that there is sufficient privacy given to my account and associated information	CtT2
Security	Based on my experience I found there is a sufficient security measure followed to protect my online information	CtT3
Transaction Transparency	I found that offered e-tax e-service is transparent in the transactions	CtT4
Unambiguous	I found that offered e-tax service is unambiguous and provides appropriate transparent information to the citizens	CtT5
Responsiveness	Based on my experience with e-tax service, I found that my e-tax request processed in minimum amount of time	CtT6
Hypothesis (H14) (CtT →EGSQ)	Citizens' trust positively affects the perceived e-government service quality in G2C e-government (e-tax service) perspective.	
Hypothesis (H15) (CtT→PE)	Citizens' trust positively affects the perceived effectiveness of e-government service in G2C e-government (e-tax service) perspective.	

Accuracy	Information on the government e-tax website is accurate and error free also, covers all information desired	InfQ1
Relevance	Information presented on the government e-tax website is comparative to the citizen's needs and subject matter	InfQ2
Completeness	Government e-tax service website provides up-to-date and sufficient information which enables citizens to complete their task	InfQ3
Trusworithiness	Information on the government e-tax website is trustworthy and consistent	InfQ4
Availability	Government e-tax service website provides precise information to the citizens	InfQ5
Timeliness	Government e-tax service website provides desired information at the right time or in timely manner to the citizens	InfQ6
Consistency	Information on this e-tax service website is consistently available for the citizens to complete their task	InfQ7
Hypothesis (H4) (InfQ →CtU)	Information quality is positively related and affects the citizens' use / usefulness in G2C e-government (e-tax service) perspective	
Hypothesis (H5) (InfQ →EGSQ)	Information quality is positively related and affects perceived e-government service quality in the G2C e-government (e-tax service) perspective	
Hypothesis (H5) (InfQ →CtS)	Information quality is positively related and affects the citizens' satisfaction in G2C e-government (e-tax service) perspective.	



Based on my experience I have full trust in offered government e-tax service.	PE1
Government e-tax service provides overall outstanding e-service quality to the citizens.	PE2
Government e-tax service offers risk free e-tax service to their citizens.	PE3
Government e-tax service is overall effective.	PE4

Assurance	Government e-tax service website assures citizens to provide necessary information and forms to be downloaded	SerQ1
Flexibility	E-tax service website provides citizens flexibility to continue and complete the remaining work at any time in next login and whenever citizen find comfortable	SerQ2
Reliability	Government e-tax service website provides reliable service to their citizens	SerQ3
Transparent	Government e-tax service provides citizens transparent service. Nothing they keep hidden when services released to their citizens	SerQ5
Sufficiency	Government provides sufficient understanding and helpful instructions to the citizens to complete their task related to the e-tax	SerQ6
Responsiveness	Government online services loads all texts and graphics quickly and respond to the query made by citizens	SerQ7
Hypothesis (H7) (SerQ →CtU)	Service quality is positively related and affects the citizens' use / usefulness in G2C e-government (e-tax service) perspective	
Hypothesis (H8) (SerQ →EGSQ)	Service quality positively affects perceived e-government service quality in the G2C e-government (e-tax service) perspective.	
Hypothesis (H9) (SerQ →CtS)	Service quality is positively related and affects the citizens' satisfaction in G2C e-government (e-tax service) perspective.	

Efficiency	Based on my experience I found e-tax services are effective and efficient	CtS1
Valuable	Based on my experience I found e-tax service is valuable and the information includes all necessary values	CtS2
Adequacy	While using government e-tax service I found satisfactory use of it which provides full confidentiality to my information	CtS3
System Satisfaction	I found e-tax service system is competent and I am fully satisfied with e-tax service system of government	CtS4
Information Satisfaction	Based on my experience I found that overall I am satisfied by information provided by e-tax service	CtS5
Hypothesis (H12) (CtS →CtT)	Citizens' satisfaction positively affects and forms citizens' trust in e-government service in G2C e-government (e-tax service) perspective	
Hypothesis (H13) (CtS →EGSQ)	Citizens' satisfaction has positive effect on perceived e-government service quality in G2C e-government (e-tax service) perspective.	

Service Functionality	Government e-tax service provides interactive environment to the citizens along with effective functionality of e-tax service system	EGSQ1
Reliability	Government e-tax service provides reliable service to the citizens	EGSQ2
Citizens' support	Government e-tax service provides necessary user support on the website and gives special attention to every users individually	EGSQ3
Service Satisfaction	Government e-tax service website provides helpful instruction for performing my task	EGSQ4
Hypothesis (H16) (EGSQ→PE)	Overall perceived e-government service quality affects the e-government perceived effectiveness in G2C e-government (e-tax service) perspective.	

New Dimensions
Revised Dimensions
Accepted Hypothesis
Rejected Hypothesis

Figure 5.28: Modified Framework (E-GEEF)
Base Model: DeLone & McLean, (2003)

5.13 Summary

The purpose of this chapter was to perform validation of the proposed framework E-GEEF using SEM which is an advanced quantitative analysis technique. For performing the advanced data analysis, two softwares including SPSS 20 and AMOS 21 were used. Descriptive analysis was performed using SPSS 20. Data file wass created in SPSS to check the data normality. After identifying the normality of the data, analysis proceeded towards advance statistical analysis SEM using AMOS 21. Proposed framework's constructs along with their items tested using confirmatory factor analyis. CFA was applied on each individual construct. Later stage move towards the assessment of measurement model fit. Six rounds simulation was carried out to confirm the measurement model as model fit. Constructs reliability and validity were achieved using discriminant validity and convergent validity test. Finally, path analysis was accomplished using structural model fit criteria. Sixteen hypothesised relationships were proposed in chapter 4; out of sixteen hypothesised relationships and twelve hypotheses found significant. Two hypotheses were rejected as these were not found significant and remaining two were negatively corrleated.

Going through the various stages of data analysis, the following outcomes are presented:

- Based on the literature, framewok E-GEEF was proposed which is consists of eight constructs and sixteen hypothesised relationshiops were proposed.
- Preliminary stage of the data analysis addressed the data normality issues. To assess the data normality, kurtosis and skewness along with standard deviation and mean were considered. Obtained values of kurtosis and skewness after descriptive analysis on the data clearly indicated the normal distribution as these values were found well within the range.
- CFA was applied on each individual construct (SysQ, InfQ, SerQ, CtU, CtS, CtT, EGSQ, and PE). Items associated with each construct loaded successfully and loading were found >0.50.
- The present study followed two steps approach to perform SEM analysis which includes 1. Measurment model fit 2. Structural model fit
- CFA was applied to evaluate the measurement model fit. Assessment of measurement model fit took six various rounds of simulation. As result measurement model fit achieved but (SysQ6, SerQ4, and CtT7) items were droped from their resptive constructs (SysQ,

SerQ, and CtT). GFA, AGFA, CFI, TLI, RMR, RMSEA, CMIN / DF, and p-value were observed during measurement model run. In last round of simulation all these mentioned valued were obtained well within the range and confirmed the model fit.

- Reliability and validity test carried out to test the reliability and validity of each latent variable. Assessment tests confirmed the constructs' reliability and validity.
- Subsequently, the structural model was assessed to test the hypothesised relationships underlying between the constructs of proposed framework E-GEEF. Proposed framework E-GEEF is based on DeLone and McLean, (2003) model and IS success theory. Based upon DeLone and McLean IS success model and other existing literature, 16 hypothesised paths proposed and were tested.
- SEM results indicated that the 12 hypotheses out of 16 hypotheses were significant and positively related. Two hypotheses significant negatively and remaining two clearly rejected as the remaining two did not match with the established criteria.

After conducting the data analysis, the next chapter illustrates detailed findings of the present study.

CHAPTER – 6

Results and Discussion

In the previous chapter, the results of the analysis were presented. This chapter discusses the findings and results obtained in relation to the research questions and the proposed hypotheses. Along with the discussion, this chapter also includes theoretical and managerial implications, limitations of the study and suggestions for future research. The aim of this chapter is to demonstrate the role of e-government service quality and trust to measure the effectiveness of e-government services and to show how the key findings illustrated in Chapters 5 led to the accomplishment of the research aim. Therefore, all pieces of work conducted in this study have been gathered and the findings discussed according to the following structure.

- **Section (6.1):** Introduction
- **Section (6.2):** Overview of the Study
- **Section (6.3):** Discussion on Main Findings
- **Section (6.4):** Discussion on Hypotheses Testing
- **Section (6.5):** Discussion on Theoretical Implications
- **Section (6.6):** Discussion on Practical Implications
- **Section (6.7):** How to use Framework E-GEEF
- **Section (6.8):** Summary

6.1 Introduction

The literature presented in Chapter 2 demonstrates the dearth of studies of theoretical frameworks concerning e-government effectiveness evaluation of e-government services. This embraces deep perceptive of e-government service quality and citizens' trust in e-government services issues which constitute and impact the effectiveness of e-government services. Apart from e-government service effectiveness other challenges including organizational, technological, and social the e-government services are facing with reference to India. A great deal of work has been conducted toward measuring the effectiveness of e-government services. Proposed framework will assist in improving the e-service quality of Indian e-tax service also other offered e-services. This study has investigated these concerns in order to contribute towards providing a better perceptive of e-government service effectiveness issues in Indian context.

Thorough literature review in Chapter 2 and the research set objectives provided the foundation of the framework E-GEEF. Proposed framework included various constructs to assess the effectiveness of e-government services. Chapters 5 provided the data to assess the proposed conceptual framework that was presented in Chapter 3, and to accomplish the aim of this study. Chapter 5 validated the proposed framework E-GEEF and evaluated the research hypotheses using structural modeling technique. After thorough statistical data analysis and produced research results later stage seeks to discuss how identified constructs of the proposed framework and research results strengthen e-government effectiveness evaluation. As mentioned previously that present chapter 6 utilizes the outcomes of the statistical analysis performed in Chapter 5 to add more explanation that may come forward during the discussion and bridge the gap in understanding the effectiveness assessment process of e-government services. Further, this chapter seeks to synthesise the empirical findings to be derived after the analysis performed in Chapter 5 and revise the conceptual framework proposed in Chapter 3 based on the factors found to influence e-government service effectiveness in an Indian context. As a result, in this chapter, a revised conceptual framework for e-government effectiveness assessment will be proposed. Such a model can be used as a tool for decision-making when implementing and assessing the e-government service effectiveness.

6.2 Overview of the Study

The purpose of this study was to develop a framework for assessing the effectivenessof e-government services. After reviewing the related literature, effectiveness assessment dimensions were identified and adopted from the areas of information systems (IS). Upon selection of the suitable dimensions, a research framework was developed to evaluate e-government service effectiveness within the area of e-government research. That area was further narrowed by considering the e-government e-tax services of India. The core idea of the proposed model was based on DeLone and McLean information system (IS) success model. DeLone and McLean, (1992, 2003, 2004) "IS Success model and its implementation in e-commerce success measurement" were used as a base model in the proposed framework of the present study. Considering the context of the research, some additional variables were incorporated with the aim of validating the framework against e-government service assessment and to determine the factors responsible for e-service effectiveness assessment. Present study updated the DeLone and McLean IS success model and included additional factors perceived e-government service quality, citizens' trust, and perceived effectiveness of e-government services in the proposed framework E-GEEF. The eight factors were identified to evaluate the effectiveness of e-government services including: (1) system quality; (2) information quality; (3) service quality; (4) citizens' use; (5) citizens' satisfaction; (6) citizens' trust; (7) perceived e-government service quality; and (8) perceived effectiveness. The study empirically evaluated the proposed framework and the hypotheses deduced from the thorough review of literature and validated the framework in the context of e-government. Consideration on this purpose, the research problem was identified as:

"The development of a framework for evaluating the effectiveness of government e-services with reference to Indian e-tax services"

The research has accomplished its objectives by exploring the role of various quality dimensions and citizens' trust in evaluating the e-government services, mainly. The main objectives of the research included:

1. Investigate the concept of e-government and the diversified ways it is perceived.
2. To explore the previous studies in performance and effectiveness assessment of e-government particularly in the area of e-services and trust and identify their inadequacies.
3. To identify the dimensions and measures used in various frameworks for assessing the effectiveness of e-government services and citizens' trust.

4. To establish the quality criteria for effective deliverance of government e-service.
5. To investigate the citizens' trust elements in government e-services and to find out the degree to which the quality criteria of the e-government services build citizens' satisfaction and citizens' trust with the e-services (Indian e-tax service).
6. To develop and evaluate the E-GEEF framework and appraise its validity via case study of India's e-government e-tax services.

Literature was extensively reviewed to achieve the aim and to meet the objectives of the present study. The reviewed literature served as the basis for identifying the gap in literature to be investigated to extend the knowledge in e-government service effectiveness assessment. The literature review was conducted in relation to the detailed research problem and then the research problem was further divided into the following specific research question:

"What is the framework that could best evaluate the effectiveness of e-government services"?

In addition to major research question, research problem was further divided into three minor research questions identified:

a. What are the effectiveness assessment frameworks for e-government services existing and why would a new framework be evolved?

b. What are the dimensions contributing to effectiveness evaluation of e-government services?

c. What could be the relationship among various effectiveness evaluation dimensions?

A set of 16 hypotheses were formulated based upon earlier theoretical discussion. The formulated hypotheses comprise the proposed research framework E-GEEF and hypotheses were to be assessed by collected data during the empirical part of the study.

6.3 Discussion on Main Findings

This section aims to provide a clear idea of the main findings of Chapters 5. In Chapter 2, a comprehensive literature review showed that there is a lack of studies that focus on e-government service effectiveness assessment; however information system success study has been performed in many studies. Based on the findings from Chapter 5, other additional factors were identified. These additional factors were found significant and their existence in the proposed conceptual framework found to be vital. Research findings in this study describe a significant addition in explaining and understanding the contextual factors influencing e-government service quality and effectiveness of e-services. This study shows that the combination of technical and non-technical factors is providing new insight and contributing to the e-government service effectiveness assessment.

6.4 Discussion on Hypotheses Testing

The presentations of the results are arranged in order of the hypothesis and this section discusses in detail the roles of e-government service quality and citizens' trust in assessing the e-government service effectiveness. Further, this section answers the research questions posed.

Hypothesis (H1): ***(SysQ →CtU)*** *System quality is positively related to and affects the citizens' use / usefulness of e-tax service in the G2C e-government perspective*.

Hypothesis H1 examined the impact of system quality on citizens' use / usefulness of the e-government service from the citizens' perspective. System quality is defined in the present study as the quality of the desired functionality and effectiveness characteristics of offered government e-services. Consequently, how system quality impacts citizens' use in an e-government setting was investigated. Hypothesis 1 was supported and shows the positive correlation between system qualities of e-government with citizens' usefulness of the government e-tax service system. The relationship between these two constructs indicates a good support for this hypothesis ($\beta = .15$, $t=3.32$, $p <.001$ / p***). According to Seddon and Kiew (1996), increased system quality is associated with increased usefulness of the system. This actually supports the finding from the first hypothesis and suggests that the citizens' perception about the use or usefulness of the system depends upon the quality of the system. Findings are consistent with the similar studies DeLone and McLean (1992, 2003, 2004); Seddon (1997); Saha et al., (2008); Khayun and Ractham (2011) found in the literature of information system success and e-government success. From these studies, it was found that increase in system quality will cause increase in the use of the system by the citizens. However, Wang and Liao (2008) found the inconsistent results in their findings and identified an insignificant relation between system quality on use in G2C in Taiwan. Wang and Liao found that this is because citizens have advanced computer self-efficacy and extensive Internet usage experience, and the system quality or ease of use of an e-government system is not vital for citizens in determining whether to use the system or not.

Seven items were selected from previous studies to measure system quality and, after the scale's refinement; six items were taken to measure system quality in the context of e-government services. The analysis revealed that items SysQ1 to SysQ7 except SysQ6 were found well correlated with system quality respectively. However, an item SysQ6 which indicates the flexibility of system usage was dropped during measurement model fit assessment. The results suggest that, according to citizens' perception, the main functionality and characteristics of the e-government systems are accessibility, functionality, reliability/ system accuracy, responsiveness, efficiency, and interactivity & navigation of system quality (Zaidi et al., 2012, 2013, and 2014). An e-government system that provides user friendly and modern technologies can present information to the citizens in an understandable format that enable them to use e-government systems effectively. With the results it is concluded that an up-to-date system provides quality of information to the citizens and, as a result, its output as quality information will be useful for citizens as they expect to have complete and updated information.

According to the analysis, we found that system quality of the government e-tax Web site is positively related to the usefulness or citizens' use of the e-tax service. That finding is in-line to the previous studies. The finding implies that citizens are most likely to utilize e-government services if they find in ease of system usage.

Hypothesis (H2): ***(SysQ→EGSQ)*** *System quality positively related to and affects perceived e-government service quality in G2C e-government (e-tax service) perspective*.

Hypothesis H2 examined the impact of system quality on overall perceived e-government service quality. It has been mentioned previously that the system quality is defined in the present study as the quality of the desired functionality and effectiveness characteristics of government e-services. Consequently, how system quality impacts the overall e-government service quality in an e-government setting was investigated. The relationship between those two constructs indicates a strong support for this hypothesis ($\beta = .36$, $t = 8.136$, $p < .001$ / p ***). This suggests that the greater quality of the system will result in greater improvement in overall perceived e-government service quality. Hypothetical relationship was supported by the empirical data and demonstrated the strong relationship between system quality and perceived e-government service quality. Obtained result is also consistent with the previous studies. Some other studies also found empirical support for the relationship between system quality and e-government service quality.

Studies (Chutimaskul et al., 2008; Wang and Liao, 2008; Bhattachariya et al., 2012; Zaidi et al., 2012, 2013, 2014; Hien, 2014) have suggested that system quality is a significant predictor of perceived e-government service quality. Bhattacharya et al., (2012) considered system quality and information quality to measure the perceived e-service quality of Indian web portal along with other seven items including citizen centricity, transaction transparency, technical adequacy, usability, complete information, privacy and security and usefulness. These seven items not only show relationship with his e-service quality but also show relationships with system quality and information quality dimensions. Chutimaskul et al., (2008) tested empirically the overall e-service quality using system quality, information quality, and service quality and hypothesized the individual impact of quality measures on e-government. Some researchers defined e-government service quality as users' overall assessment of quality in the virtual context and serves as one of the key factors in determining success or failure of e-government (Santos, 2003; Welch and Pandey, 2005; Shrivastava, 2011; Bhattacharya et al., 2012). The results suggest that the main functionality and characteristics of the e-government system's characteristics including accessibility, functionality, reliability / system accuracy, responsiveness, efficiency, and interactivity & navigation of system quality impact the overall perceived e-government service quality. In view of this, sophisticated modern technology, user-friendly and well integrated e-government system services leads to easy-to-understand and consistent outputs and better-quality information content which further will impact the perceived e-government service quality.

With the above discussion it is confirmed that perceived e-government service quality is a dependent variable has impact of previous antecedent system quality construct. Measured perceived e-government service quality can be considered as one of the major constructs to assess effectiveness of e-government services.

Hypothesis (H3): ***(SysQ→CtS)*** *System quality positively related to and affects citizens' satisfaction with e-tax service in the G2C e-government perspective*.

Hypothesis H3 examined the impact of system quality on citizens' satisfaction of the e-government system's service. From the analysis of the data, hypothesis 3 was not found to be supported by the data. In other words, hypothetical relation between system quality with citizens' satisfaction was negatively correlated. Consequently, the relationship between system quality and citizens' satisfaction was found to be insignificant in e-government perspective. The association between these two constructs indicates negative support for this hypothesis with the obtained values ($\beta = .18$, $t= -5.047$, $p <.001$ / p***). Path coefficient from system quality to citizens' satisfaction at p value (***) is significant; however, the critical ratio / t = -5.047 value was found negative which confirmed the negative correlation. This means that in the government e-tax service context, system quality does not directly affect citizens' satisfaction. This is contrary to the research's expectations since the direction of the path was proposed to be positive. This finding is converse to some previous studies also.

According to DeLone and McLean (1992, 2003); Molla and Licker (2001), system quality affects user satisfaction. Other studies (Wang and Liao, 2008; Saha et al., 2008; Hala Al-Khatib, 2011, 2013) also found strong support for the relationship between system quality and users' satisfaction and considered system quality is an important determinant of satisfaction. Based on the theoretical support of DeLone and McLean (1992, 2003) from their study, they found that increase in system quality will cause increase in user satisfaction. However, study of Saha et al., (2010) for measuring the success factors of e-government shows disagreement in this relationship between system quality and user satisfaction. Also Khayun and Ractham, (2011) study for measuring the e-excise service success factor using DeLone and McLean IS model shows insignificant relationship between system quality and users satisfaction.

Present study also did not find direct relationship between system quality and citizens' satisfaction in the context of government e-tax service of India and which is in-line with the previous two studies (Saha et al., 2010; Khayun and Ractham, 2011) results. Possible reasons may be considered for such negative correlations between both the constructs. Government e-tax service in India is a centralized system which is being accessed by every tax payer. Diversified population literacy rate and lack of technical infrastructure for accessing the e-tax services in remote rural and partial urban areas could be the strong reason of citizens' dissatisfaction for system quality.

According to Saha et al., (2010), technological infrastructure attracts the citizens' perceptions about the technology and available resources, such as widespread availability of computer and internet at affordable cost. Thus, the importance of system quality construct for the citizens is closely related to the availability of technical infrastructure. However, level of the citizens' satisfaction may vary in e-tax payers of city area due to advanced literacy rate and cost effective infrastructure's availability.

Hypothesis (H4): ***(InfQ→CtU)*** *Information quality is positively related and affects the citizens' use / usefulness in G2C e-government (e-tax service) perspective.*

Hypothesis H4 examined the impact of information quality on use / usefulness of the information by the citizens. In the context of e-tax service, information quality was found to be a very important factor. Citizens expect precise, adequate information timely to file their e-tax online and finish their related activities. Information quality is defined in the present study as the quality of the characteristics of information provided by e-government in the form of on-line services. Thus, how information quality impacts citizens' use / usefulness of offered e-tax service in an e-government setting was examined. Consequently, how information quality impacts citizens' use in an e-government setting was investigated. Hypothesis 6 was supported and shows the positive correlation between information quality of e-government with citizens' usefulness of the government e-tax service system. The relationship between these two constructs indicates considerable support for this hypothesis ($\beta = .24$, $t=5.305$, $p <.001$ / p***).

According to Wang and Liao, (2008) and Wangpipatwong et al. (2009), improved information quality can ensure continued use of e-government applications by citizens. In other words, increased information quality is associated with increased usefulness of the e-government system. This actually supports the finding from the hypothesis and suggests that the citizens' perception about the citizens' use or usefulness of the system depends upon the quality of the information. This suggests that the greater the information quality of e-government service the more likely citizens' use the e-government services and they claim to be satisfied with it. Findings are consistent with the similar studies (DeLone and McLean 1992, 2003, 2004; Wang and Liao; 2008; Saha et al., 2010; Bhattacharya et al., 2011; Zaidi et al., 2012, 2013, 2014) found in the literature of information system success and e-government success. From these studies, it was found that increase in information quality will cause more use of the system by the citizens. However, Wang and Liao (2008) found information quality exhibited a stronger effect than system quality and service quality on use and user satisfaction.

DeLone and McLean (1992, 2003) explained information quality and system quality as two decisive factors influence the use and user satisfaction contribute to net benefits at individual level and organizational level. Furthermore, the results are consistent with the findings of Wang and Liao (2008) who explains that information quality showed the strongest effects on citizen satisfaction in G2C Taiwan. However, Khayun and Ractham, (2011) study shows the perception of information quality is not significantly related to "Use" whilst most of the studies regarded information quality and use / usefulness of e-services as significant relationship; DeLone and McLean (1992, 2003) explain information quality using completeness, precision, accuracy, consistency, currency, and format concepts. Based on aforementioned literature, seven items were selected to measure information quality. Results from the analysis show that none of the items were dropped as all the items measured appropriate information quality during measurement model fit assessment. Present study considers the accuracy, relevance, completeness, timeliness, availability, reliability, and consistency as main indicators or items for measuring the information quality in e-government service context considering e-tax service. Citizens perceived e-tax service to be useful whilst they receive right time adequate information precisely according to their needs.

The findings clearly indicate that the overall effects of information quality ($t = 5.305$, $\beta = .24$) on citizens' use/ usefulness is significantly greater than those of system quality ($t = 3.32$, $\beta = .15$) and service quality ($t = 4.087$, $\beta = .18$) in the context of G2C e-government. This means that e-government authorities should pay further attention to promote the information quality of e-government services.

Hypothesis (H5): ***(InfQ→EGSQ)*** *Information quality positively related and affects perceived e-government service quality in the G2C e-government (e-tax service) perspective.*

Hypothesis H5 examined the impact of information quality on perceived e-government service quality. Information quality is defined in the present study as the quality of the characteristics of information provided by e-government in the form of on-line services. Thus, how information quality impacts overall perceived e-government service quality in an e-government setting was examined. Path analysis between both the constructs indicated a strong relationship among them and demonstrate strong support for this conceptualized hypothesis ($\beta = .22$, $t = 4.718$, $p < .001$ / p***). Path coefficient from information quality to perceived e-government service quality at p value (***) is significant also critical ratio / t =4.718 value was found positive and (>=1.96) which confirmed the positive correlation. Hypothetical relationship supported by the empirical data and demonstrated the strong relationship between information quality and perceived e-government service quality. This means that in the government e-tax service context, information quality directly affects perceived e-government service quality. This suggests that the greater quality of information, the greater improvement in overall perceived e-government service quality.

Obtained result is also consistent with previous studies. Some of the studies (Chutimaskul et al., 2008; Wang and Liao, 2008; Bhattachariya et al., 2012; Hien, 2014) also found empirical support for the relationship between information quality and e-government service quality. These studies (Chutimaskul et al., 2008; Bhattachariya et al., 2012; Hien, 2014) have suggested that information quality is a significant predictor of perceived e-government service quality. As previously stated, Bhattacharya et al., (2012) study considered information quality as main factor to measure the perceived e-service quality of Indian web portal. DeLone and McLean (1992, 2004) explain information quality using completeness, precision, accuracy, consistency, currency, and format concepts. According to Chutimaskul et al., (2008), information quality is a key quality factor which refers to the quality of information relating to government activities. It basically contains the dimensions of accuracy, timeliness, relevance, precision, and completeness. Based on aforementioned literature, seven items were selected to measure information quality. Results from the analysis show that none of the items were dropped as all the items measured appropriately information quality during measurement model fit assessment. Present study considers the accuracy, relevance, completeness, timeliness, availability, reliability, and consistency as main indicators or items for measuring the information quality in e-government services context.

This suggests that, according to citizens' needs, accurate, relevant, reliable and complete error free information are very important characteristics of the information quality generated by the e-government system. The results support the findings of (Chutimaskul et al., 2008; Bhattachariya et al., 2012; Zaidi et al., 2012, 2013, 2014) which stress that the quality of the information generated by the e-government system is an important factor for measuring the e-government service quality.

Hypothesis (H6): ***(InfQ→CtS)*** *Information quality is positively related and affects the* *citizens' satisfaction in G2C e-government (e-tax service) perspective.*

Hypothesis H6 examined the impact of information quality on citizens' satisfaction of the e-government system. From the analysis of the data, hypothesis 6 was not found to be supported by the data. In other words, hypothetical relation between information quality with citizens' satisfaction was negatively correlated. Consequently, the relationship between information quality and citizens' satisfaction was found to be insignificant in e-government context. The association between these two constructs indicates negative support for this hypothesis with the obtained values (β = -.35, t= -8.089, p <.001 / p***). Path coefficient from information quality to citizens' satisfaction is β = -.35 at p value (***) which was negative also the critical ratio / t=–8.089 value was found negative which confirmed the negative and insignificant correlation. This means that in the government e-tax service context, information quality does not directly affect citizens' satisfaction. This is contrary to the research's expectations since the direction of the path was proposed to be positive. This finding is contrary to some previous studies (DeLone and McLean, 1992, 2003, 2004; Almutairi and Subramanian, 2005; Roca et al., 2006; Wang and Liao, 2008; Khayun and Ractham, 2011) as these studies show significant effect of information quality on user satisfaction. Further, considered information quality is an important determinant of user's satisfaction. Conversely, study of Saha et al., (2010) for measuring the success factors of e-government shows disagreement on this relationship between information quality and user's satisfaction.

In the present context, no direct relationship was observed between information quality and citizens' satisfaction, but a significant relationship was found between information quality and citizens' use/ usefulness. This implies that the information quality of the e-government service while using e-tax service is an important determinant and citizens identified it as useful for them to complete their transaction effectively. As mentioned before that the government e-tax service in India is a centralized system which is being accessed by each tax payer. Diversified population with a range of entirely different provincial languages, accessing the e-tax services for the citizens could be a challenge as e-tax portal is designed with English and Hindi language option. This may not be able to satisfy the citizens' expectations and understanding. Further, accessibility of cost and effective technical infrastructure could be the strong reason of citizens' dissatisfaction for information quality. Thus, the importance of information quality construct for the citizens is closely related to the availability of easily understandable and accessible information with cost effective technical infrastructure. However, level of the citizens' satisfaction may vary in e-tax payers of city area due to advanced literacy rate too.

Finally, proposed hypothesis was not supported means as path coefficient from information quality to citizens' satisfaction is β = -.35 was found negative also the critical ratio / t value was found negative which confirmed the negative and insignificant correlation. This means that in the government e-tax service context, information quality does not directly affect citizens' satisfaction.

Hypothesis (H7): ***(SerQ→CtU)*** *Service quality is positively related and affects the citizens' use / usefulness in G2C e-government (e-tax service) perspective.*

Hypothesis H7 explained the impact of service information quality on citizens' use / usefulness of the services by the citizens. In the context of e-tax service, service quality was found to be a very significant factor. Citizens expect reliable, transparent and assured services in timely manner to file their e-tax online and complete their related activities. Service quality is defined in the present study as the quality of the characteristics of service provided by e-government in the form of online e-services. Thus, how service quality influences citizens' use / usefulness of offered e-tax service in an e-government setting was examined. Consequently, how service quality impacts citizens' use in an e-government setting was investigated. Hypothesis 7 was supported and shows the positive correlation between service quality of e-government with citizens' usefulness of the government e-tax service.

The association between these two constructs indicates positive support for this hypothesis with the obtained values (β = .18, t= 4.087, p <.001 / p***). Path coefficient from service quality to citizens' use / usefulness β = .18 at p value (***) which was positive also the critical ratio / t = 4.087 was found positive which confirmed the positive and significant correlation. This means that in the e-government e-tax service context, service quality directly affects citizens' use of e-government e-tax service. Obtained result is also compatible with the previous researches. Some of the studies also found empirical support for the relationship between service quality and citizens' use / usefulness. Findings are consistent with the similar studies (DeLone and McLean 2003, 2004; Wang and Liao; 2008; Saha et al., 2010; Bhattacharya et al., 2011; Khayun and Ractham, 2011) found in the literature of information system success and e-government success.

The service quality refers to the quality of e-government communication that is effectively utilized by citizens which contains the dimensions of tangibility, reliability, responsiveness, assurance, and empathy (Chutimaskul et al., 2008). According to Wang and Liao, (2008) and Wangpipatwong et al. (2009), Better service quality can guarantee enhance the use of e-government applications by citizens. This actually supports the finding from the hypothesis and suggests that the citizens' perception about the citizens' use or usefulness of the services depends upon the quality of the services offered by e-government.

DeLone and McLean, (2003) proposed an updated model of IS success by adding a "service quality" measure as a new dimension of the IS success model. Most researchers agree with DeLone and McLean's, (2003) suggestion that service quality deserves to be included along with system quality and information quality as a component of IS success. Previous studies (DeLone and McMean, 2003, 2004; Wangpipatwong, S. and Chutimaskul, W., 2005; Chutimaskul et al., 2008; Bhattacharya et al., 2011) refer assurance, flexibility, empathy, reliability, tangible, transparency, and responsiveness as service quality items relating to government activities. Alanezi et al., (2010) proposed assessed service quality of government portals using website design, reliability, responsiveness, security/privacy, personalization, information and ease to use as the seven factors in his scale. Consequently, seven items assurance, flexibility, empathy, tangible, reliability, transparency, and responsiveness were selected from aforementioned studies in the literature to measure service quality. After the scale's refinement; six items were taken to measure service quality in the context of e-government. The analysis revealed that items SerQ1 to SerQ7 except SerQ4 were found well correlated. However, an item SerQ4 which indicates the tangibility was dropped during measurement model fit assessment stage.

Above discussion can be concluded as: "the greater the service quality of e-government service the more likely citizens' use the e-government services".

Hypothesis (H8): ***(SerQ→EGSQ)*** *Service quality positively affects perceived e-government service quality in G2C e-government (e-tax service) perspective*.

Proposed hypothesis 8 examined the impact of service quality on overall perceived e-government service quality. Hypothesis was supported by the empirical data and strong relationship was found between service quality and overall perceived e-government service quality. Service quality is defined in the present study as the quality of the characteristics of services provided by government on-line. Consequently, how service quality impacts perceived e-government service quality in an e-government setting was investigated. Path analysis between both the constructs indicated strong relationship among them and strong support for this hypothesis ($\beta = .15$, $t = 3.576$, $p < .001$ / p***). Path coefficient from service quality to perceived e-government service quality at p value (***) is significant also critical ratio / t =3.576 value was found positive and (>=1.96) which confirmed the positive correlation. Hypothetical relationship supported by the empirical data and demonstrated the strong relationship between service quality and perceived e-government service quality. This means that in the government e-tax service context, service quality directly affects perceived e-government service quality.

Obtained result is also consistent with previous studies. Some of the studies also found empirical support for the relationship between service quality and e-government service quality. These studies (Chutimaskul et al., 2008; Hien, 2014) have suggested that service quality along with system and information quality is a significant predictor of perceived e-government service quality. Chutimaskul et al., (2008) explain service quality which refers to the quality of e-government communication that is effectively utilized by citizens. It contains the dimensions of tangibility, reliability, responsiveness, assurance, and empathy. The ISO 9241 standard also states the characteristics of service quality that can be used for e-government. DeLone and McLean, (2003) proposed an updated model of IS success by adding a “service quality” measure as a new dimension of IS success model. Most researchers agree with DeLone and McLean's, (2003) suggestion that service quality deserves to be included along with system quality and information quality as a component of IS success. Previous studies (DeLone and McMean, 2003, 2004; Wangpipatwong, S. and Chutimaskul, W., 2005; Chutimaskul et al., 2008; Bhattacharya et al., 2011) refer assurance, flexibility, empathy, reliability, tangible, transparency, and responsiveness as service quality items relating to government activities. Alanezi et al., (2010) proposed assessed service quality of government portals using website design, reliability, responsiveness, security/privacy, personalization, information and ease to use as the seven factors in his scale. Consequently, seven items assurance, flexibility, empathy, tangible, reliability, transparency, and responsiveness were selected from aforementioned studies in literature to measure service quality. After the scale's refinement; six items were taken to measure service quality in the context of e-government. The analysis revealed that items SerQ1 to SerQ7 except SerQ4 were found well correlated. However, an item SerQ4 which indicates the tangibility was dropped during measurement model fit assessment stage.

The results support the findings of (Chutimaskul et al., 2008; Wang and Liao, 2008; Bhattachariya et al., 2012; Hien, 2014) which assert that the service quality of e-government system is an important factor for measuring the e-government service quality.

Hypothesis (H9): ***(SerQ→CtS)*** *Service quality is positively related and affects the citizens' satisfaction in G2C e-government (e-tax service) perspective*.

Hypothesis H9 examined the impact of service quality on citizens' satisfaction. In the context of e-tax service, service quality was found to be a significant factor. Service quality is defined in the present study as the quality of the characteristics of service provided by e-government in the form of on-line services. Thus, how service quality impacts citizens' satisfaction of offered e-tax service in an e-government setting was examined. Hypothesis 9 was supported and shows the positive correlation between service quality of e-government with citizens' satisfaction of the government e-tax service system. The relationship between these two constructs indicates a good support for this hypothesis ($\beta = .14$, $t=3.297$, $p <.001$ / p***). The association between these two constructs indicates positive support for this hypothesis. Path coefficient from service quality to citizens' use / usefulness $\beta = .14$ at p value (***) which was positive also the critical ratio / $t = 3.297$ was found positive which confirmed the positive and significant correlation of service quality with citizens' satisfaction. This means that in the e-government e-tax service context, service quality directly affects citizens' satisfaction of e-government e-tax service. Obtained result is also consistent with previous studies. Some of the studies also found empirical support for the relationship between service quality and citizens' use / usefulness. Findings are consistent with the similar studies (DeLone and McLean 2003, 2004; Wang and Liao; 2008; Bhattacharya et al., 2011; Khayun and Ractham, 2011) found in the literature of information system success and e-government success. According to Wang and Liao, (2008) and Wangpipatwong et al. (2009), improved service quality can ensure continued use of e-government applications by citizens. In other words, increased service quality is associated with increased citizens' satisfaction of the e-government system.

However, study of Saha et al., (2010) for measuring the success factors of e-government shows deviation in this relationship between service quality and user's satisfaction.

The findings are in line with the existing studies and confirmed the positive relationship between service quality and citizens' satisfaction while using the e-government e-tax services which confirmed the proposed hypothesis.

Hypothesis (H10): ***(CtU→CtS)*** *Citizens' Use /Usefulness positively affect the citizens' satisfaction in G2C e-government (e-tax service) perspective*.

Hypothesis H10 examined the impact of citizens' use / usefulness on citizens' satisfaction of the e-government system. From the analysis of the data hypothesis 10 was not found to be supported by the data. In other words hypothetical relation between citizens' use / usefulness with respect to citizens' satisfaction was negatively correlated. Consequently, the relationship between citizens' use / usefulness and citizens' satisfaction was found to be insignificant in e-government context. The association between these two constructs indicates negative support for this hypothesis with the obtained values (β = - 0.06, t= -1.295, p =.195). Path coefficient from citizens' use / usefulness to citizens' satisfaction at value (p=.195) is insignificant and critical ratio / t = -1.295 (< 1.96) was found negative which confirmed the negative and insignificant relationship. This means that in the government e-tax service context, citizens' use / usefulness does not directly affect citizens' satisfaction. This is contrary to the research's expectations since the direction of the path was proposed to be positive. This finding is converse to some previous studies also. According to DeLone & McLean (1992, 2003, 2004), use affects user satisfaction. Other studies (McGill et al., 2003; Roca et al., 2006; Wang and Liao, 2008; Khayun and Ractham, 2011) also found support for the relationship between use and users' satisfaction. Based on the theoretical support of DeLone & McLean (1992, 2003, 2004) from their study, they found that increase in use increases the user satisfaction. However, study of Saha et al., (2010) for measuring the success factors of e-government shows disagreement on this relationship between perceived ease of and user satisfaction. Khayun and Ractham, (2011) study for measuring the e-excise service success factor claim that use of e-service will lead to user satisfaction when the user has gained positive experiences from system usage which further will lead to more satisfaction. Present study did not find direct relationship between citizens' use / usefulness and citizens' satisfaction in the context of government e-tax service of India and which is in-line with the previous study of Saha et al., (2010) and supports the argument of Khayun and Ractham, (2011) that use of e-service will lead to user satisfaction when the user has gained positive experiences from system usage.

Finally proposed hypothesis was not supported by the empirical data. This indicates that citizens' expectation and belief of usefulness of e-tax service in India tends to be more towards the enhanced quality criteria to reach to their satisfaction. If citizens think that using a particular e-government service is useful for them to file their e-tax, then that will positively affect their level of satisfaction. Citizens' satisfaction level is found to be more superior than what is being offered to them. Research reveals an unexpected result which indicates that citizens' use / usefulness is found to be a weak and insignificant construct in determining the citizens' perception towards using the e-government e-tax service of India.

Hypothesis (H11): ***(CtU→CtT)*** *Citizens'Use /Usefulness positively affect citizens' trust in G2C e-government (e-tax service) perspective*.

Hypothesis H11 observed the impact of citizens' use / usefulness on citizens' trust while using the e-government service. From the analysis of the data, hypothesis 11 was found to be supported by the empirical data. In other words, hypothetical relation between citizens' use / usefulness with respect to citizens' trust was positively correlated. Consequently, the relationship between citizens' use / usefulness and citizens' trust was found to be significant in e-government context. The association between these two constructs indicates positive support for this hypothesis with the obtained values ($\beta = .12$, $t = 2.442$, $p<.01$ / p**). Path coefficient from citizens' use / usefulness to citizens' trust at value ($p<.01$ / p**) is significant and critical ratio / $t = 2.442$ (> 1.96) was found positive which confirmed the positive and significant relationship. This means that in the government e-tax service context, citizens' use / usefulness directly influences the citizens' trust. Obtained result is also consistent with previous studies. Some of the studies also found empirical support for the relationship between citizens' use / usefulness and citizens' trust. Findings are consistent and in-line with the similar studies (Welch et al., 2005; Saha, et al., 2010; Chang and Fang, 2013) found in the literature of information system success and e-government success. Saha et al., (2010) show the positive and significant relationship between perceived ease of use and citizen trust and indicates that the ease of using a tax Web site increases citizens' trust in e-tax service. Whilst, Khayun and Ractham, (2011) study reveals statistically significant relationship between users' trust in e-government website and use with user satisfaction which allows excise tax payers to complete their transactions in reliable and adequately secured manner.

DeLone and McLean, (1992, 2003, 2004) proposed IS success model and their updated version contains "use / intension to use" as measure in the models. Most researchers agree with DeLone and McLean's, (2003) suggestion that use deserves to be included as a component of IS success as usage of the system measures everything from a visit to a Web site, to navigation within the site, to information retrieval, to execution of a transaction. Previous studies (DeLone and McLean, 1992, 2003, 2004; Almutairi and Subramanian, 2005; Iivari, 2005; Wang, 2008; Saha et al., 2010, Khayun and Ractham; 2011) included the user's use / usefulness or intension to use as measure to assess IS systems or e-government system success. These studies refer the items' frequency of use, daily use, intention to (re)use, nature of use, navigation patterns, and assurance within the usefulness construct relating to government activities while citizens' interact with e-government services. Consequently, five items frequency of use, daily use, intention to (re)use, nature of use, navigation patternswere selected from aforementioned studies in the literature to measure citizens' use / usefulness. After the scale's refinement none of the items were taken off. The analysis revealed that all the items CtU1 to CtT5 were found well correlated and loaded on citizens' use construct.

With the above discussion it is clear that the findings are in line with the existing studies and confirmed the positive relationship between citizens' use / usefulness and citizens' trust while using the e-government e-tax services which confirmed the proposed hypothesis. This result is consistent with earlier studies too.

Hypothesis (H12): ***(CtS→CtT)*** *Citizens' satisfaction positively affects and forms citizens' trust in e-government service in G2C e-government (e-tax service) perspective*.

Hypothesis H12 observed the impact of citizens' satisfaction on citizens' trust while using the e-government service. From the analysis of the data, hypothesis 12 was found not to be supported by the empirical data. In other words, hypothetical relation between citizens' satisfaction with respect to citizens' trust was negatively correlated. Consequently, the relationship between citizens' satisfaction and citizens' trust was found not to be significant in e-government context. The association between these two constructs indicates negative support for this hypothesis with the obtained values (β = -0.04, t = - 0.835, p = 0.404). Path coefficient from citizens' satisfaction to citizens' trust at value (p =0.404 is insignificant and critical ratio / t = - 0.835 (< 1.96) was found negative which confirmed the negative and in significant relationship between both the constructs. This means that in the government e-tax service context, citizens' satisfaction did not influence the citizens' trust. Obtained result is contrary with previous studies as previous studies (Molla and Licker, 2001; Welch et al., 2003, 2005; Saha et al., 2010) found empirical support for the relationship between citizens' satisfaction and citizens' trust.

Finally, proposed hypothesis was not supported by the empirical data. This indicates that citizens' level of satisfaction, expectation and belief in using the e-tax service in India look forward to avail enhanced quality and trustworthy e-services to reach to their satisfaction. If citizens think that using a particular e-government service is useful and satisfactory for them to file their e-tax, then that will positively affect their level of satisfaction which will later form the citizens' trust in e-tax services. Citizens' satisfaction level is found to be more superior than what is being offered to them. Research reveals an unexpected result which indicates that citizens' satisfaction is found to be a weak and insignificant construct in determining the citizens' trust towards using the e-government e-tax service of India.

Nevertheless, citizen's satisfaction doesn't impact directly the citizens' trust in the present study but it shows direct impact on perceived e-government service quality which is an important aspect of the present study.

Hypothesis (H13): ***(CtS→EGSQ)*** *Citizens' satisfaction has positive effect on perceived e-government service quality in G2C e-government (e-tax service) perspective*.

Hypothesis H13 observed the impact of citizens' satisfaction on overall perceived e-government service quality while using the e-government service. From the analysis of the data, hypothesis 13 was found to be supported by the empirical data. In other words, hypothetical relation between citizens' satisfaction with respect to perceived e-government service quality was positively correlated. Consequently, the relationship between citizens' satisfaction and perceived e-government service quality was found to be significant in e-government context. The association between these two constructs indicates positive support for this hypothesis with the obtained values ($\beta = .10$, $t = 1.962$, $p<.05$ / p*). Path coefficient ($\beta = .10$) from citizens' satisfaction to perceived e-government service quality at value ($p<.05$ / p*) is significant and critical ratio / t = 1.962 (> 1.96) was found positive which confirmed the positive and significant relationship. This means that in the government e-tax service context, citizens' satisfaction directly influences the perceived e-government service quality. However, hypothetical correlation between both the constructs is positive but values are close to the borderline which shows moderate but significant correlation. Obtained result is also consistent and in-line with the previous studies. Similar studies support for the relationship between user satisfaction and e-service quality (Santos, 2003; Collier and Bienstock, 2006; Horan et al., 2006; Sung et al., 2009). Collier and Bienstock (2006) conceptualized e-service quality as users' perceptions of the outcome of the service delivery whilst Santos, (2003) stated that quality e-services can provide competitive advantage online by improving organizational performance and clients' satisfaction. Khayun and Ractham, (2011) study reveals statistically significant relationship between user's satisfaction and e-service quality and quality of e-service impacts the user satisfaction which allows excise tax payers to complete their transactions in reliable and adequate manner.

With the above discussion it can be stated that the citizens' satisfaction remains an important means of measuring citizens' opinions about our e-government system and should cover the entire citizens' experience cycle from accessing the government e-service. Hence, findings are in line with the existing studies and confirmed the positive relationship between citizens' satisfaction and overall perceived e-government service quality while using the e-government e-tax services which confirmed the proposed hypothesis. This result is consistent with earlier studies too.

Hypothesis (H14): ***(CtT→EGSQ)*** *Citizens' trust positively affects the perceived e-government service quality in G2C e-government (e-tax service) perspective*.

Hypothesis H14 observed the impact of citizens' trust on overall perceived e-government service quality while using the e-government service. From the analysis of the data, hypothesis 14 was found to be supported by the empirical data. In other words, hypothetical relation between citizens' trust with respect to overall perceived e-government service quality was positively correlated. Consequently, the relationship between citizens' trust and perceived e-government service quality was found to be significant in e-government context. The association between these two constructs indicates positive support for this hypothesis with the obtained values (β =0.39, t =8.490, p<.001 / p***). Path coefficient (β =0.39) from citizens' trust to perceived e-government service quality at value (p <.001/ p***) is significant and critical ratio / t = 8.490 (> 1.96) was found positive which confirmed the positive and significant relationship between both the constructs. This means that in the government e-tax service context, citizens' trust influenced the perceived e-government service quality. Obtained results are in-line with previous studies as previous studies (Papadomichelaki and Mentzas, 2009; Khayun and Ractham, 2011; Hien, 2014) found empirical support for the relationship between user trust and perceived e-government service quality. Khayun and Ractham, (2011) study reveals statistically significant relationship between users' trust in e-government website and use with user satisfaction which allows excise tax payers to complete their transactions in reliable and adequately secured manner and impact e-government service quality. DeLone and McLean studies do not include the trust as measure; however, recent studies are being performed to address the relationship among user trust and user satisfaction. Zaidi et al., (2012, 2013, 2014) study shows significant relationship among citizens' trust and overall e-government service quality and confirmed that the citizens' trust is an important precursor to measure the overall e-government service quality in e-government context. According to him if citizens are satisfied with all the previous stated quality criteria of e-government services then only citizens' trust can be developed. Teo et al. (2009), finding also confirms that trust in an e-government website will have a significant impact on perceptions of e-government service quality through website.

Previous studies (Papadomichelaki and Mentzas, 2009, Liu and Zhou, 2010; Khayun and Ractham; 2011) included the user's trust as a measure to assess IS systems or e-government system success. These studies refer the items including "usability, privacy, security, risk, transaction transparency, responsiveness, and tangible", within the user's trust construct relating to government activities while citizens' interact with e-government services. Consequently, all seven items usability, privacy, security, risk, transaction transparency, responsiveness, and tangible were selected from aforementioned studies in the literature to measure citizens' trust. After the scale's refinement, one of the items (CtT7) tangible was taken off as it was dropped during measurement model fit assessment. The analysis revealed that all the items CtU1 to CtT6 were found well correlated and loaded on citizens' trust construct.

With the above discussion it can be stated that the citizens' trust remains an important means of measuring citizens' opinions about our e-government system and should cover the entire citizens' experience cycle from accessing the overall e-government services. Hence, findings are in line with the existing studies and confirmed the positive relationship between citizens' trust and overall perceived e-government service quality while using the e-government e-tax services which confirmed the proposed hypothesis. This result is consistent with earlier studies as well.

Hypothesis (H15): ***(CtT→PE)*** *Citizens' trust positively affects the perceived effectiveness of e-government service in G2C e-government (e-tax service) perspective*.

Hypothesis H15 observed the impact of citizens' trust on effectiveness expectation of e-government service while using the e-government e-tax service. From the analysis of the data, hypothesis 15 was found to be supported by the empirical data. In other words hypothetical relation between citizens' trust with respect to effectiveness expectation of e-government service was positively correlated. Consequently, the relationship between citizens' trust and perceived effectiveness of e-government service was found to be significant in e-government context. The association between these two constructs indicates positive support for this hypothesis with the obtained values (β =0.35, t =7.665, p<.001 / p***). Path coefficient (β =0.35) from citizens' trust to perceived effectiveness of e-government service at value (p <.001/ p***) is significant and critical ratio / t = 7.665 (> 1.96) was found positive which confirmed the positive and significant relationship between both the constructs. This relation supports strongly as the path coefficient β and obtained t value is significantly high. This means that in the government e-tax service context, citizens' trust influenced the perceived effectiveness of e-government service.

DeLone and McLean, (2003) updated IS success model measures the IS system success using system quality, information quality, service quality, use and user satisfaction dimensions and assess the impact of these antecedents on " Net Benefits". Further, DeLone and McLean, (2003) clarify that "Net Benefit" may be used in varied context depending upon the researchers' need. This means that the future researchers should carefully define the stakeholders and context in which net benefits are to be measured. Different stakeholders may have different opinions as to what constitutes a benefit to them (DeLone and McLean, 2003). Wang and Laio, (2008) measured e-government success as perceived net benefits. Scott et al., (2010) measure the citizens' value in e-government services also the aspects of IT Quality influence e-government success. Literature clearly indicates that the "Net Benefit" as a final construct used in various contexts by the researchers is not clearly specified and seems ambiguous. Hence in the context of present study, author considers "Perceived Effectiveness" as one of the e-government assessment indicators instead of net benefit which gives clear understanding of what to measure in e-government context.

Hence, the obtained results are in-line with previous studies as previous studies (DeLone and McLean, 2003, Wang and Liao, 2008, Papadomichelaki and Mentzas, 2009; Saha et al., 2010; Khayun and Ractham, 2011; Hien, 2014) found empirical support for the relationship between user trust and net benefits. Zaidi et al., (2012, 2013, 2014) study shows significant relationship among citizens' trust and overall e-government service quality and perceived effectiveness of e-government service and confirmed that the citizens' trust is an important antecedent to measure the overall e-government service quality and perceived effectiveness of e-government service in e-government context. According to him, if citizens are satisfied with all the previously stated quality criteria of e-government services then only citizens' trust can be developed which further impact the effectiveness of e-government service.

Proposed hypothesis looked at the impact of citizens' trust on perceived effectiveness to use an e-government e-tax service. Citizens' trust is defined in the current study as the degree to which citizens are willing to continue or not continue to use on-line services. With the preceding discussion, it can be stated that the citizens' trust remains an important means of measuring the perceived effectiveness of e-government service and should cover the entire citizens' experience cycle from accessing the overall e-government services. Hence, findings are in line with the existing studies and confirmed the positive relationship between citizens' trust and perceived effectiveness of e-government service while using the e-government e-tax services which confirmed the proposed hypothetical correlation. This result is consistent with earlier studies as well.

Hypothesis (H16): ***(EGSQ→PE)*** *Overall perceived e-government service quality affects the e-government perceived effectiveness in G2C e-government (e-tax service) perspective.*

Hypothesis H16 determined the impact of overall perceived e-government service quality on perceived effectiveness of e-government service while using the e-government e-tax service. From the analysis of the data, hypothesis 16 was found to be strongly supported by the empirical data. In other words, hypothetical relation between overall perceived e-government service quality with respect to perceived effectiveness of e-government service was positively correlated. Consequently, the relationship between overall perceived e-government service quality and perceived effectiveness of e-government service was found to be very much significant in e-government context. The association between these two constructs indicates positive support for this hypothesis with the obtained values (β =0.43, t =8.960, p<.001 / p***). Path coefficient (β =0.43) from citizens' trust to perceived effectiveness of e-government service at value (p <.001/ p***) is significant and critical ratio / t = 8.960 (> 1.96) was found positive which confirmed the positive and significant relationship between both the constructs. This relation supports strongly as the path coefficient β and obtained t value is significantly high at p ***. This means that in the government e-tax service context, overall perceived e-government service quality influenced the perceived effectiveness of e-government service.

As previously mentioned that DeLone and McLean, (2003) measure the IS system success using system quality, information quality, service quality, use and user satisfaction dimensions and assess the impact of these antecedents on " Net Benefits" and clarify that "Net Benefit" may be used in varied context depending upon the researchers' need (Wang and Liao, 2008). Hence, as per the context of present study instead of "Net Benefits" author used "Perceived Effectiveness" since the context of the present study is to measure the "perceived effectiveness of e-government services". In this context, "Perceived Effectiveness" is found to be more appropriate than "Net Benefits". Further, present study added total new constructs including "Citizens' Trust", "Perceived e-government Service Quality, and "Perceived Effectiveness" in the proposed framework which is not in DeLone and McLean's updated model for measuring information systems success.

Wang and Liao, (2008) measured e-government success as "perceived net benefits", Scott et al., (2010) measured the "citizens' value", Saha et al., (2010) measured "Citizens Satisfaction", Khayun and Ractham, (2011) measured "Perceived Net Benefits" of e-excise services. Literature clearly indicates that the "Net Benefit" as a final construct used in various contexts by the researchers is not clearly specified and seems ambiguous. Hence, in the context of present study author considers “Perceived Effectiveness” as most appropriate keyword for e-government effectiveness assessment instead of net benefit which gives rational nomenclature of what to measure in e-government context.

Proposed hypothesis looked at the impact of overall e-government service quality on perceived effectiveness while citizens using e-government e-tax service. Overall perceived e-government service quality is defined in the current study as the degree to which antecedent quality criteria system quality, information quality, and service quality fulfils and impacts the overall e-government service quality along with citizens’ trust. With the foregoing discussion, it can be stated that perceived e-government service quality remains an important means of measuring the effectiveness of e-government service and should cover the entire citizens’ experience cycle from accessing the overall e-government services. Hence, findings are in line with the existing studies (DeLone and McLean, 2003, Wang and Liao, 2008, Saha et al., 2010; Khayun and Ractham, 2011; Zaidi et al., 2012, 2013, 2014; Hien, 2014) and confirmed the positive relationship between perceived e-government service quality and perceived effectiveness of e-government service while using the e-government e-tax services which confirmed the proposed hypothetical correlation. This result is consistent with earlier studies as well.

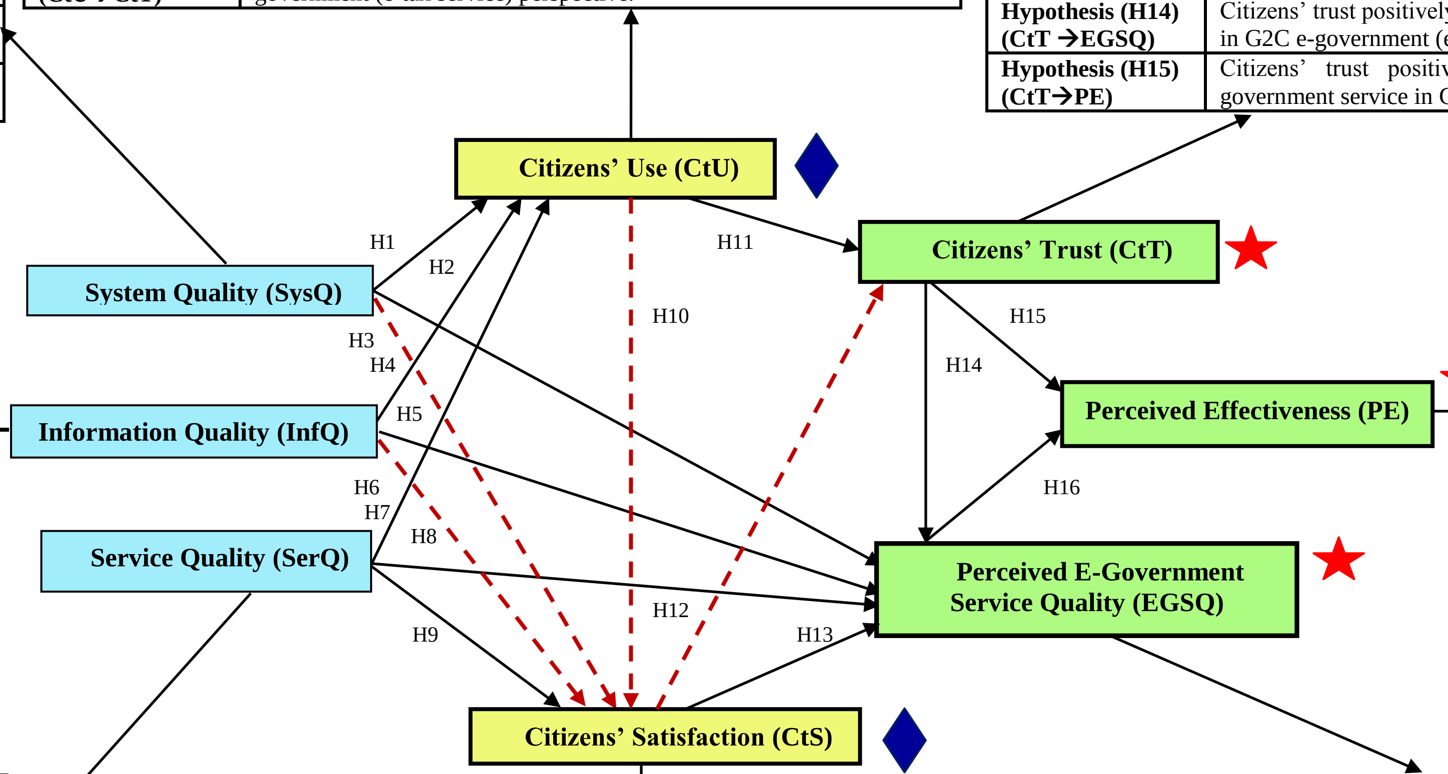
The following figure 6.1 shows the emerged framework drawn based upon the status of the hypotheses:

Accessibility	Government e-tax system is accessible 24 hours online every day whenever I need to access I can access it	SysQ1
Flexibility	E-tax website offers flexibility to use it anywhere	SysQ2
Functionality	E-tax website is easy in its functionality that allows user to browse different pages and does not stuck while using	SysQ3
Reliability	E-tax website is available all the time and quality of contents is appropriate, error free, precise and related to the subject according to the citizen's need	SysQ4
Easy to use	E-tax website allows citizens to use e-government system that enables citizen to accomplish tasks more easily and quickly	SysQ5
Nevigation	It is easy to navigate within this website which allows citizen to go back and forth between pages	SysQ7
Hypothesis (H1) (SysQ →CtU)	System quality is positively related and affects the citizens' use / usefulness of e-tax service in the G2C e-government perspective	
Hypothesis (H2) (SysQ →EGSQ)	System quality is positively related and affects perceived e-government service quality in G2C e-government (e-tax service) perspective.	

Frequency of use	I regularly use government e-tax service and whenever I need to file my tax online I choose to file through e-tax website	CtU1
Intension to reuse	I have intension to use government e-tax service again in the future	CtU2
Nature of use	Effectively I can use and perform a variety of e-tax related operations and tasks using government e-tax service	CtU3
Interactivity	It is easy to intreract efficiently while navigating within the government e-tax website and use e-services	CtU4
Number of transaction	Using the government e-tax service makes it easier to do my task and I can perform number of transactions	CtU5
Hypothesis (H11) (CtU→CtT)	Citizens' Use / Usefulness positively affect citizens' trust in G2C e-government (e-tax service) perspective.	

Usability	Based on my experience with e-tax service, I found that there is usable trustworthy e-tax service is being offered	CtT1
Privacy	Based on my experience I found that there is sufficient privacy given to my account and associated information	CtT2
Security	Based on my experience I found there is a sufficient security measure followed to protect my online information	CtT3
Transaction Transparency	I found that offered e-tax e-service is transparent in the transactions	CtT4
Unambiguous	I found that offered e-tax service is transparent / unambiguous and provides appropriate transparent information to the citizens	CtT5
Responsiveness	Based on my experience with e-tax service, I found that my e-tax request processed in minimum amount of time	CtT6
Hypothesis (H14) (CtT →EGSQ)	Citizens' trust positively affects the perceived e-government service quality in G2C e-government (e-tax service) perspective.	
Hypothesis (H15) (CtT→PE)	Citizens' trust positively affects the perceived effectiveness of e-government service in G2C e-government (e-tax service) perspective.	

Accuracy	Information on the government e-tax website is accurate and error free also, covers all information desired	InfQ1
Relevance	Information presented on the government e-tax website is comparative to the citizen's needs and subject matter	InfQ2
Completeness	Government e-tax service website provides up-to-date and sufficient information which enables citizens to complete their task	InfQ3
Trusworithiness	Information on the government e-tax website is trustworthy and consistent	InfQ4
Availability	Government e-tax service website provides precise information to the citizens	InfQ5
Timeliness	Government e-tax service website provides desired information at the right time or in timely manner to the citizens	InfQ6
Consistency	Information on this e-tax service website is consistently available for the citizens to complete their task	InfQ7
Hypothesis (H4) (InfQ →CtU)	Information quality is positively related and affects the citizens' use / usefulness in G2C e-government (e-tax service) perspective	
Hypothesis (H5) (InfQ →EGSQ)	Information quality is positively related and affects perceived e-government service quality in the G2C e-government (e-tax service) perspective	



Based on my experience I have full trust in offered government e-tax service.	PE1
Government e-tax service provides overall outstanding e-service quality to the citizens.	PE2
Government e-tax service offers risk free e-tax service to their citizens.	PE3
Government e-tax service is overall effective.	PE4

Assurance	Government e-tax service website assures citizens to provide necessary information and forms to be downloaded	SerQ1
Flexibility	E-tax service website provides citizens flexibility to continue and complete the remaining work at any time in next login and whenever citizen find comfortable	SerQ2
Reliability	Government e-tax service website provides reliable service to their citizens	SerQ3
Transparent	Government e-tax service provides citizens transparent service. Nothing they keep hidden when services released to their citizens	SerQ5
Sufficiency	Government provides sufficient understanding and helpful instructions to the citizens to complete their task related to the e-tax	SerQ6
Responsiveness	Government online services loads all texts and graphics quickly and respond to the query made by citizens	SerQ7
Hypothesis (H7) (SerQ →CtU)	Service quality is positively related and affects the citizens' use / usefulness in G2C e-government (e-tax service) perspective	
Hypothesis (H8) (SerQ →EGSQ)	Service quality positively affects perceived e-government service quality in the G2C e-government (e-tax service) perspective.	
Hypothesis (H9) (SerQ →CtS)	Service quality is positively related and affects the citizens' satisfaction in G2C e-government (e-tax service) perspective.	

Efficiency	Based on my experience I found e-tax services are effective and efficient	CtS1
Valuable	Based on my experience I found e-tax service is valuable and the information includes all necessary values	CtS2
Adequacy	While using government e-tax service I found satisfactory use of it which provides full confidentiality to my information	CtS3
System Satisfaction	I found e-tax service system is competent and I am fully satisfied with e-tax service system of government	CtS4
Information Satisfaction	Based on my experience I found that overall I am satisfied by information provided by e-tax service	CtS5
Hypothesis (H13) (CtS →EGSQ)	Citizens' satisfaction has positive effect on perceived e-government service quality in G2C e-government (e-tax service) perspective.	

Service Functionality	Government e-tax service provides interactive environment to the citizens along with effective functionality of e-tax service system	EGSQ1
Reliability	Government e-tax service provides reliable service to the citizens	EGSQ2
Citizens' support	Government e-tax service provides necessary user support on the website and gives special attention to every users individually	EGSQ3
Service Satisfaction	Government e-tax service website provides helpful instruction for performing my task	EGSQ4
Hypothesis (H16) (EGSQ→PE)	Overall perceived e-government service quality affects the e-government perceived effectiveness in G2C e-government (e-tax service) perspective.	

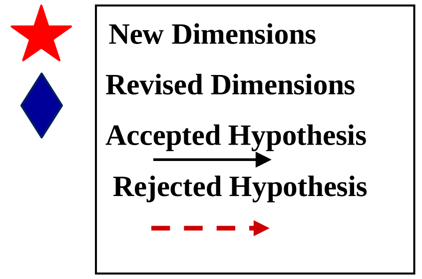


Figure 6.1: Final FrameworkE-GEEF
Base Model: DeLone & McLean, (2003)

6.5 Discussion on Theoretical Implications

The aim of the thesis is to develop a framework for assessing the effectiveness of e-government service and test it using e-tax service of India. This study presents and validates the framework E-GEEF which is an extension of updated IS success model of DeLone and McLean (2003). Validated framework E-GEEF captures the multidimensional and interdependent nature of G2C e-government systems. This study determines the factors responsible for assessing the effectiveness of e-government service and demonstrates how these factors are related to each other as effectiveness evaluation factors. The effectiveness assessment framework was developed which is based on former IS success model and e-commerce success research areas.

The theoretical importance of the findings in the current research is classified in two parts. First part of this study highlights the significance of theoretical relationships when performing empirical research in e-government context. The current research influences researchers to consider the perspective of correlation and assimilation when designing research models that involve socio-technical interaction in an e-government setting. In fact, the findings of the current research demonstrate that research on e-government effectiveness assessment should consider technological aspectsand citizens' perception about the offered e-government services. The complexity of e-government is a socio-technical system as it involves technological, organizational, behvioural, economical, and political factors (Ndou, 2004; Al-Adawi et al., 2005; Al-Shehry et al., 2006; Lau et al., 2008). Thus, integrating object-based and behavioural beliefs represented in DeLone and McLean IS success model yields a better understating of behaviour intentions to use e-government systems. Present study shows the positive significant impact of system quality, information quality, and service constructs on citizens' use / usefulness which further impacts the citizens' trust. This argument is supported by Wangpipatwong et al. (2009) as in their study of e-government portals of Thailand reveal that improved system quality, information quality, and service quality can ensure continued use of e-government applications by citizens. This justifies socio-technical relationship between all service quality constructs, citizens' use, and citizens' trust. Consequently, theoretically, the citizens' trust, perceived e-government service quality and perceived effectiveness factors should be embedded to enrich the model which will firmly predict e-government effectiveness from the citizens' perspective. Present study supports that the beliefs in e-government context include technological factor (system quality, information quality, service quality, overall perceived e-government service quality) which explains citizens' behavioural factors (citizens’ use / usefulness, citizens’ satisfaction, and citizens’ trust) while usage of e-government service and consolidate the perceived effectiveness of e-government services. Each domain of IS research requires different types of measurements. Hence, in the present study, the selection of the constructs and appropriate items to measure e-government services was attentively taken place from the literature. Empirical data supported the study’s hypotheses and confirmed the significance of the presence of chosen contrasts and their associated items.

Second, to the best of the author’s knowledge which performed extensive literature review, the DeLone and McLean, (2003) information success model was not validated previously in an e-government effectiveness assessment setting. However, other studies (Wang and Liao, 2008; Saha et al., 2010; Khayun and Ractham, 2011) validated DeLone and McLean (1992, 2003) model and assessed success factors of e-government.

6.6 Discussion on Practical Implications

Apart from above mentioned theoretical implications there are some practical implications of the research findings. Developed scale for this study will provide a reasonable approach of effectiveness evaluation and can act as a reference point in defining reliable quality standards for offered e-government services. Offered excellent quality of e-service will certainly influence citizens to utilize more compared to the traditional service. Government e-tax service providers can take an initiative to establish robust evaluation methods based on devised criteria to identify if there is any shortcoming of the offered e-tax service delivery, and can take corrective measures as needed to provide citizens’ friendly superior quality of e-tax service.

The proposed framework provides an appropriate approach to government decision making authorities for determining which factors require consideration in order to yield the highest returns from the their offered e-governments services. At the same time it will ensure whether citizens accept and prefer to interactwith e-government e-services. In other words, the study offers an understanding of citizens’ perceptions of an e-government system. According to the proposed framework, the most important issues that need consideration when implementing an e-government service in G2C context and these are overall perceived e-government service quality, citizens’ trust, and effectiveness of e-government services. EGSQ which is overall perceived e-service quality is the outcome of its preceding quality system quality, information quality, and service quality factors’ characteristics and citizens’ satisfaction toward e-government service (Chutimaskul et al., 2008; Zaidi et al., 2012, 2013; Hien, 2014). EGSQ is influenced by all mentioned quality constructs and citizens' trust generated by using e-government services. The findings clearly indicate that the effect of information quality on citizens' use/ usefulness (β=0.24 and t=5.305) is higher than system quality and service quality in the context of G2C e-government. This confirms that the beliefs about information quality have a more prevailing influence on citizens' use; this means that e-government agencies should pay much more attention to promoting the information quality of e-government services to enhance the citizens' confidence in them. Whilst system quality (β=0.36 and t=8.136) and information quality (β=0.22 and t=4.718) show strong impact on perceived e-government service quality than service quality (β=0.15 and t=3.576) construct. Citizens' Trust (CtT) is an important factor as citizens put forward their personal information online believes that service provider will maintain the privacy of their personal data and sufficient security will be provided while interacting with the e-tax or any other e-services. Perceived effectiveness (PE) of e-government service which is the outcome of overall e-government service Citizens' quality is influenced by EGSQ and citizens' trust. Government agencies that design and deliver e-services to their citizens' should consider above mentioned quality factors for providing better quality of e-government services. Providing effective quality of e-service is a continuous and innovative process hence to maintain the quality of such services is a vital factor in influencing and generating citizen trust and satisfaction which are indicators of effectiveness evaluation. The results of the proposed study can help the government agencies specifically the e-tax authority to applyproposed quality dimensions of E-GEEF for evaluating the effectiveness e-tax service. The study suggests that the government agencies should keep improving the quality of their web services by incorporating the quality criteria. Providing complete, relevant, reliable, up-to-date information, assuring quick access, rapid response, easy navigation, and offering trustworthy government e-service effectively at the level of citizens' satisfaction, are confirmed in this study to be the most significant factors in assessing e-government effectiveness.

The proposed framework suggests that the perceived e-government service quality is one of the vital indicators for assessing effectiveness of e-government service. For achieving improved e-services quality emphasis should be given on ensuring that efficiently and effectively citizens are utilising technology, as user satisfaction led to an optimistic impact on e-government service quality to effectiveness of the e-services. Research results will also assist the e-tax authority to understand what influence citizens' needs and what is the altitude of citizens' satisfaction with their offered e-tax service. Factors of validated framework along with chosen items will steer the government authority to improve the e-service delivery process in effective manner to improve effectiveness of offered e-government service.

6.7 How to use Framework E-GEEF

The purpose of developing E-GEEF framework was to evaluate the e-government service effectiveness from citizens' perspective in (G2C) context, so this framework will be helpful for government agencies in making the decision and assessing their offered e-services. In this study, the developed framework E-GEEF outlines the basis for government agencies to evaluate their initiatives and set the priorities.

The framework was developed in such a way so that it will help out the decision making authorities by highlighting the most significant factors and also illustrate how these factors interact and evolve in the e-government service effectiveness process. This study identified the distinctive steps explaining the decision makers and guiding them about the use of E-GEEF framework for assessing the effectiveness of e-government services.

- ***Step 1:*** Appraise the present status of their offered e-government e-service and identify the obstructions and factors influencing the e-government e-service. A classification of the most decisive factors involved in this stage help in categorising the challenges. After performing this step it is expected that government agencies will be able to illustrate a clear picture of the offered e-government service status in terms of effectiveness of e-service.
- ***Step 2:*** Adapt the E-GEEF framework along with the proposed dimensions, measurement items, and factors, further; eliminate some indecisive factors in order to deal with the dynamic changing of e-government settings.
- ***Step 3:*** E-GEEF framework is extendable and includes the dimensions system quality, information quality, service quality, citizens' usefulness, citizens' satisfaction, citizens' trust, perceived e-government service quality, and perceived effectiveness of e-government services. It also includes various measurement items in each dimension. So based upon the government priorities and citizens' expectation, new items can be added within the proposed dimensions and evaluate empirically the effectiveness of offered e-government services.
- ***Step 4:*** Based upon the E-GEEF dimensions and measurement items, government can

conduct online surveys using e-service website and collect the responses from the e-government service users.

- ***Step 5:*** Later, analyse the responses by applying statistical methods and interpret the obtained results.
- ***Step 6:*** Obtained results will help the government agencies to prioritize future strategy and initiatives in order to improve and further assess e-government service effectiveness.

In addition to the above steps, implementation part of the framework E-GEEF can be discussed with e-government officials to find more ways to apply E-GEEF for evaluating other e-government services.

6.8 Summary

The purpose of this chapter "Result and Discussion" was to discuss the outcomes and key findings of the chapter "Data Analysis" which was performed for the proposed study. Chapter aims to present the independent and dependent factors and key determinants that affect the effectiveness of e-government services. The purpose of this study was to identify and examine the roles of various e-government service quality factors, citizens' satisfaction, and citizens' trust towards the usage of e-government services and assess the effectiveness of e-government services from citizens' perspective by considering Indian e-tax service. DeLone and McLean (2003) model was modified and extended using citizens' trust, perceived e-government service quality, and perceived effectiveness of e-government services.Study made the following observations:

- Conceptulised model proposed sixteen hypotheses, out of sixteen twelve hypotheses were supported. Consequently, the findings of the present study are consistent with the proposed theoretical foundation.
- Twelve hypotheses were found significant and show the positive correlations between the constructs (SysQ→CtU; InfQ→CtU; SerQ→CtU; SerQ→CtS; CtU→CtT; SysQ→EGSQ; InfQ→EGSQ; SerQ→EGSQ; CtS→EGSQ; CtT→EGSQ; CtT→PE; EGSQ→PE) howevertwo hypotheses (SysQ→CtS; InfQ→CtS) show negative correlations between the constructs which were the exceptions. Remaining two hypotheses did not show positive relationship among the constructs and the obtained values were not found significant at p (<.05, <.01, <.001).
- The relationship between the constructs citizens' use / usefulness (CtU) to citizens' satisfaction (CtS) should be considered carefully and needs further investigation in an

e-government context as both did not show significant relationship and hence the proposed hypothesis was rejected.

- Similarly, the relationship between the constructs citizens' satisfaction (CtS) and citizens' trust needs further investigation in an e-government context as both did not show significant relationship and hence the proposed hypothesis was rejected.
- As estimated, perceived e-government service quality had shown a significant influence on perceived effectiveness of e-government service with the value of path coefficient ($\beta = 0.43$) and critical ratio (t value = 8. 960). This confirmed that preceding quality criteria impacts the effectiveness of e-government services.
- Further, as estimated, citizens' trust had shown a significant influence on perceived effectiveness of e-government service with the value of path coefficient ($\beta = 0.35$) and critical ratio (t value =7.665). This confirmed that the citizens' trust impacts the effectiveness of e-government services and trust of citizens in offered e-government service was considered as major contributory factor for assessing the effectiveness of e-government service.
- System quality, information quality, and service quality constructs individually impact overall perceived e-government service quality. Quality constructs' relationship among (SysQ→EGSQ) with ($\beta = 0.36$) value, (InfQ→EGSQ) with ($\beta = 0.22$) value, and (SerQ→EGSQ) with ($\beta = 0.15$) value show the significant relationships and demonstrated the importance of system quality, information quality, and service quality constructs in consolidating the overall perceived e-government service quality.
- Citizens' satisfaction had shown a significant influence on perceived e-government with the value of path coefficient ($\beta = 0.10$) and critical ratio (t value = 1.962) at p value ($<.05$). This confirmed that the citizens' satisfaction impacts directly the perceived e-government service quality and has shown indirect influence as a contributory factor for assessing the effectiveness of e-government service.
- Validated framework shows 52% variance among the factors revealed by perceived effectiveness of e-government service.

Summary of this chapter clearly explains the importance of various quality factors and citizens' perception about e-government services. The findings offer e-government agencies a new perspective for dealing with e-government system and services by suggesting that the perceived e-government service quality and citizens trust are prominent indicators for assessing effectiveness of e-government services.

CHAPTER – 7

Conclusions

In the previous chapter, the results and discussion were presented. This chapter reviews the discussion on the findings and presents the possible conclusions after interpreting the results derived from previous chapter. The following sections are presented in this chapter.

- **Section (7.1):** Overview of the Research
- **Section (7.2):** Research Aim and Answering Research Questions
- **Section (7.3):** Contribution to Knowledge and Research Novelty
- **Section (7.4):** Research Limitations
- **Section (7.5):** Direction for Future Work
- **Section (7.6):** Research Conclusion

7.1 Overview of the Research

This chapter highlights the possible conclusions from proposed research work presented in this thesis. Along with the presentation of research overview, this chapter will discuss about the contributions which author has made in the thesis to assess the e-government service effectiveness from the citizens' perspective. Further, a brief discussion of research findings, research limitations, and directions of future research in the area of e-government effectiveness evaluation will be discussed.

E-government is employed as a means for providing better public services. The accomplishment of this objective of e-government depends upon offering superior quality e-services and satisfactory usage by their citizens. With the increased usage of Internet in today's day-to-day life of the people, people are progressively utilizing the e-government services through G2C systems. Higher e-government quality, then better e-services and organisations are possible to provide (Chutimaskul et al., 2008; Wang and Liao, 2008). Hence, it was important to measure how effective e-government services are being offered by G2C systems from the citizen's perspective. Therefore, the study was intended to assess the effectiveness of e-government services and demonstrate the role of e-government service quality and citizens' trust in the evaluation of e-government effectiveness. Concurrently analysing and to develop a better perceptive of the spaces that exists between e-service execution issues and effectiveness of e-government services from the citizens' perspective. Developed framework was validated by using e-tax service of India.

The process of this research was mainly carried out in the following stages.

- **Stage 1:**
  Chapter 1 defined the introductory background of e-government and stated the research problem furthermore demonstrated different motivations for carrying out this research. Initial stage of the study was to identify the research problem and highlighted the proposed study's aim and objectives.
- **Stage 2:**
  Literature review was carried out for identifying the findings from the literature in Chapter 2 and various theoretical perspectives were discussed related to e-government. This assisted in identifying the scope of the research problem. It also discussed different models of e-government related to e-service quality, performance assessment, citizens' satisfaction, citizens' trust, and effectiveness. A comparison of existing e-government evaluation frameworks was carried out which helped to understand that, how, various factors and their relationships in e-government studies contribute, hence

comprehensive study was performed in literature review. Lastly, e-government effectiveness evaluation's advantages and challenges were discussed which directed to offering the possible guidelines about the e-government effectiveness assessment and citizen's expectation from the offered e-government services.

- **Stage 3:**

  While reviewing the literature, substantial amount of research gaps were identified specifically related to existing effectual theoretical models for understanding e-government effectiveness assessment phenomenon. Consequently a conceptual framework was derived from the literature aimed to provide better measurement criteria for assessing e-government service effectiveness in this proposed study. In the mentioned context, Chapter 3 highlighted e-government challenges involved in performance assessment of e-services and factors that impacts citizens' perceptions. To understand the better perceptive of e-government effectiveness evaluation, a conceptual framework E-GEEF was conceptualized and proposed in Chapter 3. Proposed framework contained a set of e-government service quality estimation factors (system quality, information quality, service quality) and citizens' behavioural factors (citizens' use /usefulness, citizens' satisfaction, citizens' trust) when citizens' avail these e-services. Combining these mentioned factors, the researcher proposed and developed an e-government effectiveness evaluation framework E-GEEF to offers an enhanced perceptive of the phenomenon of employing an effective initiative of e-government service. Sixteen hypothesised relationships were proposed among the previously discussed factors and constructs in the proposed validated framework. DeLone and McLean (1992, 2003) models were considered as the base models for studying e-government effectiveness assessment as these models were widely used in e-commerce success measurement.

- **Stage 4:**

  Stage four in the proposed research, outlined the detailed research methodology which guided about possible number of steps was to be carried out. Steps related to the research design, research strategy and research methods used in the study were explained systematically. It discussed the research approaches available in the quantitative and qualitative data analysis. Afterward, it proceeded with the selection of suitable research method for present research. It stressed how quantitative data analysis approach is suitable for author's present study. Hence, for quantitative data analysis, data collection took place that covered both technical and citizens' behavioural issues in the context of Indian e-government. In order to assess and validate the proposed framework E-GEEF, the survey was administered among citizens of India who use e-tax service.

- **Stage 5:**
  Chapter 5 discussed the various steps used in data analysis and model validation was performed using structural equation modeling technique. Descriptive analysis was carried out using the data collected from the survey performed among citizens (e-tax service users) and this was the initial step within the data analysis. Preliminary data examination initially required screening of the data. As part of screening the data tackling the missing data was very important. Incomplete and vague responses were clearly dropped. Further, cleaning and coding the data using SPSS took place. Descriptive statistics application on the collected described the suitability and appropriateness of sample. A high survey response rate more than 85% was reported in the research. The findings suggested that the citizens' survey showed positive concurrence for chosen constructs. Reliability test and construct validity of items performed on collected data. Cronbach's alpha score for reliability test was found to be greater than the desired range (0.70) followed by desired range of factors' loadings. Finally, structural equation modeling technique was applied for testing the measurement model and structural model.
- **Stage 6:**
  Finding showed the significant results that confirmed the measurement model and structural model fit demonstrated good model fit to the empirical data. The results from the analysis showed that all constructs satisfied the criteria of reliability and validity specifically construct reliability, discriminant validity, and convergent validity. Twelve hypotheses out of proposed sixteen hypotheses were found significant using path estimation. Chapter 6 confirms the novel contribution to e-government effectiveness evaluation which is reflected in the findings. It also supported the theoretical perspectives of the study. Analysis results illustrated in Chapters 5 and discussion on the obtained results in Chapter 6 led to the accomplishment of the research aim.

7.2 Research Aim and Answering Research Questions

The present study has accomplished the research aim. Ultimate aim of this research was:
"*To dvelopment a framework for assessing the effectiveness of e-government services from the citizens' perspective*"

To accomplish the aim and objectives of this research study, following main research question was defined in Chapter 1.

Main Research Question: *"What is the framework that could best evaluate the effectiveness of e-government services"?*

Systematic review of literature in Chapter 2 provided in-depth perceptive of the e-government services, e-service quality, performance, effectiveness, and citizens' trust issues. Consequently, research problem was identified and research aim came into existence. To fulfill the research aim and for answering the research question, an e-government effectiveness evaluation framework E-GEEF for assessing the effectiveness of e-government service was proposed and validated.

The proposed research problem was further alienated into three specific research questions.

Apart from the major research question, there are three minor research questions possible:

a. What are the effectiveness assessment frameworks for e-government services existing and why would a new framework be evolved?

A number of e-government performance and effectiveness assessment models were identified and analysed by the researcher after performing comprehensive review of literature in Chapter 2 and Chapter 3. Most of the frameworks were designed specifically for IS system success and e-commerce success assessment. Some of the researchers implemented these models in e-government context. Literature review clearly indicates the gap of profound study which took place yet to systematically assess the e-government effectiveness and citizens' behaviours. Hence, the need was arisen to fill the gap in the research and introduce an effective novel framework which could assess the e-government effectiveness in citizens' perspective. Consequently, a novel framework E-GEEF came into existence to fulfill the research gap. Chapter 5 demonstrates the validation of the framework by analysing the collected empirical data from the citizens who utilise government e-tax service in India.

b. What are the dimensions contributing to effectiveness evaluation of e-government services?

The review of literature demonstrated the number of assessment factors which were identified in Chapters 2 and 3, analysed by the researcher in Chapters 5, results of the analysis were presented in chapter 6. DeLone and McLean (2003) model was used as base model which has system quality, information quality, service quality, use, satisfaction, and net benefits as core IS success factors. Present study of the author identified technological and behvioiural factors including system quality, information quality, service quality, citizens' use/ usefulness, citizens' satisfaction, citizens' trust, perceived e-government service quality, and perceived effectiveness of e-government service factors. Present validated study introduced three new additional factors including citizens' trust, perceived e-government service quality, and perceived effectiveness of e-government service which played key role in assessing e-government service effectiveness in e-government context also provide novelty in the framework which are not available in the literature and in the DeLone and McLean (2003) model.

c. *What could be the relationship among various effectiveness evaluation dimensions?*

A number of hypotheses were presented which were based upon the third research question and previous arguments from reviewed literature. Various conceptualized hypotheses comprised the proposed research framework E-GEEF and were tested empirically in the present study. Sixteen hypotheses were formulated and out of sixteen twelve hypothesised relational were confirmed which justified the correctness of the selection of the factors in the validated E-GEEF framework. However, study didn't see the significant relationship among citizens' use and citizens' satisfaction also citizens' satisfaction and citizens' trust but citizens' satisfaction and citizens' trust show significant relationship with perceived e-government service quality and with perceived effectiveness of e-government service.

7.3 Contribution to Knowledge and Research Novelty

Within the scope of a single research, it was unattainable to examine each facet of the research in e-government area. Therefore, it is essential to identify a specific problem for the study and limit the research area so that only reasonable attention could be given within the specific research context. Considering this analogical fact, the current research centered on assessing the effectiveness of e-government service and revealing the roles of various e-government service quality antecedents and citizens' trust in effectiveness evaluation of e-government service. As per the continuous review of literature and review of recently published research articles, it is confirmed that no study has previously examined these roles specifically with reference to Indian e-government e-tax service.

The findings highlighted in the preceding section have made a novel contribution to the theoretical knowledge in the field of e-government. Outcome of the effectiveness assessment framework and its associated critical factors also makes a constructive contribution to both academic research and practitioners. The results of the present research have further extended the knowledge in the area of e-government by building a valued and inventive involvement to assessing the effectiveness of e-government service.Findings of the present study are supported by literature review and empirical evidences which produced the following contributions.

- **Contribution 1:**

  Largely, the present research has accomplished all the objectives primarily set out in Chapter 1. A systematic comprehensive review of the literature was carried out in Chapter 2 about e-government effectiveness assessment frameworks, e-government service quality, and citizens' trust. Chapter 2 emphasized the dearth of theoretical studies and framework to comprehend the diverse challenges and issues that obstruct the effectiveness of e-government service. Review of the literature clearly indicated that evaluation of e-government service effectiveness was required from the citizens' viewpoint in G2C context.

- **Contribution 2:**

  To bridge the research gap identified in the review of e-government literature, theoretical framework E-GEEF was proposed by the author in Chapter 3 for providing better understanding and demonstrated the prospective relationships which possibly exist between factors influencing the effective e-government service and usage of e-government service by the citizens. The core aspect of the research's contribution is to provide better perceptive of effective e-government services and citizens' perception as trust in offered e-government service.

  DeLone and McLean (2003) model has been used substaintially for assessing IS success and e-commerce success. In the present research, it was considered as base model and the author developed an e-government effectiveness evaluation framework E-GEEF. DeLone and McLean (2003) consists of six dimensions which include system quality, information quality, service quality, system use, user satisfaction and net benefits to measure the IS system success and e-commerce success. Few studies in e-government are available which utilized DeLone and McLean model without making any amendments in all previously mentioned dimensions. E-government studies in literature are mostly carried out by using DeLone and McLean model that covers e-government success, adoption, readiness, and e-government implementation area but e-government effectiveness evaluation area is unseen in literature.

Present study is in the perspective of e-government and as a novel contribution to the research involves the addition of three new dimensions incorporated from the literature to the proposed framework E-GEEF and re-specification and extensions of the model were proposed to evaluate the effectiveness of e-government service (e-tax service). Existing dimensions of DeLone and McLean were respecified as "citizens' use /usefulness", and "citizens' satisfaction" and three novel dimensions including "perceived e-government service quality", "citizens' trust", and "perceived effectiveness" were incorporated.

The literature and studies regarding e-government evaluation and success of e-government are still at relatively early stages of development (Saha et al., 2010). Consequently, more work is to be done in this area. In this regard, to the present study this is considered as major contribution.

- **Contribution 3:**

Accomplished empirical study's outcome was the validation of the developed theoretical framework E-GEEF for the evaluation of government e-service effectiveness. It has been developed to assess e-tax filing system / service in Indian e-government context. Literature indicates that limited number of conceptual studies performed in the context of Indian e-government do not suggest a single definite measurement procedure to evaluate e-government e-service effectiveness from the citizens' perspective. Developed framework E-GEEF succeeded in revealing the key factors including e-government service quality and citizens' trust that assesses and affects e-government service effectiveness of Indian e-tax service and perception of e-tax payers (Indian citizens) towards offered India e-tax service.

- **Contribution 4:**

Proposed validated study stresses the role and importance of perceived e-government service quality in assessing the effectiveness of e-government services. Validated framework E-GEEF confirmed the significant effect of "perceived e-government service quality" on perceived effectiveness of e-government services. Further, study also revealed that perceived e-government service quality has impact of system quality, information quality, and service quality.

- **Contribution 5:**

Proposed study confirmed the significant relationship between "citizens' trust" and "perceived effectiveness of e-government service" which stresses on including "citizens' trust" in e-government effectiveness evaluation and observed the key role of citizens' trust as influential determinant. E-government services are utilized by citizens, so citizens' opinions play a vital role in evaluating the effectiveness of e-government services. Present study shows that the citizens' trust is indirectly affected by system quality, information quality, and service quality; however, these 3 factors show direct effect to citizens' use /usefulness which further impacts on the citizens' trust. The specific combination of factors addressed in contribution 4 and contribution 5 formed in this study are unique and were found absolutely appropriate in the Indian context.

- **Contribution 6:**

  It has been highlighted in Chapter 2 that the current literature lacks the generic frameworks necessary for e-government effectiveness evaluation; however, IS system success measurement scales are available. So the present study addresses this short coming. The major contribution of this research is the development of the novel framework to address this deficiency. Further, the proposed validated framework E-GEEF relates the technological and citizens' behvioural factors. Tackling these two diverse factors together and extending to significant determining indicators is a distinctive contribution of this research. This explains the complexity in e-government services and their effectiveness assessment and proposed study will help government agencies and policy makers to better understand the effective e-service phenomenon and manage their initiatives accordingly.

Above points show the major contribution to the research. Four published papers in journals and confrerences confirm that the research has made positive contributions to the effectiveness evaluation of e-government e-service. The revised theoretical framework can be used by researchers to comprehend and examine the effectiveness of e-service concept within the e-government context and the challenges that might obstruct the implementation of effective e-services. Prediction of citizens' expectation from offered e-government services using proposed framework could be determined. Proposed validated framework can be used by government agencies for administering continuous evaluation system at provincial and federal level. Abovementioned contributions to this study indicate an original and innovative attempt towards understanding of effective e-government accomplishment mainly in Indian context. Additionally, proposed empirical study establishes an efficient framework, which can add reasonably in further theoretical advances related to effective assessment of e-government service quality provided by government agencies and used through the e-government portals by citizens.

Complying with international research works we performed a precise study and developed a reliable instrument of eight dimensions, which can effectively determine effectiveness of e-services along with e-service quality of government and citizens' trust in government.

7.4 Research Limitations

This research is affluent in its contents because it developed a framework from well known theories of IS and e-commerce by covering large sized sample pooled from the citizens of India. However, findings in this research have been affected by the lack of theory in e-government research area particularly related to effectiveness assessment. Few e-government assessment frameworks (EAF) are introduced in India but the efforts made so far to develop theories relating to the e-government service effectiveness assessment in country like India which is at present are not sufficient, effective and well structured. However, building a conceptual framework helped to reduce the effect of lack of theory and established the theoretical foundation for the research. Further, the developed e-government service effectiveness framework as an ultimate outcome contributes to the theory building and testing.

Nevertheless, like any other research study this research also has a number of limitations. Hence, it is essential to highlight the possible number of limitations within the context of present e-government research. This is equally important to place the findings in appropriate perspective.

- **Limitation 1:**

  First identified limitation comes from the sample population. Although, the study has followed the common practice of data collection which was random sample technique. Most of the respondents who participated in the survey had internet experience and were familiar with the India e-tax service usage.

- **Limitation 2:**

  Second important limitation was geographical area of India. India is country of large population with diversification in culture, languages, and level of education among citizens. Two states were targeted for data collection and most of the respondents were educated male. However, business personnel were also considered for data collection.

Consequently, it is natural to find that the educated citizens' are internet savvy and they are more likely to access the online services whereas the scenario with elementary educated citizens was different.

- **Limitation 3:**

  Third limitation is related to the chosen case study as this research was conducted using only one case study. However, e-tax service in India caters a huge population of citizens who pay their taxes. Since, e-tax service of India was considered for the validation of proposed framework and hence it is difficult to predict whether the proposed framework will be applicable for additional e-government services (e.g., revenue service, excise service, e-tender service, and other e-services offered by Indian government). Further, the research was conducted in Indian context, and confined to the public sector of India so whether it could be useful to apply in the perspective of different countries.

- **Limitation 4:**

  Fourth limitation of the present study is the core use of quantitative techniques for data analysis. As conceptual framework was proposed after extensive review of literature and hypotheses were formulated then quantitative approach was found best suited when we need to test theories with hypotheses. Quantitative techniques in the present research provided efficient statistical assessments and confirmed the hypothsised correlation between factors. Despite of fact that quantitative techniques are best fitted for such research studies; qualitative research techniques along with quantitative techniques could be used. Qualitative technique could have helped in identifying more factors and profound understanding could be achieved. Although, proposed study provided robust research findings, but due to limitations of time and some restrictions on obtaining government documentations about e-tax service it was not possible to carry out qualitative analysis along with quantitative data analysis. However, during extensive review of literature, qualitative approaches were studied thoroughly and items and information available on India e-tax service web portal were observed and studied carefully.

- **Limitation 5:**

  Finally, the citizens' trust in e-government it quite wider and complex to study. Studies related to trust in e-services are still being carried out due to its complexity. Therefore, present study considered the knowledge and institution based trust items since these corresponding with the author's research perspective. Further, in Indian e-tax service context, the citizens' satisfaction did now show significant relationship with citizens' use and citizens' trust however, previous studies performed by the researchers for their countries stated the positive and significant relationship.

7.5 Direction for Future Work

The study conceptualized and presented a framework E-GEEF drawn from the existing theories of IS and e-commerce for validating the effectiveness of e-government service. Despite the obtained results found significant by performing measurement model fit and structural model fit statistical analysis by using structural equation modeling, there is a possibility of including more factors in framework to enhance the understanding of the e-government effectiveness assessment phenomenon. Hence, based on above discussed research limits and findings from the present study, possible number of implications and future directions may be proposed for future research.

- **Direction 1:**
  Within the present study, an e-government effectiveness assessment framework was introduced in the perspective of e-tax services of India, and the proposed framework was examined using e-tax data collected from India as researcher's origin is from India. Empirical analysis supported suitability of the framework in India. Furthermore, the appropriateness of the proposed framework can be examined in any geographical settings with different comparable government e-services. As researcher is presently based in the gulf region and spent more than 13 years as an academician so it is a good opportunity to carry out further validation of the proposed framework as part of the future research by considering the range of the e-services being offered in gulf countries. Gulf region is entirely different in terms of geography, culture, citizens' education, and in offering e-services to their citizens' as compared to India.
- **Direction 2:**
  The focus of this study was evaluating the effectiveness of e-government service from the citizens' perspective in government G2C system. However, G2B (government to business) and G2G (government to government) contexts were not covered in the current study. Only citizens who avail e-tax service in India and have good experience of using Indian e-tax service were targeted as source for data collection. The e-tax practitioners specifically employees in e-tax were not the part of data collection process. Thus, G2G (government to government) e-services which are also known as inter-governmental e-services and G2B (government to Business) e-services (e.g. e-tendering) would be the area of study for future research.

- **Direction 3:**
  The focal theoretical result of the current research is the confirmation of a novel theory formed after examining the hypotheses by specifying the proposed and validated framework E-GEEF. As present study followed the DeLone and McLean (1992, 2003) IS success model which has space opened for further addition of any new factor. Likewise, proposed framework E-GEEF is also open for any additional variables. Future research may include more technological and behavioural factors to the presented framework. Citizens' trust factor and other quality factors may be integrated with e-government phenomenon.
- **Direction 4:**
  As mentioned in the limitations of the study that study used the quantitative data analysis techniques which is a positivist quantitative method of analysing the data but analysis from qualitative perspective did not include in the present study. Thus, an interpretive qualitative approach would be suggested to enhance the perceptive and may shed some light on the unanticipated results. The citizens' satisfaction with citizens' use / usefulness and citizens' trust has shown insignificant relationship in the present study which may be reversed by analysing the phenomenon using qualitative data analysis approach.
- **Direction 5:**
  EU funded Project eGovRTD2020 "*Roadmapping eGovernment Research: Visions and Measures towards Innovative Governments in 2020*", Consortium in 2007 (Codagnone and Wimmer, 2007), published their results and identified the most important research themes. Evaluating the significance of various research themes for prospective e-government, many e-government research themes were identified which include e-participation, information quality, data privacy, performance assessment, trust issues, e-government value assessment, and cyber infrastructure of e-government (Codagnone and Wimmer, 2007). Present study is aligned with the mentioned research topics proposed in eGovRTD2020. Finally as future research direction, the identified factors in present study E-GEEF could be used to explore and assess otherareas mentioned in e-GovTRD2020.

7.6 Research Conclusion

The conclusion chapter demonstrates the discussion on final results, major contributions to the research, explains its possible limitations and has proposed future directions for further studies.

Author confirms that the proposed research is novel and distinctive study that addresses the various concerns of e-government effectiveness evaluation and evaluated e-government effectiveness of e-service from the citizens' perspective in India. This is also unique in its holistic approach which empirically examined the technological, behvioural, and environmental issues related to e-services. As a result, the research identified the contributory factors of e-government effectiveness assessment in India public sector, and developed a comprehensive framework E-GEEF as a powerful tool that assists in the assessment process of e-government effectiveness.

The novelty of this research can be considered as a significant contribution to the body of knowledge and its implications are essential for researchers and e-government authorities who are working towards offering effective e-services.

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Appendix A:

"Interview Questions for Preliminary Qualitative Study of Indian E-tax Service"

Interviews with e-tax service users in India for preliminary qualitative study to know the citizens' view about offered Indian e-tax service.

Interviews Questions:

1. Do you have awareness of available online e-tax filing service?

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2. Do you always use Indian e-tax service and file your taxes online?

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3. Does the available internet speed support quick access to e-tax service online?

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4. Can you access e-tax service system through website from any location?

   ……………………………………………………………………………………

5. Does e-tax service system available at any time for use?

   ……………………………………………………………………………………

6. Do you find that offered e-tax system is easy to use but needs lots of technical understanding while using.

   ……………………………………………………………………………………

7. While using e-tax service website, can you easily move from page to page?

   ……………………………………………………………………………………

8. Do find that e-tax service system offers all operational functions at e-tax web service portal?

   ……………………………………………………………………………………

9. Do you find a reliable network to access e-tax service?

   ……………………………………………………………………………………

10. Does e-tax web service system works continuously without any interruption.

    ……………………………………………………………………………………

11. Does e-tax service website update the web pages for any announcement?

    ……………………………………………………………………………………

12. Does e-tax service website provide the latest and satisfactory information for the citizens?

    ……………………………………………………………………………………

13. Do you find error free information on the e-tax website?

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14. Do you find information available on time at e-tax website?

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15. Do you find precise information on e-tax service website?

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16. Do you find significant information through e-tax web service?

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17. Do you fully trust on the information available through e-tax web service?

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18. Do you consider that offered e-tax service maintains transparency?

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19. Is there any help videos or steps available for using the e-tax web service.

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20. Does e-tax website provide linkage to other departments and ministries through e-tax web service portal?

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21. Do think that e-tax website provides reliable service to their citizens?

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22. Do you receive prompt response of any inquiry you make through e-tax service?

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23. Do you find e-tax service web site is interactive?

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24. If any transaction goes wrong then does e-tax service offer online provision to rectify the transaction issues?

……………………………………………………………………………………………

25. Are citizens able to access online documents related to issues currently being decided?

……………………………………………………………………………………………

26. Do you use e-tax service on regular basis?

……………………………………………………………………………………………

27. Do you find e-tax service useful for filing e-tax?

……………………………………………………………………………………………

28. Do you know how to use e-tax service and file your e-tax?

……………………………………………………………………………………………

29. Do you find easy to perform number of transactions at any time.

……………………………………………………………………………………………

30. Do you wish to continue the use of e-tax service for future transactions?

……………………………………………………………………………………………

31. Do you find all valuable information from e-tax service which gives you satisfaction with e-tax service?

……………………………………………………………………………………………

32. Do you experience sense of confidentiality while using e-tax service?

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33. Are you satisfied with the information being provided through e-tax service?

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34. Do you find yourself fully satisfied with e-tax service systems?

……………………………………………………………………………………………

35. Do you think that offered e-tax service is well organized?

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36. Do you have reasonable trust in offered e-tax service?

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37. Do you find reasonable level of security while performing transaction through e-tax service web site?

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38. Do you find privacy of your personal information at e-tax service website?

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39. Do you able to finish your e-tax filing work in minimum amount of time?

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40. Do you think that the offered e-tax service gives speedy response while using.

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41. Do you find any ambiguity in the offered e-tax service?

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42. Any time you feel distrust while using e-tax service?

……………………………………………………………………………………………

43. Do you think that you receive the excellent quality of e-tax service?

……………………………………………………………………………………………

44. Do you think that citizens receive high quality of information through e-tax service web?

    ………………………………………………………………………………………

45. Do find that the e-tax service is reliable and available consistently in trustworthy manner?

    ………………………………………………………………………………………

46. Is there any feedback mechanism system available in e-tax service website by which the citizens can provide feedback after using online e-tax service?

    ………………………………………………………………………………………

47. Do you think that any improvement is required in offered e-tax service?

    ………………………………………………………………………………………

48. Do you think that offered e-tax service is risk free in all the aspects?

    ………………………………………………………………………………………

49. Is there any provision for monitoring and evaluation of e-tax service and its effectiveness?

    ………………………………………………………………………………………

50. Has the e-government made any efforts to improve e-tax service efficiency?

    ………………………………………………………………………………………

51. Do you find the e-tax service effective and fulfill your requirements?

    ………………………………………………………………………………………

Appendix B:

"Survey on Effectiveness Evaluation of E-government E-Tax Services"

COVER SHEET

The aim of this research is to develop the framework E-GEEF for assessing the effectiveness of e-government e-tax services in India from the citizens' perspective. Researcher wishes to identify the factors that influence the e-government e-tax service effectiveness in India and how citizens of India anticipate the effective e-services from the electronic government.

Your participation in author's research survey is greatly appreciated. No personal individual information on the questionnaires is sought. Participation in the survey is purely consent based and voluntary. Participant may opt to quit from the participation from survey at any time. Confidentiality related to the answers of this survey will be maintained in strict manner. Only score of the answered questions by participants as measures will be used in data analysis and in further writing the conclusions from the research. No data will be associated with individuals specific. To do this names, address, and ID number kind of information is not being collected from the individuals. All questionnaires will be trashed once the data have been entered into my system, where it will be secured and will not be available to anyone. Your responses and information will not be shared with anyone. The data will be used solely for research purposes.

I will deeply appreciate your time and effort for this survey. Filling the survey will not take your long time. Thank you for your cooperation.

Participants' / Demographic Information

S.N.	Questions	Answers
1	Have you ever used Indian online tax web site for filing your e-tax? If no then please do not proceed with the survey.	1. Yes 2. No
2	What is your gender	1. Male 2. Female
3	What is your age	1. 18 -30 2. 30-40 3. 40-50 4. 50-60 5. Above 60
4	What is your education	1. Secondary School 2. Graduation 3. Post-graduation and above
5	What is your occupation	
6	How many years have you been using e-tax services of India	

Instructions for Filling the Survey

Purpose of this survey is to determine the overall effectiveness of e-tax services offered by Indian e-government. Based on e-tax payer's experience with the government e-tax services, various questions related to system quality, information quality, service quality, citizens' use / usefulness, citizens' satisfaction, citizens' trust, overall e-government service quality, and perceived effectiveness of e-government services in various sections will ask tax payers to indicate that to what extent they agree or disagree with the following statements.

If you **strongly disagree** with the statement then please **choose 1**, and if you **strongly agree** with the statement then please **choose 5**. There is no right or wrong answer and the main aim is to know your answer that best reflects your opinion. The following are the five different choices:

1: Strongly disagree 2**:** Disagree**3:** Neutral or no opinion**4:** Agree**5:** Strongly agree

Note: Circle the most appropriate answer of each question in the questionnaire**.**

System quality evaluation statements						
1	Government e-tax system is accessible 24 hours online every day whenever I need to access I can access it.	5	4	3	2	1
2	E-tax website offers flexibility to use it anywhere.	5	4	3	2	1
3	E-tax website is easy in its functionality that allows user to browse different pages and does not stuck while using.	5	4	3	2	1
4	E-tax website is available all the time and quality of contents is appropriate, error free, precise and related to the subject according to the citizen's need.	5	4	3	2	1
5	E-tax website allows citizens to use e-government system that enables citizen to accomplish tasks more easily and quickly.	5	4	3	2	1
6	E-tax website provides integration to other website of ministries.	5	4	3	2	1
7	It is easy to navigate within this website which allows citizen to go back and forth between pages.	5	4	3	2	1
Information quality evaluation statements						
1	Information on the government e-tax website is accurate and error free also, covers all information desired.	5	4	3	2	1
2	Information presented on the government e-tax website is comparative to the citizen's needs and subject matter.	5	4	3	2	1
3	Government e-tax service website provides up-to-date and sufficient information which enables citizens to complete their task.	5	4	3	2	1
4	Information on the government e-tax website is trust worthy and consistent.	5	4	3	2	1
5	Government e-tax service website provides precise information to the citizens.	5	4	3	2	1
6	Government e-tax service website provides desired information at the right time or in timely manner to the citizens.	5	4	3	2	1
7	Information on this e-tax service website is consistently available for the citizens to complete their task.	5	4	3	2	1
Service quality evaluation statements						
1	Government e-tax service website assures citizens to provide	5	4	3	2	1

	necessary information and forms to be downloaded.					
2	E-tax service website provides citizens flexibility to continue and complete the remaining work at any time in next login and whenever citizen find comfortable.	5	4	3	2	1
3	Government e-tax service website provides reliable service to their citizens.	5	4	3	2	1
4	Government e-tax service provides concrete and substantial or tangible services to their citizens.	5	4	3	2	1
5	Government e-tax service provides citizens transparent service. Nothing they keep hidden when services released to their citizens.	5	4	3	2	1
6	Government provides sufficient understanding and helpful instructions to the citizens to complete their task related to the e-tax.	5	4	3	2	1
7	Government online services loads all texts and graphics quickly and respond to the query made by citizens.	5	4	3	2	1
Citizens' use / usefulness of e-services statements						
1	I regularly use government e-tax service and whenever I need to file my tax online I choose to file through e-tax website.	5	4	3	2	1
2	I have intension to use government e-tax service again in the future.	5	4	3	2	1
3	Effectively I can use and perform a variety of e-tax related operations and tasks using government e-tax service.	5	4	3	2	1
4	It is easy to navigate efficiently within the government e-tax website and use e-services.	5	4	3	2	1
5	Using the government e-tax service makes it easier to do my task and I can perform number of transactions.	5	4	3	2	1
Citizens' satisfaction in e-services statements						
1	Based on my experience I found e-tax services are effective and efficient.	5	4	3	2	1
2	Based on my experience I found e-tax service is valuable and the information includes all necessary values.	5	4	3	2	1
3	While using government e-tax service I found satisfactory use of it which provides full confidentiality to my information.	5	4	3	2	1
4	I found e-tax service system is competent and I am fully satisfied with e-tax service system of government.	5	4	3	2	1
5	Based on my experience I found that overall I am satisfied by information provided by e-tax service.	5	4	3	2	1
Citizens' Trust in e-services statements						
1	Based on my experience with e-tax service, I found that there is usable trustworthy e-tax service is being offered.	5	4	3	2	1
2	Based on my experience I found that there is sufficient privacy given to my account and associated information.	5	4	3	2	1
3	Based on my experience I found there is a sufficient security measure followed to protect my online information.	5	4	3	2	1
4	I found that offered e-tax e-service is transparent in the transactions.	5	4	3	2	1
5	I found that offered e-tax service is transparent and provides appropriate transparent information to the citizens.	5	4	3	2	1
6	Based on my experience with e-tax service, I found that my e-tax request processed in minimum amount of time.	5	4	3	2	1
7	Based on my experience with e-tax service, I found that e-tax service system offers tangible service.	5	4	3	2	1
Overall e-government service quality statement						

1	Government e-tax service provides interactive environment to the citizens along with effective functionality of e-tax service system.	5	4	3	2	1
2	Government e-tax service provides reliable service to the citizens.	5	4	3	2	1
3	Government e-tax service provides necessary user support on the website and gives special attention to every user individually.	5	4	3	2	1
4	Government e-tax service website provides helpful instruction for performing my task.	5	4	3	2	1
Perceived effectiveness of e-government services						
1	Based on my experience I have full trust in offered government e-tax service.	5	4	3	2	1
2	Government e-tax service provides overall outstanding e- service quality to the citizens.	5	4	3	2	1
3	Government e-tax service offers risk free e-tax service to their citizens.	5	4	3	2	1
4	Government e-tax service is overall effective.	5	4	3	2	1