Assessing Organizational E-Government Readiness of the Public Sector: A Saudi Arabian Context

This Thesis is Submitted in Fulfilment of the Requirements of the Degree of Doctor of Philosophy

By

AUTHOR: IBRAHIM A. ALGHAMDI
STUDENT ID: 2077614

SUPERVISORS:

DR ROBERT GOODWIN

DR GISELLE RAMPERSAD

SCHOOL OF COMPUTER SCIENCE, ENGINEERING AND MATHEMATICS

FLINDERS UNIVERSITY
AUSTRALIA

DATE: SEPTEMBER 17, 2014

Declaration

This work has not been previously submitted for a degree or diploma in any university. To the best of my knowledge and belief, this thesis contains no material previously published or written by another person except where due reference is made in the thesis itself.

_____

Ibrahim A. Alghamdi

September 17, 2014

Acknowledgments

I would first like to thank God for giving me the strength and persistence to pursue my thesis, and for helping me throughout the entire process especially during the numerous times when I was short of ideas, and then suddenly the flow of ideas came.

I wish to express my special appreciation to Dr Robert Goodwin for being such a supportive supervisor. My deep appreciation is extended to Dr Giselle Rampersad, for being such as an amazing co-supervisor. Without their inspiration, generous support and encouragement, this work would never have come to fruition. From the first day they have provided me with invaluable knowledge and suggestions, and I have been very fortunate to have them as my supervisors.

Many thanks are due to the staff members in the Flinders University School of Computer Science, Engineering and Mathematics for their kind help and administrative support. I also wish to thank my PhD colleagues for giving me a memorable and enjoyable experience. I am also grateful to Flinders University for providing a good learning environment and research support.

Special appreciation is extended to the top management interviewees for their support during the data collection phase. I also appreciate the generous help of respondents who participated in my quantitative survey.

My deep gratitude and appreciation go out to my father, my brothers and my wonderful sisters. Their support and constant encouragement gave me the strength and determination that helped me during my PhD journey. My gratitude also goes out to my lovely family for their generous and warmest support. My beloved wife and best friend, Malak, who always listened and helped whenever she could. My sons Khalid, Abdulrahman, Abdullah and Abdulmalik were always proud of me, and were certain that I would be able to complete this thesis.

Finally, this study is dedicated to my father for his efforts and love.

Abstract

Information and Communication Technology (ICT) has become increasingly important in the development of nations. E-Government refers to the strategic use of ICT to transform the public sector. E-Government is regarded as a driver of citizen-centric, supportive, and advanced governance involving a transformation in how government re-engineers its internal processes and interacts with its stakeholders. Yet barriers can be encountered in the transformation to e-Government services due to limited readiness of a country's ICT infrastructure and deployment.

A review of the literature showed a lack of research in developing countries such as Saudi Arabia regarding e-Government, particularly pertaining to internal organisation factors. The majority of e-Government assessment models focus on the websites that offer service to the citizens. In addition, most existing models assess OEGR on a macro level (of the whole country) without performing an in-depth assessment at the micro level of public organisations. Consequently, an effective Organisational e-Government Readiness (OEGR) assessment model is essential for advancing appropriate e-Government implementation and transformation.

Given the significant investment in e-Government programmes and the need to allow such programmes to germinate, this study assessed OEGR in Saudi Arabia. Academic research on the main internal organisational factors leading to e Government readiness is still sparse. Few organisational e-Government studies incorporate pertinent value dimensions.

To address this gap in the literature, an organisational e-Readiness assessment model was developed and described in detail in this study. This OEGR model can be used by a range of stakeholders including information technology managers and policy makers in improving OEGR within the public sector and thus in improving the quality of public service delivery.

A model was developed comprising the effect of seven main constructs: strategy, user access, the national e-Government programme (Yesser), portal, processes, ICT infrastructure and human resources on OEGR. The model factors, relationships, and hypotheses stemmed from the literature on Information Systems (IS), Electronic Commerce (e-Commerce), Electronic Readiness (e-Readiness), and e-Government

readiness. To test the model, the research focused on examining the relationships and interactions among these factors in an organisational e-Government environment using a study comprising organisations associated with the government of Saudi Arabia. A qualitative method was employed for interviewing leading e-Government officials in Saudi Arabia. Quantitative data was also collected through a questionnaire distributed to a sample of top management ICT and e Government specialists in Saudi Arabia. Data obtained from the survey was triangulated with data gathered from interviews.

The qualitative findings confirmed the significance of each construct in influencing OEGR, and revealed certain issues specific for the Saudi Arabian implementation context. Quantitative findings revealed that strategy, Yesser, portal, processes, ICT infrastructure, and human resources had a positive impact on OEGR, while there was no direct link found between user access and OEGR.

The model provided in this study is a systematic approach to assess the OEGR of public organisations and to guide them in self-assessments. The thesis contributes to the literature pertaining to assessments of information systems and e-Commerce in general and e-Readiness and e-Government readiness in particular. Furthermore, it offers a valuable tool to government organisations for assessing their e-Government readiness and in assessing the success of e-Government transformation efforts.

Contents

List of Figures x
List of Tables xi
Abbreviations Used in This Study xiii
Publications From This Thesis Since Enrolment xvi
Chapter 1 : Introduction 1
1.1 Background to the Research 1
1.2 Research Topic 3
1.3 Country Profile 4
1.4 Research Aims and Significance 7
1.5 Research Contribution to Knowledge 10
1.6 Thesis Layout 11
1.7 Summary 13
Chapter 2 : Literature Review 14
2.1 Overview 14
2.2 E-Government 14
2.2.1 E-Government as a Concept 15
2.2.2 E-Readiness 16
2.2.2.1 Factors Affecting E-Readiness 16
2.2.2.2 E-Readiness Models 18
2.2.3 Requirements for E-Government 22
2.2.3.1 Strong IS 22
2.2.3.2 E-Commerce tools 26
2.2.4 Benefits and Goals of E-Government 30
2.2.5 Model, Stages, and Functional Elements of E-Government 33
2.3 E-Government in Developing Countries 35
2.4 E-Government Initiative in Saudi Arabia 38
2.5 Assessment of E-Government Readiness (EGR) 40
2.5.1 EGR Models and Factors 41
2.6 Proposed Conceptual Model for OEGR 47
2.6.1 Conceptual Model's Design 47
2.6.2 Explanation of Variables and Hypotheses 51
2.6.2.1 Strategy 51
2.6.2.2 User Access 53
2.6.2.3 E-Government programme 54
2.6.2.4 Portal 58
2.6.2.5 Processes 59
2.6.2.6 ICT Infrastructure 60

2.6.2.7 Human Resources 61
2.7 Summary 63

Chapter 3 : Research Methodology and Design 64
3.1 Overview 64
3.2 Research Approach 64
3.3. Research Design 67
3.3.1 Phase One Research Design 69
3.3.2 Phase Two Research Design 69
3.3.3 Integration of Findings from Phase One and Phase Two 69
3.4 Sampling 70
3.4.1 Sampling for Phase One 70
3.4.2 Sampling for Phase Two 72
3.5 Data Collection 73
3.5.1 Phase One – Qualitative Data Collection 73
3.5.2. Phase Two – Quantitative Data Collection 74
3.5.2.1 Questionnaire Scales 75
3.5.2.2 Questionnaire pre-testing methods 76
3.6 Data Analysis Strategies 76
3.6.1 Phase One – Qualitative Analysis 77
3.6.1.1 Validity 77
3.6.2. Phase Two -- Quantitative Analysis 78
3.6.2.1 Descriptive data analysis 78
3.6.2.2 Reliability and Validity of Data 79
3.6.2.3 Relationship identification 82
3.7 Limitations of Research Design 83
3.8 Ethical Considerations 83
3.9 Summary 84

Chapter 4 : Qualitative Results: Model and Hypotheses Development 86
4.1 Overview 86
4.2 Conceptual Model 87
4.2.1 Strategy 87
4.2.1.1 Leadership 87
4.2.1.2 Action plan 89
4.2.1.3 Development plans 90
4.2.2 User Access 93
4.2.2.1 Stakeholders 93
4.2.2.2 Delivery channels 94
4.2.3 E-Government Programme - Yesser 96
4.2.3.1 Availability 97

4.2.3.2 Government security network 97
4.2.3.3 Government service bus 98
4.2.4 Portal 100
4.2.4.1 Availability 100
4.2.4.2 Layered structure 101
4.2.4.3 Service oriented architecture 102
4.2.5 Processes 103
4.2.5.1 Support processes 103
4.2.5.2 Processes automation 104
4.2.5.3 Data and information flow 105
4.2.6 ICT Infrastructure 108
4.2.6.1 Hardware and software 109
4.2.6.2 Connectivity 109
4.2.6.3 Security 110
4.2.6.4 Operations 111
4.2.7 Human Resources 114
4.2.7.1 Awareness 114
4.2.7.2 ICT Skills 115
4.2.7.3 Training 116
4.3 Inter-relations Between the Strategy and the Other Six Dimensions 118
4.4 Refinement of Conceptual Model 119
4.5 Summary 122

Chapter 5 : Quantitative Results 123
5.1 Overview 123
5.2 Descriptive Statistics 124
5.3 Data Screening 132
5.4 Assessment of Normality 132
5.5 Outlier Screening 133
5.6 Standard Deviation and Standard Errors of Means 134
5.7 Scale Reliability 137
5.7.1 Internal consistency 137
5.7.2 Item-total correlation 138
5.8 Exploratory Factor Analysis 139
5.8.1 Factorability of data 140
5.8.2 Factor extraction and rotation 141
5.8.3 EFA results 142
5.8.4 Test of common method variance 149
5.8.5 Summary of EFA results 150
5.9 Confirmatory Factor Analysis 153

5.9.1 Assessment of model fit and estimation methods *153*
5.9.2 CFA results *154*
5.9.3 Summary of CFA results *166*
5.10 Relationship Identification 168
5.10.1 Structural equation modelling overview *168*
5.10.2 Measurement model assessment *168*
5.10.2.1 Measurement model specification and assessment criteria 168
5.10.2.2 Measurement model results 169
5.10.3 Structural model assessment *172*
5.10.3.1 Structural model specification and assessment criteria 172
5.10.3.2 Structural model results 172
5.11 Summary 174

Chapter 6 : Discussion 177
6.1 Overview 177
6.2 Impact of Strategy on All OEGR-Related Factors 178
6.3 Nature of Factors' Influence on OEGR 186
6.3.1 Impact of User Access on OEGR *186*
6.3.2 Impact of e-Government Programme on OEGR *188*
6.3.3 Impact of Portals on OEGR *190*
6.3.4 Impact of Processes on OEGR *191*
6.3.5 Impact of ICT Infrastructure on OEGR *192*
6.3.6 Impact of Human Resources on OEGR *194*
6.4 Integrated Model for OEGR Assessment in Saudi Arabian Public Sector Organizations 195
6.5 Summary 201

Chapter 7 : Conclusion 202
7.1. Overview 202
7.2. Conclusion 202
7.3 Revisiting the Research Aim and Objectives 205
7.4 Answering the Research Question 207
7.5 Summary of Thesis Findings 208
7.6 Theoretical Implications of Thesis Findings 209
7.7 Practical Implications of Thesis Findings 211
7.8 Strengths and Limitations of the Research 214
7.9 Future Research Directions 216
7.10 Summary 218

References 220
Appendix 1: INFORMATION SHEET (Interview) 238
Appendix 2 CONSENT FORM FOR PARTICIPATION IN RESEARCH 240
Appendix 3: LETTER OF INTRODUCTION (Interview) 241

Appendix 4: Questions to Officials from the Government Sector 242
Appendix 5: Interviews 248
Appendix 6: Letter of Introduction (Questionnaire English version) 309
Appendix 7: Online Questionnaire (English Version) 310
Appendix 8: Online Questionnaire (Arabic Version) 311
Appendix 9: Questionnaire (English Version) 312

List of Figures

Figure 2-1: Information system success 23
Figure 2-2: Updated DeLone and McLean success model 25
Figure 2-3: E-Commerce success model (Molla and Licker, 2001) 27
Figure 2-4: Conceptual Model (developed for this research) 50
Figure 2-5: Government security network (Yesser, MCIT) 56
Figure 2-6: GSB's role in e-Government services infrastructure (Yesser, MCIT) 57
Figure 3-1: Research design (developed for this research) 68
Figure 3-2: Procedure for selecting officials (adapted from Delbecq et al. (1975) and Okoli and Pawlowski, 2004) 72
Figure 4-1: Conceptual model (revised version) 121
Figure 5-1: Government organisations and participants involved in this survey 125
Figure 5-2: Survey participants: Distribution according to job position 126
Figure 5-3: Survey participants: Distribution according to city 127
Figure 5-4: Survey participation by number of employees 127
Figure 5-5: Survey participation by number of branches 128
Figure 5-6: Survey participation by number of services offered 128
Figure 5-7: Distribution of e-Services in participating government organisations against variables G2C, G2G, G2B and G2E 129
Figure 5-8: Distribution of services fully, partially, and not automated 130
Figure 5-9: CFA model of the strategy construct 156
Figure 5-10: CFA model of the user access construct 157
Figure 5-11: CFA model of the Yesser construct 158
Figure 5-12: CFA model of the portal architecture construct 160
Figure 5-13: CFA model of the business processes construct 162
Figure 5-14: CFA model of the ICT infrastructure construct 164
Figure 5-15: CFA model of the human resources construct 165
Figure 5-16: Final measurement model 170
Figure 5-17: Structural model with standardised path coefficients 174
Figure 6-1: Revised model for Saudi Arabia 197

List of Tables

Table 2-1: Internal factors of OEGR 48
Table 3-1: List of interviewees 77
Table 4-1: Factors of strategy construct and corresponding questions 93
Table 4-2: Main factors of user access and corresponding questions 95
Table 4-3: Main factors of user access construct (delivery channels) and corresponding questions 96
Table 4-4: Main factors of Yesser and corresponding questions 100
Table 4-5: Main factors of portal construct and corresponding questions 103
Table 4-6: Main factors of processes construct and corresponding questions 107
Table 4-7: Main factors of proportion of automation and corresponding questions 108
Table 4-8: Main factors of ICT infrastructure construct and corresponding questions 113
Table 4-9: Main factors of human resources construct and corresponding questions 118
Table 4-10: Thirteen hypotheses 122
Table 5-1: Distribution of desktop and network coverage, e-Mail and Internet usage, and connection speed 130
Table 5-2: Distribution of employees' skills and training within the organisation 131
Table 5-3: Criteria of analysing each category 134
Table 5-4: Descriptive statistics of the factors 136
Table 5-5: Cronbach's alpha values of the scales 138
Table 5-6: Item-total correlation of the factors 139
Table 5-7: KMO and Bartlett's test values of the scales 140
Table 5-8: Rotated factor loadings of the strategy construct–final factors 143
Table 5-9: Rotated factor loadings of the user access–final factors 144
Table 5-10: Rotated factor loadings of the Yesser–final factors 144
Table 5-11: Rotated factor loadings of the portal construct 145
Table 5-12: Rotated factor loadings of the business processes construct 146
Table 5-13: Rotated factor loadings of the ICT infrastructure construct 148
Table 5-14: Rotated factor loadings of the human resources construct 149
Table 5-15: Rotated factor loadings of the e-Government construct 149
Table 5-16: EFA results for common method variance test 151
Table 5-17: Summary of EFA results 152
Table 5-18: CFA results of the strategy construct–final factors 155
Table 5-19: CFA results of the user access construct–final factors 157
Table 5-20: CFA results of the Yesser construct–final factors 158

Table 5-21: CFA results of the portal construct–final factors 159
Table 5-22: CFA results of the processes construct–final factors..... 161
Table 5-23: CFA results of the ICT infrastructure construct–final factors 163
Table 5-24: CFA results of the human resources construct–final factors 165
Table 5-25: Summary of CFA results..... 167
Table 5-26: Measurement model results..... 171
Table 5-27: Initial structural model results..... 173
Table 7-1: Summary of managerial implications..... 213

Abbreviations Used in This Study

ADF	Asymptotically Distribution-Free
ADSL	Asymmetric Digital Subscriber Line
AMOS	Analysis of MOment Structures
APEC	Asia-Pacific Economic Cooperation
ATMs	Automated Teller Machines
B2C	Business-to-Consumer
BPR	Business Process Re-engineering
CDG	Country Development Gateway
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
CID	Center for International Development
CIDCM	Center for International Development and Conflict Management
CIO	Chief Information Officer
CRM	Customer Relationship Management
DBMS	Database Management System
EAI	Enterprise Application Integration
ECM	Enterprise Content Management
EDI	Electronic Data Interchange
EFA	Exploratory Factor Analysis
EGR	E-Government Readiness
ERP	Enterprise Resource Planning
G2B	Government-to-Businesses
G2C	Government-to-Citizens
G2E	Government-to-Employees
G2G	Government-to-Governments
GDP	Gross Domestic Product
GFI	Goodness-of-Fit Index
GIS	Geographic Information Systems
GSB	Government Service Bus
GSN	Government Security Network
ICDL	International Computer Driving Licence
ICT	Information and Communications Technology
IFI	Incremental-Fit Index
IS	Information Systems
ISP	Internet Service Provider

IT	Information Technology
ITPOSMO	Information, Technology, Processes, Objectives, Skills, Management systems, Other resources
ITU	International Telecommunication Union
KAM	Knowledge Assessment Methodology
KMO	Kaiser-Meyer-Olkin
KSA	Kingdom of Saudi Arabia
LAN	Local Area Network
MCIT	Ministry of Communication and Information Technology
METER	Measurement and Evaluation Tool for e-Government Readiness
ML	Maximum Likelihood
NRI	Network Readiness Index
OECD	Organisation for Economic Cooperation and Development
OEGR	Organisational e-Government Readiness
OLS	Ordinary Least Square
PC	Personal Computer
PDAs	Personal Digital Assistants
PKI	Public Key Infrastructure
RMSEA	Root Mean Square Error of Approximation
ROI	Return On Investment
SAMA	Saudi Arabian Monetary Agency
SD	Standard Deviation
SE	Standard Error
SEM	Structural Equation Modelling
SIS	Strategic Information System
SMEs	Small and Medium-sized Enterprises
SMS	Short Message Service
SOA	Service Oriented Architecture
SSO	Single Sign On
STOPE	Strategy, Technology, Organisation, People and Environment
TAM	Technology Acceptance Model
TLI	Tucker Lewis Index
UNPAN	United Nations Public Administration Network
USAID	U.S. Agency for International Development
VoIP	Voice over Internet Protocol
WAM	Web Assessment Method
WAN	Wide Area Network

WAP	Wireless Application Protocol
WITSA	World Information Technology and Services Alliance
WLS	Weighted Least Square

Publications From This Thesis Since Enrolment

Book Chapter

Alghamdi, Ibrahim A. (2014), Ready or Not? Are Saudi Arabian organisations ready for e-government', 'Technology Innovation Leadership in Development: A 'Middle East' (West Asia) Perspective', Nova Publishers: New York. ISBN: 978-1-63117-388-2

Refereed Journal Articles

Alghamdi, Ibrahim, A., Goodwin, Robert and Rampersad, Giselle (2014), Organisational E-Government Readiness: An Investigation in Saudi Arabia, International Journal of Information Management. (Acceptance Date: 12/2/2014)

Alghamdi, Ibrahim A., Goodwin, Robert and Rampersad, Giselle (2013), Evaluation of Organisational E-Government Readiness in the Public Sector, International Journal of E-Services and Mobile Applications (IJESMA), Vol. 5, No. 2, pp. 1-21 , Published by IGI Global.

Alghamdi, Ibrahim A., Goodwin, Robert and Rampersad, Giselle (2011), E-Government Readiness Assessment for Government Organisations in Developing Countries, Computer and Information Science (CIS), Vol. 4, No. 3, pp. 3-17, Published by Canadian Center of Science and Education.

Refereed Conference Proceedings

Alghamdi, Ibrahim A., Goodwin, Robert and Rampersad, Giselle (2011), A Suggested E-Government Framework for Assessing Organisational E-Readiness in Developing Countries, International Conference, Informatics Engineering and Information Science, Communications in Computer and Information Science (ICIEIS 2011), Kuala Lumpur, Malaysia, November 14-16, 2011. Proceedings, Part II, Vol. 252, 2011, pp. 479-498. Published by Springer Berlin Heidelberg.