

Graduate School of Business

**Diffusion of ICT and SME Performance: The Mediating Effects of
Integration and Utilisation**

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Doctor of Philosophy
of
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DECLARATION

To the best of my knowledge and belief, this thesis contains no material previously published by any other person except where due acknowledgment has been made.

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university.



Md Shah Azam

25 February 2014

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DEDICATION

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ABSTRACT

Information and communications technology (ICT) offers enormous opportunities for individuals, businesses and society. The application of ICT is equally important to economic and non-economic activities. Researchers have increasingly focused on the adoption and use of ICT by small and medium enterprises (SMEs) as the economic development of a country is largely dependent on them. Following the success of ICT utilisation in SMEs in developed countries, many developing countries are looking to utilise the potential of the technology to develop SMEs. Past studies have shown that the contribution of ICT to the performance of SMEs is not clear and certain. Thus, it is crucial to determine the effectiveness of ICT in generating firm performance since this has implications for SMEs' expenditure on the technology. This research examines the diffusion of ICT among SMEs with respect to the typical stages from innovation adoption to post-adoption, by analysing the actual usage of ICT and value creation. The mediating effects of integration and utilisation on SME performance are also studied. Grounded in the innovation diffusion literature, institutional theory and resource-based theory, this study has developed a comprehensive integrated research model focused on the research objectives.

Following a positivist research paradigm, this study employs a mixed-method research approach. A preliminary conceptual framework is developed through an extensive literature review and is refined by results from an in-depth field study. During the field study, a total of 11 SME owners or decision-makers were interviewed. The recorded interviews were transcribed and analysed using NVivo 10 to refine the model to develop the research hypotheses. The final research model is composed of 30 first-order and five higher-order constructs which involve both reflective and formative measures. Partial least squares (PLS)-based structural equation modelling is employed to test the theoretical model with a cross-sectional data set of 282 SMEs in Bangladesh. Survey data were collected using a structured questionnaire issued to SMEs selected by applying a stratified random sampling technique. The structural equation modelling utilises a two-step procedure of data analysis. Prior to estimating the structural model, the measurement model is examined for construct validity of the study variables (i.e. convergent and discriminant validity).

The estimates show cognitive evaluation as an important antecedent for expectation which is shaped primarily by the entrepreneurs' beliefs (perception) and also

influenced by the owners' innovativeness and culture. Culture further influences expectation. The study finds that facilitating condition, environmental pressure and country readiness are important antecedents of expectation and ICT use. The results also reveal that integration and the degree of ICT utilisation significantly affect SMEs' performance. Surprisingly, the findings do not reveal any significant impact of ICT usage on performance which apparently suggests the possibility of the ICT productivity paradox. However, the analysis finally proves the non-existence of the paradox by demonstrating the mediating role of ICT integration and degree of utilisation explain the influence of information technology (IT) usage on firm performance which is consistent with the resource-based theory. The results suggest that the use of ICT can enhance SMEs' performance if the technology is integrated and properly utilised. SME owners or managers, interested stakeholders and policy makers may follow the study's outcomes and focus on ICT integration and degree of utilisation with a view to attaining superior organisational performance.

This study urges concerned business enterprises and government to look at the environmental and cultural factors with a view to achieving ICT usage success in terms of enhanced firm performance. In particular, improving organisational practices and procedures by eliminating the traditional power distance inside organisations and implementing necessary rules and regulations are important actions for managing environmental and cultural uncertainties. The application of a Bengali user interface may help to ensure the productivity of ICT use by SMEs in Bangladesh. Establishing a favourable national technology infrastructure and legal environment may contribute positively to improving the overall situation. This study also suggests some changes and modifications in the country's existing policies and strategies. The government and policy makers should undertake mass promotional programs to disseminate information about the various uses of computers and their contribution in developing better organisational performance. Organising specialised training programs for SME capacity building may succeed in attaining the motivation for SMEs to use ICT. Ensuring easy access to the technology by providing loans, grants and subsidies is important. Various stakeholders, partners and related organisations should come forward to support government policies and priorities in order to ensure the productive use of ICT among SMEs which finally will help to foster Bangladesh's economic development.

PUBLICATIONS ASSOCIATED WITH THIS THESIS

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CONTENTS

DECLARATION	ii
ACKNOWLEDGEMENTS	iii
DEDICATION	iv
ABSTRACT	v
PUBLICATIONS ASSOCIATED WITH THIS THESIS	vii
CONTENTS	viii
FIGURES	xiv
TABLES	xv
ACRONYMS	xvi
<i>CHAPTER 1: INTRODUCTION</i>	1
1.1 Overview	1
1.2 Research Questions	4
1.3 Objectives.....	8
1.4 Research Background.....	9
1.5 Definition of Terms.....	13
1.6 Research Significance	15
1.6.1 Contribution to theory	15
1.6.2 Contribution to practice.....	17
1.7 Organisation of the Thesis	17
1.8 Summary	19
<i>CHAPTER 2: LITERATURE REVIEW</i>	20
2.1 Introduction	20
2.2 Diffusion Process	20
2.3 Theoretical Framework	23
2.3.1 Diffusion of innovation (DOI) theory (Rogers, 1983).....	23
2.3.2 Theory of reasoned action (TRA) (Fishbein & Ajzen, 1975)	25
2.3.3 Theory of planned behaviour (TPB) (Ajzen, 1985).....	26

2.3.4	Technology acceptance model (TAM) (Davis, 1986).....	27
2.3.5	Technology, organisation and environment (TOE) framework (Tornatzky & Fleischer, 1990).....	28
2.3.6	Institutional theory (DiMaggio & Powell, 1983).....	29
2.3.7	Unified theory of acceptance and use of technology (UTAUT) (Venkatesh et al., 2003)	30
2.3.8	Resource-based view (RBV) (Barney, 1991).....	30
2.3.9	Review of the existing theories	31
2.4	Review of Empirical Studies.....	37
2.5	Determinants of ICT Use	48
2.5.1	Cognitive evaluation and owner innovativeness.....	48
2.5.2	Behavioural intention and behavioural expectation.....	49
2.5.3	Facilitating condition and country readiness.....	50
2.5.4	Culture and environmental pressure	51
2.6	Determinants of Organisational Performance.....	55
2.6.1	ICT use, integration and degree of utilisation.....	55
2.6.2	Organisational performance	56
2.6.3	Mediation of integration and utilisation.....	57
2.7	Preliminary Research Model.....	59
2.8	Summary	61
	CHAPTER 3: RESEARCH METHODOLOGY	62
3.1	Introduction.....	62
3.2	Research Paradigm.....	62
3.3	Research Method.....	63
3.4	Research Process.....	65
3.5	Qualitative Field Study Method.....	69
3.5.1	Sample selection	70
3.5.2	Data collection	72
3.5.3	Analyses of qualitative data	74
3.6	Quantitative Study Method.....	75
3.6.1	Developing the questionnaire.....	75
3.6.2	Questionnaire translation	77

3.6.3	Pre-testing of the questionnaire and pilot test.....	79
3.6.4	Sample selection	80
3.6.5	Quantitative data collection	84
3.6.6	Quantitative data analysis	86
3.6.7	Partial least squares (PLS) procedures.....	87
3.6.8	Assessment of measurement model	88
3.6.9	Structural model estimation and nomological validity	92
3.7	Summary	93
CHAPTER 4: FIELD STUDY ANALYSIS AND COMPREHENSIVE RESEARCH MODEL		94
4.1	Introduction.....	94
4.2	Operation of the Field Study.....	94
4.2.1	Sample.....	94
4.2.2	Demographic profiles of study respondents.....	95
4.2.3	Data collection	96
4.2.4	Data analysis	96
4.3	Findings (1 st Stage: Inductive Analysis).....	97
4.3.1	Factors and variables.....	98
4.3.2	Linkages among the factors	119
4.3.3	Comparison between field study findings and the initial model (2 nd stage: deductive model).....	122
4.3.4	Justification of the findings in the literature review.....	123
4.3.5	Justification of combining behavioural intention and expectation ...	124
4.3.6	The comprehensive research model.....	127
4.3.7	Summary	128
CHAPTER 5: HYPOTHESES AND QUESTIONNAIRE DEVELOPMENT		131
5.1	Introduction.....	131
5.2	Hypotheses Development	131
5.2.1	Hypothesis related to cognitive evaluation	131
5.2.2	Hypotheses related to owner innovativeness	133
5.2.3	Hypotheses related to environmental pressure.....	134
5.2.4	Hypotheses related to facilitating condition.....	136
5.2.5	Hypotheses related to country readiness	136

5.2.6 Hypotheses related to culture	138
5.2.7 Hypothesis related to expectation	139
5.2.8 Hypotheses related to ict use.....	140
5.2.9 Hypothesis related to ict integration	142
5.2.10 Hypothesis related to ict utilisation	143
5.2.11 Hypothesis related to the mediation effects of integration and utilisation	144
5.3 Questionnaire Development.....	145
5.3.1 Overview of the questionnaire	145
5.3.2 Measurement instrument.....	146
5.4 Questionnaire Translation	161
5.4.1 Questionnaire refinement and pilot test	162
5.5 Summary	163
CHAPTER 6: DATA ANALYSIS	165
6.1 Introduction.....	165
6.2 Overview of Survey and Data Examination.....	166
6.2.1 Sample profile	167
6.2.2 Data examination	169
6.2.3 Justification of reflective and formative measures.....	170
6.2.4 Examination of possible biases	172
6.3 Model Assessment	174
6.3.1 Assessment of the measurement model	174
6.3.2 Convergent validity	174
6.3.3 Discriminant validity.....	177
6.3.4 Indicator weights for formative constructs	183
6.4 Validation of the Higher-order Model	187
6.4.1 Validation of second-order reflective construct: cognitive evaluation (reflective-reflective).....	190
6.4.2 Validation of second-order formative constructs.....	192
6.5 Structural Model.....	196
6.5.1 Nomological validity.....	197
6.5.2 Tests of hypotheses	198
6.5.3 Test for mediating role of integration and utilisation.....	202

6.6	Summary	214
CHAPTER 7: DISCUSSION AND INTERPRETATION		215
7.1	Introduction	215
7.2	Hypothesis Related to Cognitive Evaluation	215
	7.2.1 Hypothesis H_1	215
7.3	Hypotheses Related to Owner Innovativeness	216
	7.3.1 Hypothesis H_{2a}	216
	7.3.2 Hypothesis H_{2b}	217
	7.3.3 Hypothesis H_{2c}	218
7.4	Hypotheses Related to Environmental Pressure	218
	7.4.1 Hypothesis H_{3a}	218
	7.4.2 Hypothesis H_{3b}	219
7.5	Hypotheses Related to Facilitating Condition	220
	7.5.1 Hypothesis H_{4a}	220
	7.5.2 Hypothesis H_{4b}	220
7.6	Hypotheses Related to Country Readiness	221
	7.6.1 Hypothesis H_{5a}	221
	7.6.2 Hypothesis H_{5b}	222
7.7	Hypotheses Related to Culture	223
	7.7.1 Hypothesis H_{6a}	223
	7.7.2 Hypothesis H_{6b}	224
7.8	Hypothesis Related to Expectation	225
	7.8.1 Hypothesis H_7	225
7.9	Hypotheses Related to ICT Use	226
	7.9.1 Hypothesis H_{8a}	226
	7.9.2 Hypothesis H_{8b}	226
	7.9.3 Hypothesis H_{8c}	227

7.10 Hypothesis Related to ICT Integration	227
7.10.1 Hypothesis H_9	227
7.11 Hypothesis Related to Degree of Utilisation.....	228
7.11.1 Hypothesis H_{10}	228
7.12 Hypothesis Related to Mediating Effects of ICT Integration and Degree of Utilisation.....	229
7.13 Summary	230
CHAPTER 8: CONCLUSIONS AND FUTURE RESEARCH DIRECTIONS	231
8.1 Introduction.....	231
8.2 Research Summary.....	231
8.3 Contributions of the Research.....	234
8.3.1 Theoretical contribution.....	235
8.3.2 Practical contribution	237
8.4 Limitations of the Study.....	243
8.5 Future Research Directions.....	244
8.6 Conclusion	246
REFERENCES	248
APPENDIX A	277
APPENDIX B	278
APPENDIX C	283
APPENDIX D	292
APPENDIX E	302

FIGURES

Figure 2.1: Primary research model based on literature review.....	61
Figure 4.1: The comprehensive research model	130
Figure 5.1: The comprehensive research model and hypotheses.....	164
Figure 6.1: Cognitive evaluation.....	191
Figure 6.2: Culture	192
Figure 6.3: Environmental pressure	193
Figure 6.4: Country readiness	194
Figure 6.5: Organisational performance	195
Figure 6.6: The comprehensive model estimates.....	200
Figure 6.7: Mediating model.....	203
Figure 6.8: Mediating effects of integration	206
Figure 6.9: Mediating effects of utilisation.....	208
Figure 6.10: Mediating effects of integration and utilisation.....	212

TABLES

Table 2.1: Empirical Evidence in Favour of Rogers’ (1983) Model	24
Table 2.2: Review of the Theoretical Frameworks.....	35
Table 2.3: Review of Related Empirical Studies	38
Table 3.1: Threshold Values for Reliability and Validity.....	92
Table 4.1: Sample Profile for Qualitative Research.....	95
Table 4.2: Factors and Items from Field Study.....	117
Table 4.3: Causal Links Explored from the Qualitative Survey	121
Table 4.4: Justification of the Field Study Variables by the Literature	124
Table 5.1: Cognitive Evaluation	148
Table 5.2: Items for Owner Innovativeness and Facilitating Condition	149
Table 5.3: Items for Environmental Pressure.....	151
Table 5.4: Items for Country Readiness.....	153
Table 5.5: Items for Culture.....	155
Table 5.6: Items for Expectation and ICT Usage.....	158
Table 5.7: Items for Integration and Utilisation.....	159
Table 5.8: Items for Performance	161
Table 6.1: Survey Firm Characteristics	167
Table 6.2: Survey Respondent Characteristics	169
Table 6.3: Test of Possible Biases.....	173
Table 6.4: Psychometric Properties for First-order Reflective Constructs	176
Table 6.5: Correlation Matrix for First-order Reflective Constructs	179
Table 6.6: Cross-loading Matrix	181
Table 6.7: Validity for First-order Formative Constructs (Culture and Environment).....	185
Table 6.8: Validity for First-order Formative Constructs (Country Readiness and ICT Use) ...	186
Table 6.9: Description of Second-order Reflective Constructs	189
Table 6.10: Description of Second-order Formative Constructs	190
Table 6.11: Second-order Cognitive Evaluation Construct and Its Association with First-order Components.....	191
Table 6.12: Second-order Culture Construct and its Association with First-order Components.....	193
Table 6.13: Second-order Environmental Pressure Construct and Its Association with First-order Components.....	194
Table 6.14: Second-order Country Readiness Construct and Its Association with First-order Components	195
Table 6.15: Validity for Second-order Performance Construct	196
Table 6.16: Nomological Validity of the Endogenous Variables	197
Table 6.17: Results of the Structural Model	199
Table 6.18: Results of Hypotheses Tests	202
Table 6.19: Mediating Role of Integration in Explaining Performance.....	206
Table 6.20: Mediating Role of ICT Utilisation in Explaining Performance.....	208
Table 6.21: Mediating Roles of ICT Integration and Utilisation	213
Table 6.22: Summary of Hypotheses Tests for Mediating Effects of Integration and Utilisation	213

ACRONYMS

AGFI	Adjusted goodness-of-fit index
AVE	Average variance extracted
B2B	Business to business
B2C	Business to consumer
B2G	Business to government
BBS	Bangladesh Bureau of Statistics
BDT	Bangladeshi Taka
BGMEA	Bangladesh Garment Manufacturers and Exporters Association
BKMEA	Bangladesh Knitwear Manufacturers and Exporters Association
CAIC	Comprehensive Akaike information criteria
CATI	Computer-aided telephone interview
CBIS	Computer-based information systems
CBSEM	Covariance-based structural equation modelling
CEEM	Communication Economics and Electronic Markets Research Centre
CEO	Chief Executive Officer
CFI	Comparative fit index
CIS	Commonwealth of Independent States
C-TAM-TPB	Combined TAM and TPB
CUPS	Curtin University Postgraduate Scholarship
DOI	Diffusion of innovation
DSS	Decision support system
DTPB	Decomposed theory of planned behaviour
EB	Electronic business
ECaTT	Electronic Commerce and Telework Trends
EDI	Electronic data interchange
EIPRS	Endeavour International Postgraduate Scholarship
ERP	Enterprise resource planning
EU	European Union
GDP	Gross domestic product

GLOBE	Global Leadership and Organizational Behavior Effectiveness
GoF	Goodness of fit
GSS	Group support system
HOTE	Human, organisation, technology and environment
HOT-fit	Human, organisation and technology fit
IBDT	Internet-based digital technology
ICT	Information and communications technology
IFI	Incremental fit index
IS	Information systems
IT	Information technology
ITRC	Information Technology Research Cell
ITU	International Telecommunication Union
LDCs	Least developed countries
LLMEB	Leather and Leather Product Manufacturers and Exporters Association of Bangladesh
MDG	Millennium Development Goals
ML	Maximum likelihood
MM	Motivational model
MPCU	Model of PC utilisation
NFI	Normed fit index
PLS	Partial least squares
PLS-SEM	Partial least squares-based structural equation modelling
RBV	Resource-based view
RMG	Ready-made garments
RMSEA	Root mean square error of approximation
SCCS	Supply chain communication systems
SCT	Social cognitive theory
SEAMEWE	South East Asia, Middle East and West Europe
SEM	Structural equation modelling
SME	Small and medium-sized enterprise
SPSS	Statistical package for the social sciences

TAM	Technology acceptance model
TOE	Technology, organisation and environment
TPB	Theory of planned behaviour
TRA	Theory of reasoned action
UK	United Kingdom
UNCTAD	United Nations Conference on Trade and Development
USA	United States of America
UTAUT	Unified theory of acceptance and use of technology
VAF	Variance accounted for
VIF	Variance inflation factor
WB	World Bank
WSIS	World Summit on the Information Society

CHAPTER 1

INTRODUCTION

1.1 OVERVIEW

Information and communications technology (ICT) has become an integral part of human life in the 21st century. The rapid expansion of ICT and its application into various economic activities have opened new opportunities for individuals, businesses and society. In particular, the introduction of various ICT devices has increased productivity in business organisations and has assisted them to manage intra- and inter-organisational affairs. The technology also provides customers with the ability to conduct personal communications, business transactions and banking operations in a more flexible and efficient manner.

Organisations are integrating ICT into business operations to enhance productivity¹. The wide-ranging applications of ICT, particularly Internet-based digital technology, have reshaped the ways in which communication occurs and have also made changes to the systems, procedures and processes of relevant services. Consequently, this affects the ways in which customers, suppliers, regulatory bodies and other external parties deal with business organisations.

The past decades have produced much research investigating the use of information technology (IT) by both individuals and organisations (see Taylor & Todd, 1995b; Mathieson, 1991; Davis et al., 1989; Davis, 1993; Moore & Benbasat, 1991; Premkumar & Potter, 1995; Agarwal & Prashad, 1997, 1998, 1999; Tan & Teo, 2000; Kendall et al., 2001; Sathye & Beal, 2001; Venkatesh & Davis, 2000; Venkatesh & Morris, 2000; Venkatesh, Morris, Davis, & Davis, 2003; Venkatesh,

¹ Particular ICT advantages include: service accuracy (quality service); immediacy (real-time capability); service ubiquity (i.e. services are conducted ‘anywhere’); efficiency (low-cost service capability); privacy (services conducted are personal and private); and service customisation (person-specific services). Important emerging ICT applications include: communications (email, web browsing, social networks); management (accounts management, human resource management, production management); business (homepage, product cataloguing, order processing); transactions (interactive homepage, online payment processing); finance (e-banking); services (entertainment, information, tourism and facilitation of services in relation to gas, water, electricity supply, etc.); and governance (government–citizen, government–business and government–government communication, interaction and transactions).

Brown, Maruping, & Bala, 2008). A primary focus of these research studies is the identification of the factors that determine adoption and diffusion of ICT.

Previous studies have mostly followed the notion that the use of ICT would enhance organisational performance. In the past few years, the growth in ICT usage has increased tremendously across industries around the world. Business enterprises' investment in ICT has also increased dramatically which poses the valid question about whether organisational spending on ICT results in improved organisational performance. Zhu and Kraemer (2005) referred to the wave of debate over the new "IT value paradox" which was triggered by N. Carr (2003) in the article "IT Doesn't Matter."

Past studies have revealed ambiguous results about the contribution of ICT to business performance, such as having a negative effect (Warner, 1987); zero effect (Venkatraman & Zaheer, 1990); a contingent positive effect (Powell & Dent-Micallef, 1997; Tippins & Sohi, 2003; Wu et al., 2006) and a direct positive effect (Bharadwaj, 2000; Zhu & Kraemer, 2005). What is clear is that the contribution of ICT to organisational performance is not straightforward and certain.

Organisational sustainability is largely dependent on the productive use of ICT. Thus, answers to this renewed paradox will have important implications for the way businesses approach IT investment and management. Zhu and Kraemer (2005) revealed that ICT use (e-commerce use) generates organisational performance. By applying the notion of the resource-based view, they reported that the integration of ICT with front-office functionalities and back-end databases can create unique ICT capabilities which cannot be easily imitated and thus have the potential to create improved business performance (Bharadwaj, 2000; Zhu & Kraemer, 2002). This aspect of ICT use, named, 'ICT integration,' has not been widely documented in the contemporary research literature and, hence, its effect on business performance has not been clearly identified. Similarly, another aspect of ICT use may correlate with firm performance which is 'ICT utilisation', that is, whether the ICT is used properly and effectively.

This phenomenon of ICT use is particularly related to the developing country environment. Anandarajan, Igbaria, & Anakwe (2002) have stated that many

information systems (IS) in the less developed countries are under-utilised and, thus, do not make a significant contribution to improving the performance of organisations that are using them (Forster & Cornford, 1992; Ordedra, Lawrie, Bennett, & Goodman, 1993). This statement is indicative of the fact that proper utilisation of ICT may result in improved firm performance; that is, utilisation can make a bridge between ICT use and firm performance. Integration may also act in the same way. Contemporary research initiatives have not produced adequate facts and figures about integration, utilisation and their effects, particularly the mediating effects, on firm performance which may be considered as the agenda for a new research study.

The perspective of the study, that is, the developed versus developing country perspective, has become another research motivation. The past few decades have witnessed an unprecedented increase in the trend of ICT usage to accomplish a wide range of functions at individual, organisational and society levels. The phenomenal usage growth has inspired organisations to become ICT-dependent in accomplishing various internal and external functions. The trend for organisations to become ICT-dependent is significantly higher in developed countries than for organisations from the developing world. Past studies have therefore mainly focused on the developed country context. Consequently, most of the theories in ICT have been formulated from the perspective of developed countries, particularly the American perspective (Zhu & Kraemer, 2005).

In reality, the theories formulated in the developed country environment may not be appropriate in addressing similar phenomena in developing countries as there remains a wide digital divide between the two types of countries. Utilising the advantages of high Internet penetration, developed countries have become ICT-dependent to accomplish various functions such as governance, business, education and utilities (for individuals and organisations) with this gradually trickling down to the developing world.

The success of various ICT applications in the developed world has a significant implication for technology adoption and usage behaviour in developing countries. Recent statistics have suggested significantly higher Internet usage growth (between 2000 and 2013) in the developing part of the world than in developed countries which has created the grounds for diverse use and utilisation of ICT in developing

countries. The changing pattern of the world's ICT usage growth in recent years may attract researchers' attention towards developing and least developed countries (LDCs)².

Bangladesh is a member of the LDCs (least developed countries). The country is characterised by high population, low income and inadequate infrastructural supports such as inefficient technology, inadequate power supply, low teledensity, very low Internet penetration, absence of effective legal systems, and financial and banking mechanisms which are not supportive for facilitating communication and transactions via the Internet. Despite poor teledensity and Internet penetration, the government has planned to make Bangladesh a technology-dependent society by the 50th anniversary of the birth of the country in 2021 with this adopted in the national development plan, *Vision 2021*. The development of ICT and its utilisation in the country's economic development were included in the election manifesto and post-election agendas of the present government which have later attracted the attention of many researchers, policy makers, practitioners and the general public as a movement called *Digital Bangladesh*.

The growth indices, development initiatives and infrastructure of Bangladesh are identical with those of a typical developing country. The characteristics of the country and its move towards establishing an ICT-based society are the rationale behind undertaking this survey-based research on the diffusion of ICT and SME performance seeking reliable and valid research outcomes that are representative of developing countries.

1.2 RESEARCH QUESTIONS

The success of the use of ICT as a tool for increasing productivity in various sectors is the main driver for new adopters. The uniqueness of the technology viz., cost,

² According to the International Telecommunication Union (ITU, 2013), in 2013, over 2.7 billion people are using the Internet which corresponds to 39% of the world's population. In the developing world, 31% of the population is online, compared with 77% in the developed world. The Internet penetration in developed and developing countries is significantly different with developed countries in an advantageous position in various ICT applications. However, at 30 June 2012, the Internet penetration of North America, Europe, Australia, Africa and Asia stood at 78.6 %, 63.2 %, 67.6 %, 15.6 %, and 27.5 % while the growth of Internet usage between 2000 and 2012 was estimated as 153.3 %, 393.4 %, 218.7 %, 3,606.7 % and 841.9 %, respectively (Internet World Stats, 2012). The high Internet usage growth in African and Asian countries spells out the potential of ICT usage in developing and least developed countries (LDCs).

convenience and efficiency (speed and accuracy) motivates users in their new and continued use of technology for personal and business use. The productivity implications of ICT have received the bulk of researchers' attention around the world in their studies of its adoption and diffusion phenomena. However, the majority of the previous ICT adoption-diffusion studies have investigated intention (e.g. Pavlov & Chai, 2002; Lal, 1999; Gefen & Straub, 2000; Kendall et al., 2001; Teo, Wei, & Benbasat, 2003) and actual usage behaviour (e.g Venkatesh et al., 2008; Johnson & Hignite, 2000; Anandarajan et al., 2002; Thatcher, Foster, & Zhu, 2006). Thus, the question about whether the adoption or use of technology induces improved organisational performance remains relatively under-researched, especially in the case of SMEs. This may be considered as a vital research gap which has therefore provided the motivation to link technology adoption-diffusion behaviour with organisational performance in studying the effects of ICT on SME performance.

The innovation adoption theories explain the adoption and diffusion phenomena mainly through intention (Rogers, 1983; Fishbein & Ajzen, 1975; Ajzen, 1985; Davis, 1986; Venkatesh et al., 2003). A criticism of the existing theories is that intention is a reflection of the adopter's internal schema of beliefs which may fail to adequately explain actual behaviour in a situation under incomplete volitional control. Intention, furthermore, may not be reflected in the decision if a time gap exists between intention and actual behaviour.

A recent technology adoption research study has examined the role of behavioural expectation in order to avoid the inabilities of the cognitive factor, behavioural intention. The new construct, behavioural expectation, is not a cognitive factor thus it is able to address the roles of various internal and external factors (Venkatesh et al., 2008). The measurement of behavioural expectation as well as its contribution to actual ICT usage behaviour from an organisational perspective has not been well examined.

The adoption and diffusion phenomena of technological innovation have been analysed by applying a number of theoretical models in the last few decades. The parsimony of the research model has been an important concern for researchers

seeking accuracy in outcomes and ease of estimations.³To maintain parsimony in the analytical model, a number of external factors, such as various aspects of culture and environment, have remained outside of the study due to the scope of the research model previously employed to examine the diffusion of a technological innovation (viz., Rogers, 1983; Fishbein & Ajzen, 1975; Ajzen, 1985; Davis, 1986; Venkatesh et al., 2003, 2008). In some cases, although these external variables have attracted researchers' attention, the effects have not been comprehensively analysed.

Generally, the external variables have been considered either separately or a part of the context has been taken into consideration. For example, the effects of culture or environmental pressures have been examined separately to address the ICT adoption and usage behaviour in many past studies (see Teo et al., 2003 [for environmental pressure]; Erumban & Jong, 2006 [for culture]). Some other studies have analysed a part of culture or environment such as competitive pressure, in some cases normative pressure, has been analysed (with other antecedent factors) to study the effects of environmental pressures on the diffusion of a technological innovation (see Zhu, Kraemer, Xu, & Dedrick, 2004; Zhu, Dong, Xu, & Kraemer, 2006a; Zhu & Kraemer, 2005). Inclusion of an adequate number of variables on the other hand can improve model efficiency for reliable and valid research outcomes.⁴

In recent years, significant progress has been made in the process of statistical analysis. In particular, the introduction of partial least squares (PLS)-based structural equation modeling (SEM) (Chin, 2010) has offered robust estimates and an increased ability to handle a large number of latent variables in a single platform. It can also handle the compound or higher-order constructs by estimating higher-order hierarchical modelling (see Wetzels, Odekerken-Schröder, & van Oppen, 2009). The construction of a comprehensive research model with a range of variables, such as individual, organisational, cultural and environmental variables, and a robust

³ The parsimonious research model attracts researchers seeking accuracy in outcomes and ease of estimations. For instance, the technology acceptance model (TAM) has been found to be the most frequently used model across multidisciplinary fields of study around the world due to the parsimony of the conceptual framework.

⁴ Inclusion of additional relevant variables can improve the explanatory power of the model and also cause changing patterns of the explanatory variables. A parsimonious model (such as TAM), although it ensures robustness in the analysis, may not be able to adequately explain the phenomena due to not including all relevant variables in the model. Thus the recent adoption diffusion studies have employed a relatively large number of diversified variables for comprehensive and reliable results (viz., Tornatzky & Fleischer, 1990; Venkatesh et al., 2003, 2008; Zhu et al., 2004, 2006a; Zhu & Kraemer, 2005).

analysis may offer a detailed and clear understanding about the organisational technology diffusion behaviour.

Contemporary researchers have applied additional variables with the existing innovation diffusion theoretical frameworks (see Venkatesh et al., 2003, 2008; Zhu et al., 2004, 2006a; Zhu & Kraemer, 2005). For example, Venkatesh et al. (2003) included perceived performance expectancy, effort expectancy, social influence and facilitating condition as exogenous variables in the model. Facilitating condition is defined as the extent to which the organisation is able to use the technology. Employee skill and knowledge, compatibility and the organisational resource base constitute the facilitating condition. Past literature has supported the view that the higher the facilitating conditions, the higher the usage of a technological innovation in an organisation (Gupta, Dasgupta, & Gupta, 2008; Venkatesh et al., 2008).

ICT, particularly Internet-based digital technologies, functions over a public network. Thus, the technology infrastructure of a country, government telecommunication policy, and the availability and speed of the Internet may matter in organisational ICT usage behaviour. Like facilitating condition, country readiness may play a significant role in ICT diffusion behaviour. Recent studies have investigated country readiness a little. For example, government policy and the regulatory environment have been studied in some previous studies (see Zhu et al., 2004; Zhu, Kraemer, & Xu, 2006b; Zhu & Kraemer, 2005). The effects of country readiness on organisational IT usage behaviour, although addressed conceptually (see Molla & Licker, 2005), have not been documented widely in the existing literature. Besides this, previous research studies have mostly favoured the view that organisations adopt technology that is useful and that provides them with some economic benefit while, although important, non-economic factors such as cultural and environmental factors have been overlooked (Thatcher et al., 2006).

The economic development of a country is largely dependent on SMEs in the present market-based global competitive environment. Although equally important in terms of economic significance, SMEs in developed countries have continued to contribute substantially to their country's growth process while those from developing countries have not fared well. The rapid expansion of IT and its application to almost every sphere of economic activity have initiated the process of encouraging SMEs to make

the most cost-effective use of new technologies in production, marketing and networking (Mandal, 2007). Thus, how SMEs can be tapped into new opportunities and produce enhanced performance in economic development is considered to be a worthwhile research study.

Taking into consideration the notion of ICT's performance implications, recent high ICT usage growths in the developing world and SMEs' economic significance, this study has opted to examine how ICT affects economic development through improved organisational performance in the developing country context. Considering SMEs as a population, this study, thus, has attempted to answer the main research question: "How does diffusion of ICT correlate with SME performance in Bangladesh"? The study has also raised the following primary questions:

RQ-1: What is the contribution of internal and external factors in behavioural expectation in the context of Bangladesh?

RQ-2: How does behavioural expectation correlate with ICT use by SMEs in Bangladesh?

RQ-3: What is the role of ICT use, integration and utilisation in determining SME performance?

1.3 OBJECTIVES

The main objective of this study is to formulate a theoretical framework for examining the contribution of the use and utilisation of ICT to SME performance. The specific objectives of the study are to:

RO-1: Explore the cognitive factors influencing ICT adoption by SMEs.

RO-2: Delineate the effects of culture and environmental pressure on the adoption and usage of ICT by SMEs.

RO-3: Measure the effects of facilitating condition and country readiness on ICT adoption and use by SMEs.

RO-4: Examine the role of behavioural expectation in explaining ICT usage by SMEs.

RO-5: Examine the contribution of ICT usage to SME performance.

RO-6: Examine the mediating effects of ICT integration and utilisation in explaining the contribution of ICT usage to SME performance.

1.4 RESEARCH BACKGROUND

ICT, particularly the Internet, underpins almost every single activity undertaken in the modern world and affects everyone on the planet—even those who do not themselves have first-hand access to ICT (ITU, 2010). Good examples include food distribution, power networks, water supplies or mass transportation, all of which are controlled and managed today by ICT networks and applications.

According to the *World Telecommunication Report 2010*, released to review the mid-term status and achievement between the World Summit on the Information Society (WSIS) 2005 and the Millennium Development Goals (MDG) 2015, tremendous progress has been made over the past decade, with almost two billion people throughout the world now having access to the Internet.

Although significant progress has been evident in the world's Internet penetration, household Internet penetration levels vary substantially between countries and regions. At the end of 2008, one out of four households in the world had access to the Internet but only one out of eight households in developing countries was connected, compared to three out of five in developed countries.

While by the end of 2008, 58.1% of households in Europe had Internet access, only 16.8% of households in Asia-Pacific countries were connected to the Internet. The Internet penetration of Asia-Pacific countries remains at a lower level in comparison to Europe, America, the Commonwealth of Independent States (CIS) and the Arab States. The Internet penetration of Bangladesh is significantly lower (below 1%) than that of other Asia-Pacific countries, such as Japan, Malaysia, Korea, Singapore and Australia.

According to the World Bank (WB) (World Bank, 2010) the Internet penetration in various countries was estimated as USA (75.9%), UK (76%), Australia (70.8%), Singapore (69.6%) and Malaysia (55.8%), while Bangladesh's Internet penetration

was only 0.347% in 2008 (Azam, 2013). The Internet penetration of those countries was more recently calculated as USA (78.1%), UK (83.6%), Australia (88.8%), Singapore (75.0%), Malaysia (60.7%) and Bangladesh (5.0%) at 30 June 2012.⁵ The statistics show an increasing trend in Internet penetration in all of the above countries; however, the volume of Internet penetration in Bangladesh is very small in comparison to the other countries. While many developed and developing countries have achieved significant advantages through the computerisation of government departments, business firms and educational institutions, the digital initiatives of Bangladesh still remain at risk due to the poor digital participation of the citizenry.

The Internet began operating commercially in Bangladesh in the mid-1990s. Bangladesh has a poor teledensity in comparison to other developed and developing countries around the world (ITU, 2013). Like many other developing countries, Bangladesh suffers from inadequate infrastructure, outdated telephone systems, limited access to telephones and computers, poor service quality with high prices, lack of qualified personnel and a low level of literacy and IT skills, as well as cultural and language barriers (Azam, 2007). The main obstacle to using the Internet in Bangladesh is its distribution. The Internet is still an urban privilege in Bangladesh as the facilities are more concentrated in urban areas, especially being Dhaka⁶-based. The population living outside urban areas is mostly deprived of gaining the benefit of the Internet although they have the potential.⁷ The noticeable digital divide is observed in Bangladesh in the following areas (Rahman, 2003):

- Urban and rural populations
- Dhaka (the capital) and rest of the country
- Different educational streams
- Rich population and poor population
- Male and female
- Mainstream and tribal populations
- Government and private organisations.

⁵ Information source: Internet World Stats (<http://www.internetworldstats.com/stats.htm>, accessed on 18 July 2013).

⁶ Dhaka is the capital city of the People's Republic of Bangladesh.

⁷ Recently, a significant development has occurred through the participation of the mobile service provider in providing Internet connectivity to remote areas. However, urban inhabitants are still gaining more benefits on several counts than rural inhabitants.

Despite suffering from multidimensional problems in terms of Internet access, Bangladesh has the potential of achieving success in its use of the Internet in the education, development, business and other services sectors.

The Government of Bangladesh considers the ICT sector as the thrust sector in the fifth five-year plan of the People's Republic of Bangladesh. In order to enjoy high bandwidth at a lower usage cost, the country has been connected with the information super highway through submarine optic fibre networks with a 16-country consortium through the SEA-ME-WE-4 project.⁸ The Government of Bangladesh inaugurated this connectivity on 21 May 2006 (Daily Star, 2006, Prothom Alo, 2006). The landing station has been established at Cox's Bazar, the southern city, near the Bay of Bengal.

Despite Bangladesh's poor Internet penetration, the present Government of Bangladesh has given the highest priority to ICT and has initiated diverse policies and programs to achieve the digital goal provisioned in the 2009 national election and post-election agenda. The country's yearly national budgets (in the last few years) have allocated a substantial amount of resources for ICT development thus reiterating the expansion of ICT networks to rural communities to achieve government, citizen and business interactions and exchanges through the Internet. The government has also initiated some modifications to the country's national ICT policy in 2009 which reiterate the necessity of establishing e-government, e-services and e-commerce environments in order to gain economic potential. In addition, the government has emphasised the formulation of appropriate policies and strategies to facilitate Internet-related communication, e-commerce operation and e-governance. In order to achieve the potential of ICT, the government is dedicated to utilising the Internet in the education and services sectors (Azam & Quaddus, 2009a, 2009b, 2009c). Although numerous policy initiatives have been adopted to utilise the potential of ICT in the economic development of the country, the success of digitisation or computerisation is still doubtful.

Bangladesh has initiated steps to possibly fight against the hurdles and hindrances of ICT adoption, such as, limited accessibility to the Internet, poor teledensity, poor electricity network. However, poor Internet penetration is still considered as the

⁸ SEA-ME-WE means South East Asia, Middle East and West Europe.

main issue in establishing an e-based transparent society along with other issues such as the limited affordability of computers and limited knowledge; inadequate legal and regulatory support; inefficient and traditional systems of banking operation; poor financial support and traditional payment mechanisms; lack of human resources; and high Internet usage cost as well as security concerns (Azam & Quaddus, 2009a; Azam, 2005, 2006a; 2006b, Azam & Lubna 2008a, 2008b; Hossain, 2000; ITRC, 2000; Rahman, 2002).

Bangladesh is basically an agricultural-based country. Its recently developed industrial base, particularly the ready-made garments (RMG) industry, has emerged as the main vehicle for the country's economic development. The overall culture of the country is characterised by a high population, low incomes and quite a large number of unemployed people with labour cheap and available as a result. Like many other Asian states, Bangladesh's culture has also been characterised by high power distance, collectivism and low uncertainty avoidance (House et al., 2004). The power is concentrated at the top of Bangladeshi society.

The Internet usage statistics shown in the preceding section are inspiring Asian countries to utilise the potential of ICT in their economic development. The Internet penetration in Bangladesh likewise is also growing.

The rapidly increasing trend of ICT usage, particularly Internet use, in business provides a motivation for large organisations as well as for smaller organisations in developing countries to adopt this technology. This usage encompasses the management of organisational internal communication, external communication, shop floor management, inventory control and customer integration as well as online order processing and transactions to acquire increased and competitive organisational performance.

Small and medium-sized enterprises (SMEs) have played an important role in the development of all countries. SMEs in developed countries contribute substantially to those countries' growth processes. Although lagging behind, SMEs in developing countries are also contributing positively. The prospects and contribution of Bangladesh's SMEs in its economic development are enormous. SMEs account for about 45% of the manufacturing value-add in Bangladesh. They account for about

80% of industrial employment, about 90% of total industrial units and about 25% of the total labour force. Their total contribution to export earnings varies between 75% and 80% (Azam & Quaddus, 2009c, 2009d).

According to the Bangladesh Bureau of Statistics (BBS), SMEs provide about 44% of the country's employment. The 2003 Private Sector Survey estimated that about six million micro-, small- and medium-sized enterprises, defined as enterprises with fewer than 100 employees, contributed around 20-25% of gross domestic product (GDP) (The New Nation, 2008). The number of SMEs and their significant contribution to the national economy in terms of employment generation, GDP contribution and export earnings thus create a significant research opportunity exploring the adoption and diffusion of ICT.

1.5 DEFINITION OF TERMS

Behavioural expectation: Refers to an individual's self-reported subjective probability of his or her performing a specified behaviour, based on his or her cognitive appraisal of volitional or non-volitional behavioural determinants. It is the immediate antecedent of actual behaviour which is stronger than intention and is able to include the effects of some contextual and other external factors (Venkatesh et al., 2008).

Cognitive evaluation: Refers to an individual's overall evaluation towards an innovation. The evaluation process involves functional as well as psychological consequences. These cognitive and affective evaluations form one's attitude, that is, negative or positive feelings about performing a behaviour: this has been widely researched in the consumer, marketing and information systems research. This study modelled cognitive evaluation to address attitude which is reflected by salient beliefs and respective evaluations (Ajzen, 1985, 1991).

Country readiness: Refers to an individual's perceptions about the country's preparedness or resources base which may support one's (an individual or organisation) decision to use a technological innovation. Country readiness comprises technology infrastructure, financial infrastructure, legal infrastructure, and Government policy and supports.

Culture: Refers to the collective programming of the mind that distinguishes the members of one group or category of people from another (Hofstede, 2001).

Degree of utilisation: Refers to the degree through which the proper and actual use of technology is ensured.

Environmental pressure: Refers to the pressure arising from the institutional environment. For example, environmental pressure includes various encouragement, advice or pressures which a firm receives from its customers, suppliers, the regulatory authority and other stakeholders. Environmental pressure comprises normative, mimetic and coercive pressures.

Facilitating condition: Refers to an individual's perceptions of the availability of technological and/or organisational resources (i.e. knowledge, resources and opportunities) that can remove barriers to using a system (Venkatesh et al., 2003).

ICT: Refers to information and communications technology which may range from a simple digital phone or computer operation to highly sophisticated computer-driven and Internet-driven automated equipment. In this study, ICT is used to refer to the computer and computer-driven Internet and networking technologies which include various levels of ICT applications such as: (i) basic computing (computer and Internet); (ii) computing with a homepage operation which entails product cataloguing systems; (iii) computing with a homepage operation which offers online order receiving and processing systems; (iv) computing with interactive homepage operations which involve online order processing with online transaction processing systems; and (v) computing with complete internal and external digital communication (enterprise resource planning [ERP]).

ICT usage: Refers to an individual's self-reported subjective assessment about rate of usage of various ICT applications. This study applies terms '*ICT usage*' and '*ICT use*' interchangeably to indicate SMEs' ICT usage behaviour.

Organisational performance: Refers to the outcome of organisational processes in a given time. Profit growth, sales growth, market share, productivity growth and firm competitiveness are the dimensions of organisational performance.

SMEs: Refer to small and medium-sized enterprises. In this study, SMEs are defined according to the Industrial Policy 2010 of the People’s Republic of Bangladesh as:

- A manufacturing firm with 100–250 employees or having fixed assets from 10 Crore (1 Crore = 10m) Bangladeshi Taka (BDT) to 30 Crore BDT (excluding the value of land and factory) is considered a medium enterprise while any firm with 25–99 employees or having fixed assets from 55 Lakh (1 Lakh = 10k) BDT to 10 Crore BDT (excluding the value of land and factory) is considered a small enterprise.
- Also, a firm in the services industry with 50–100 employees or having fixed assets from 1 Crore BDT to 15 Crore BDT (excluding the value of land and factory) is considered a medium enterprise while a firm with 10–49 employees or having fixed assets from 5 Lakh BDT to 1 Crore BDT (excluding the value of land and factory) is considered a small enterprise.

1.6 RESEARCH SIGNIFICANCE

This research has been dedicated to the extensive study of the ICT diffusion process and its effects on SME performance. In its design, the study has extended beyond the traditional innovation diffusion theories and has combined this with the resource-based view to examine SME performance. The study has employed a mixed-method research approach to overcome the limitations of a mono-method application, that is, either a qualitative or quantitative method. In this research, the qualitative study has led to the presentation of a fine-tuned and contextualised comprehensive research model. A number of new constructs and measurement procedures have also been identified during the field study. The quantitative survey and analyses have validated the anticipated model. However, the significance of this research lies in its contribution to theory and its contribution to practice.

1.6.1 CONTRIBUTION TO THEORY

To examine organisational performance, this study has reviewed several existing innovation diffusion theories and has combined them with the institutional theory

and resource-based views. More specifically, the following theories have been reviewed: theory of reasoned action (TRA) (Fishbein & Ajzen, 1975); diffusion of innovations (DOI) theory (Rogers, 1983); theory of planned behaviour (TPB) (Ajzen, 1985); technology acceptance model (TAM) (Davis, 1986); unified theory of acceptance and use of technology (UTAUT) (Venkatesh et al., 2003); technology, organisation and environment (TOE) framework (Tornatzky & Fleischer, 1990); institutional theory (DiMaggio & Powell, 1983); and resource-based theory (Barney, 1991).

A comprehensive research model has been constructed by synthesising existing theories: the model focuses on the diffusion of ICT process and its impacts on organisational performance. As most of the previous innovation diffusion studies have focused on the developed country perspective, the primary research model has been fine-tuned and contextualised through a qualitative study. The rigour in the qualitative field study analysis has resulted in a comprehensive model which includes a range of variables from individual, organisational, socio-cultural and environmental levels. The qualitative research has also provided an extensive understanding about this field of research through the inclusion of some new variables and the examination of their relationship with other study variables. For example, the study has included integration and utilisation as new constructs and has anticipated their mediating roles in examining the effects of ICT usage on SME performance. The field study has also provided a valuable contribution by presenting the measurement procedures for the newly introduced variables. By adding some higher-order compound variables which cover a wide range of variables as each higher-order variable has two or more manifest variables, the framework has become a holistic research model.

The theoretical framework now offers an opportunity to examine the whole process of innovation diffusion and its effect on organisational performance in a comprehensive model which is an important theoretical contribution. The robustness of estimates, furthermore, suggests the suitability of the comprehensive model for analysing the diffusion of ICT by SMEs and its effects on organisational performance. This framework is potentially suitable for testing similar phenomena in the large organisation environment from both a developing and developed country perspective.

1.6.2 CONTRIBUTION TO PRACTICE

This study provides a clear picture of how internal and external factors affect ICT usage by SMEs in a developing country and its consequent effects on organisational performance. In analysing the data collected from SMEs using different levels of ICT applications, it was revealed that SMEs with a positive cognitive evaluation towards ICT, and that had adequate technological resources and received positive pressures from their institutional environment were more likely to use ICT while the overall culture and country infrastructure were not complementary to the use of ICT.

The study has provided a unique contribution in addressing the ICT paradox in a developing country context. This study has found that ICT use does not increase the performance growth of SMEs straightaway. Organisations should acquire the integration and proper utilisation of the technology to achieve performance growth. This is consistent with the notion of the resource-based view of ICT which reiterates that combining ICT into different organisational functionalities (i.e. integration with front-end functionalities or back-end integration) can create IT capabilities that are rare, un-imitable, valuable and sustainable, thereby contributing to value generation. Managers, interested stakeholders and policy makers may follow the outcome of this study and focus on ICT integration and the degree of utilisation with the view of attaining superior firm performance.

This study has also explored the patterns of ICT usage by SMEs and forecasts the degree and magnitude of the effects of various individual, organisational, and environmental factors on the adoption and usage of different levels of ICT applications. This study suggests some changes and modifications to Bangladesh's existing policies and strategies to promote ICT adoption and use by SMEs for economic development. Government policy and supports focusing on the integrated and proper use of technology could contribute positively to SME performance.

1.7 ORGANISATION OF THE THESIS

The thesis is structured as eight chapters followed by references and appendices.

The first chapter has presented an introduction and overview of the study including the research background with an overview of the overall structure of the research.

The chapter started with the grounding of the research questions and has drawn general and specific research objectives. The significance of the research has also been discussed.

The second chapter deals with the review of the literature. The literature review includes reviewing some important theories in the domain of innovation diffusion along with institutional theory and resource-based theory. The empirical studies are also reviewed to develop a conceptual framework for the study. A preliminary research model is proposed which provides the basis for the field study and for the quantitative data collection survey.

The third chapter deals with research methodology. This chapter discusses the research methodology and design incorporated in the study. It first introduces the research paradigm of the study. An interpretive (qualitative) approach and a positivist (quantitative) approach are discussed. A mixed-method approach incorporating qualitative approach into a quantitative framework is adopted.

The fourth chapter deals with the field study and the development of the final research model. This chapter presents the detailed results of the qualitative data analyses. It presents a brief sample profile for the field study and a wide discussion of the factors and variables identified during the interviews. The chapter also illustrates the final model of the study by incorporating the field study results and the factors identified from the literature review.

The fifth chapter deals with the hypotheses developed and the questionnaire construction. This chapter develops and describes the hypotheses for the study and also describes the instrument with its origins and sources. A brief description of the pre-testing of the survey instrument is also presented at the end of the chapter.

The sixth chapter deals with analysis of the quantitative data. This chapter presents the analyses of the quantitative data in detail. The rationale for sample size determination is firstly presented followed by the assessment of the non-response bias and outer model estimation. The outer model estimation deals with the assessment of the psychometric properties of the model which includes assessment of the reliability and validity of the measures. The composite reliability, content validity, construct validity and discriminant validity of the constructs and measures

are discussed in detail. Finally, the results of the inner model estimates are presented. A summary of the entire analyses with the results of hypotheses testing is presented at the end of the chapter.

The seventh chapter discusses the findings of the PLS results in the light of the major research questions and the hypotheses proposed in this study. The theoretical and practical implications from these results are provided in this chapter.

The final chapter (Chapter 8) presents the conclusion and future research directions. This chapter provides an overview of the study and presents its theoretical and practical contributions. The chapter also discusses the limitations and weaknesses of this study and concludes with a brief discussion of possible future research directions in the subject area of this study.

1.8 SUMMARY

This chapter has provided background information and an overview of the research approach documented in this thesis. The review of the literature pertaining to the research topic has shown where key aspects have not been explored, and thus has led to the research questions posed here. This chapter has formulated the research questions which provide the basis for determining the objectives of the study. The significance of the research and definitions of related terms have been discussed. Finally, the organisation of the thesis structure was outlined. The next chapter presents the literature review and outlines a primary research model.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter focuses on reviewing the literature, both the theories and empirical studies, to address the information and communications technology (ICT) diffusion process and firm performance from a small and medium-sized enterprise (SME) perspective. Various theories relating to ICT adoption and organisational performance are critically reviewed to build a comprehensive model which finally employs individual, organisational, socio-cultural and environmental factors to look at SMEs' ICT usage behaviour and its consequential effects on firm performance. The following sections of the literature review serve a number of purposes. Section 2.2 describes the diffusion process while the theoretical frameworks that address ICT adoption-diffusion, institutional factors and firm performance are discussed in section 2.3. Section 2.4 reviews empirical studies and section 2.5 addresses the determinants of ICT use, while section 2.6 discusses the determinants of firm performance. Finally, a testable research model (Figure 2.1) is developed based on the discussion and literature review described in the sections below.

2.2 DIFFUSION PROCESS

The adoption of a new product is a decision process that moves through different stages of time. Diffusion refers to the process by which an innovation is communicated through certain channels over time among the members of a social system. According to Rogers (1995), the decision process begins with knowledge about a new innovation and ends with implementation and confirmation that the innovation is being used. The process involves the five different phases, namely, knowledge, persuasion, decision, implementation and confirmation, through which the adoption and diffusion of an innovation occur.

A range of various characteristics, variables and factors affect the diffusion process in different phases (Rogers, 1983). For example, the socio-economic characteristics, personality traits and communication behaviour of the decision-making unit influence the knowledge stage while decision-makers' perceptions about the

innovation affect the intention or decision to adopt an innovation. However, the implementation and continued use of the innovation are related to several other variables.

Researchers face two fundamental questions when studying the adoption and diffusion of an innovation. These questions are related to the differences between adoption and diffusion, and the patterns of adoption-diffusion of an innovation by an individual and organisation. The answers are not straightforward and vary as the process (discussed above) involves several stages of diffusion, namely knowledge, persuasion, decision, implementation and confirmation, through which the adoption and diffusion are projected into an integrated environment. However, according to the innovation diffusion research, the organisation first has to make a decision on the adoption of the innovation (e.g. new technology). Information about the innovation is collected. This information then leads to the formation of perceptions about the innovation (Xu & Quaddus, 2005). In a simplistic view, adoption may be defined as the mental state which accepts or rejects an innovation for use while the process by which an innovation becomes popular (implementation and confirmation) is called diffusion.

The second question is crucial for adoption researchers as there are big differences between the individual and the organisational adoption and diffusion processes. The individual adoption-diffusion process mainly relates to an individual's knowledge, personality, perceptions and motivation while the organisational adoption-diffusion process depends on the organisational rules and procedures and the people involved with the decision. Normally, a decision-making unit (in an organisation) comprises three or more people who are primarily guided by the company policy, rules, regulations and customs. Thus, the nature, complexity and the process of organisational adoption and diffusion appear differently to that of the process and nature of individual adoption and diffusion. This study explored the organisational adoption-diffusion process from the perspective of an SME which is similar to the individual adoption-diffusion process. In SMEs, the decision about ICT adoption is more likely to be made by the owner (Doukidis, 1996; Matlay & Addis, 2003; Kendall, 2001; Quaddus & Hofmeyer, 2007) with often little concern about the

importance of ICT strategy and planning within their business (Beckett, 2003; Nejadirani, 2011).

An innovation also passes through several stages in its life cycle which starts from the introduction stage and passes through growth, maturity and decline stages. People from different socio-cultural, economic and financial positions adopt an innovation in different stages. The risk-takers who come first and try an innovation promptly (during the introduction stage) are called innovators. Other types of adopters such as early adopters, early majority, late majority and laggards use an innovation during the growth, maturity and decline stages accordingly. Interestingly, while the laggards are the users of the innovation when an innovation reaches its decline stage, the innovators have already shifted to a new innovation which has just started its journey.

An innovation comes to the market to satisfy specific needs of individuals, groups or society. Thus, potential adopters use an innovation with the motivation of satisfying some specific needs. Similarly, SMEs use an innovation with the motivation of increasing organisational productivity to enhance organisational performance, such as profit increase, revenue increase or cost saving (Madden, Azam & Beard, 2013; Beard, Madden & Azam, 2014). Numerous past studies have investigated the adoption and diffusion of ICT based on the notion that ICT adoption, diffusion or use generates improved organisational performance. However, the question of whether the adoption and usage of the technology have succeeded in addressing the motivation or reasons for the adoption and usage is not well understood. This study thus has been motivated to look at the impact of the diffusion of ICT on organisational performance with particular attention given to the mediating effects of integration and utilisation. An integrated framework has then been developed by extending the scope of existing adoption-diffusion theories to address organisational performance. The following section discusses relevant theories of innovation, diffusion and organisational performance and outlines the theoretical framework for studying the ICT diffusion process and organisational performance.

2.3 THEORETICAL FRAMEWORK

This research has investigated SMEs' ICT diffusion behaviour by extending the scope of existing diffusion theories through the link with firm performance. The theoretical grounding for the constructs under study was developed by combining the notions and principles of various theoretical frameworks applicable to the adoption and diffusion of ICT. The theories reviewed were the diffusion of innovation (DOI) theory (Rogers, 1983, 1995); theory of reasoned action (TRA) (Fishbein & Ajzen, 1975); theory of planned behaviour (TPB) (Ajzen, 1985); technology acceptance model (TAM) (Davis, 1986); technology, organisation and environment (TOE) framework (Tornatzky & Fleischer, 1990); institutional theory (DiMaggio & Powell, 1983); unified theory of acceptance and use of technology (UTAUT) (Venkatesh et al., 2003); and resource-based theory (Barney, 1991).

2.3.1 DIFFUSION OF INNOVATION (DOI) THEORY (ROGERS, 1983)⁹

The diffusion of innovation (DOI) theory (Rogers, 1983) explains the diffusion process of an innovation and highlights various factors that affect different phases of the process. According to Rogers (1983), the diffusion process begins with the *knowledge* of the existence of the innovation and matures through *persuasion*, *decision*, *implementation* and *confirmation* stages. During the knowledge stage, the consumer is exposed to the innovation's existence and gains some understanding of how it functions. The persuasion stage refers to that period in which the consumer forms a favourable or unfavourable attitude towards the innovation. The persuasion stage is followed by a decision phase. If the decision is in favour of adoption, an implementation process starts. An innovation may be confirmed and incorporated into the culture of the user population, may undergo changes (re-invention) or may be rejected during the implementation phase.

The persuasion stage is considered to be the most important stage in terms of the relative importance of the five stages explained in the DOI theory since potential

⁹The diffusion of innovation (DOI) theory, widely used in the past few decades to study the adoption of an innovation, is popularly known as Rogers' (1983) model. The theory was mostly cited from the book 'Diffusion of Innovations' by E. M. Rogers published by the Free Press, New York in 1983. The publisher released two more editions of the same book in 1995 and 2003 which analyse the theory in relation to contemporary issues. However, the basic model (Rogers, 1983) appears unchanged in the three editions of the book. Although much of the contemporary literature refers to the model as Rogers (1995) or Rogers (2003), this study refers to this theoretical framework as Rogers' (1983) model to indicate its origin and applicability at different points of time.

adopters gather information from various sources and attempt to determine the utility of the innovation during this stage (Rogers, 1995). Potential adopters' adoption intention or willingness is formed during the persuasion stage. Rogers (1995) highlighted five attributes of innovation as perceived by the individual or organisation—perceived innovation characteristics which determine adopter willingness or rate of adoption. These five innovation attributes are relative advantage, compatibility, complexity, trialability and observability. These innovation characteristics may explain 49–87% of the variance in the rate of adoption of the innovation (Rogers, 1995). The DOI theory (Rogers, 1983), although focused on the individual's innovation adoption process, is also effective in examining organisational innovation adoption (Attewell, 1992; Brancheau & Wetherbe, 1990; Kendall et al., 2001; Tan & Teo, 2000; Azam & Quaddus, 2009b).

Numerous past studies have shown the significant impacts of perceived innovation characteristics, as highlighted by Rogers (1983, 1995, 2003), on the rate of adoption of an innovation. Table 2.1 shows that the innovation characteristics highlighted by Rogers (1983, 1995, 2003) are supported by a number of empirical studies.

Table 2.1: Empirical Evidence in Favour of Rogers' (1983) Model

Attributes of innovation	References
Relative advantage	Kuan & Chau (2001); Wymer & Regan (2005); Jeon et al. (2006); Kendall et al. (2001); Tan & Teo (2000); Teo & Ranganathan (2004); Lim & Speece (2002); Sathye & Beal (2001); Holak & Lehman (1990); Azam & Quaddus (2009b); Scupola (2003b); Premkumar, Ramamurthy & Nilakanta. (1994)
Compatibility	Teo & Ranganathan (2004); Kendall et al. (2001); Jeon et al. (2006); Azam & Quaddus (2009b); Tan & Teo (2000); Hoppe et al. (2001); Cooper & Zmud (1990)
Complexity	Jeon et al. (2006); Hoppe et al. (2001); Tan & Teo (2000); Lederer et al. (1997); Cockburn & Wilson (1996); Azam & Quaddus (2009b)
Trialability Observability	Kendall et al. (2001); Azam & Quaddus (2009b) Azam (2007); Azam & Quaddus (2009b)

The impacts of *relative advantage*, *compatibility*, *complexity*, *trialability* and *observability* have been empirically proven in different countries around the world. Past studies have also revealed that Rogers' (1983, 1995, 2003) model is suitable for

examining the adoption rate of a technological innovation from the organisational perspective, particularly the SME perspective.

2.3.2 THEORY OF REASONED ACTION (TRA) (FISHBEIN & AJZEN, 1975)

The theory of reasoned action (TRA) (Fishbein & Ajzen, 1975; Ajzen & Fishbein, 1980) is one of the well-researched theories for measuring behavioural intention: it explains the causes of behavioural intent and illustrates the structures of the relationships.

The TRA has two unique factors which are the attitude towards the behaviour (ATT) and subjective norms (SNs) that contribute to behavioural intention (BI) which finally explains the actual behaviour. The TRA is guided by the underlying basic assumption that humans are quite rational and make use of all available information, both personal and social, before they act (Crawley & Coe, 1990).

The TRA has been widely used in previous years to examine consumers' behavioural intention as well as to address the causes of actual consumer behaviour in various consumption-related issues (Crawley, 1988; Crawley & Coe, 1990; Chang, 1998; Bang et al., 2000). The TRA has also been used in the information technology (IT) field as the basis for testing several technologies and has spanned a variety of subject areas, for example, word processing (Davis et al., 1989); MS Windows (Karahanna et al., 1999); e-commerce (Vijayarathy, 2004); Internet information management (Celuch et al., 2004); and e-banking (Shih & Fang, 2004, 2006). A particularly helpful aspect of TRA from an information system (IS) perspective is that attitude and subjective norms are theorised to mediate the effect of external variables on the intention to use new IT (Davis et al., 1989).

Many studies have shown the applicability of the TRA for studying individuals' behavioural intention and actual usage behaviour with regard to an innovation by revealing the significant effects of *attitude towards intention* (Davis et al., 1989; Mathieson, 1991; Taylor & Todd, 1995b; Crawley & Coe, 1990; Chang, 1998; Lu, Yu, Liu, & Yao, 2003; Rhodes & Courneya, 2003; Ramayah, Jamaluddin, & Azam, 2007) and *subjective norms* (Taylor & Todd, 1995b; Venkatesh & Davis, 2000; Crawley & Coe, 1990; Ramayah et al., 2007) on behavioural intention.

The TRA was subsequently reviewed and modified to comprehensively explain usage behaviour by adding more variables as antecedents of behavioural intention. For example, the theory of planned behaviour (TPB) is an extension of the TRA which includes a new variable, *perceived behavioural control*, within the TRA framework.

2.3.3 THEORY OF PLANNED BEHAVIOUR (TPB) (AJZEN, 1985)

The theory of planned behaviour (TPB) was proposed by Icek Ajzen (1985, 1991) and, as explained in the previous section, is an extension of the TRA (Ajzen & Fishbein, 1980). The TPB was developed to address the original model's limitations in dealing with behaviours over which people have incomplete volitional control (Ajzen, 1985, 1991). Thus, it overcomes the problematic predictive validity of the TRA to explain the behaviour under study which is not under full volitional control. Ajzen (1985) made the extension by including one additional construct, *perceived behavioural control*, within the TRA framework to predict behavioural intention and behaviour. Perceived behavioural control refers to "people's perception of [the] ease or difficulty of performing the behaviour of interest" (Ajzen, 1991). A number of external factors (such as environmental or organisational factors, etc.) can make a given behaviour easier or harder to perform.

The TPB holds that human action is guided by three kinds of considerations: beliefs about the likely outcomes of the behaviour and the evaluations of these outcomes (behavioural beliefs); beliefs about the normative expectations of others and motivation to comply with these expectations (normative beliefs); and beliefs about the presence of factors that may facilitate or hinder performance of the behaviour and the perceived power of these factors (control beliefs). The TPB also explains that certain factors or constructs, known as control beliefs, may facilitate and impede people's behaviour; thus, they can influence a person's adoption intention or their purchase of a product or service (Ajzen & Madden, 1986).

Many studies have shown the effectiveness and applicability of the TPB for examining individuals' behaviour towards an innovation by revealing the significant effects of *attitude towards intention* (Davis et al., 1989; Mathieson, 1991; Taylor & Todd, 1995a; Chang, 1998; Lu et al., 2003; Shih & Fang, 2004; Rhodes & Courneya, 2003; George, 2002; 2004; Ramayah et al., 2003, 2004; 2005; 2007); *subjective*

norms (Taylor & Todd, 1995b; Venkatesh & Davis, 2000; Ramayah et al., 2003; 2004); and *perceived behavioural control* (Taylor & Todd, 1995a; Jiang et al., 2000; Cheung, Chang & Lai, 2000; Jones, Sundaraman, & Chin, 2002) on behavioural intention. Ajzen (1991) showed the direct link between perceived behavioural control and actual behaviour although it has an indirect effect on actual behaviour through significantly contributing to behavioural intention.

2.3.4 TECHNOLOGY ACCEPTANCE MODEL (TAM) (DAVIS, 1986)

The technology acceptance model (TAM) was developed by Davis (1986) to explain IT usage behaviour. It is an adaptation of the TRA and states that behavioural intention to use a technology is directly determined by two key beliefs: *perceived usefulness* and *perceived ease of use*. Perceived usefulness assesses the extrinsic characteristics of IT, that is, task-oriented outcomes such as “the prospective user’s subjective probability that using a specific application will increase his or her job performance within an organisational context”. On the other hand, perceived ease of use examines the intrinsic characteristics of IT, that is, its ease of use (how easy it is to use), ease of learning, flexibility and clarity of the interface. Perceived ease of use is stated as “the degree to which the prospective users expect the target system to be free of effort” (Davis, Bagozzi, & Warsha, 1989).

The earlier version of the TAM included subjective norms with perceived ease of use and usefulness as antecedents of behavioural intention which was omitted from the later model. One key benefit of using the TAM to understand system usage behaviour is that it provides a framework for examining the influence of external factors on system usage (Hong, Thong, Wong, & Tam, 1999).

Various external variables such as computer self-efficacy, social influence, experience, voluntariness, diversity of technology, trust, culture and relevance have been added in the context of the TAM in different settings in previous initiatives to gain more insight into technology acceptance (Agarwal & Prasad, 1999; Davis et al., 1989; Hong et al., 1999; Shih, 2004; Taylor & Todd, 1995a; Venkatesh & Morris, 2000; Venkatesh & Davis, 2000; Wang, Wang, & Tang, 2003; Yoon, 2009).

The TAM (Davis, 1986) has been one of the most frequently used research models for examining systems’ usage behaviour over the past two decades. Many previous

studies have revealed that the fundamental components of TAM, perceived ease of use and perceived usefulness, were found to have strong significant effects on behavioural intention (e.g. Chau & Hu, 2002; Chau, 1997; Szajna, 1996; Subramanian, 1994; Davis, 1989; Davis et al., 1989; Lu et al. 2003; Mathieson, 1991; Szajna, 1996; Taylor & Todd, 1995a; Venkatesh & Davis, 2000; Yoon 2009).

2.3.5 TECHNOLOGY, ORGANISATION AND ENVIRONMENT (TOE) FRAMEWORK (TORNATZKY & FLEISCHER, 1990)

In addition to these individual adoption diffusion theories, Tornatzky and Fleischer (1990) proposed a technology, organisation and environment (TOE) framework to look at organisational aspects of technology diffusion. The TOE framework identifies the following three aspects of a firm's context that influence the process by which it adopts, implements and uses technological innovations:

- (i) Technological context is concerned with existing technologies as well as new technologies relevant to the firm.
- (ii) Organisational context addresses descriptive measures about the organisation such as scope, size and the amount of slack resources available internally.
- (iii) Environmental context refers to the aspects of how a firm conducts its business, responds to its industry, customers and competitors, and deals with government.

This framework has received more attention and acceptance from diverse fields of study as it is consistent with the classical DOI theory (Rogers, 1983). Rogers emphasised technological characteristics, and both internal and external characteristics of the organisation, as drivers for technology diffusion.

Many previous studies have utilised the TOE framework to examine organisational technology usage behaviour and have analysed the effects of technological, organisational and environmental factors (e.g. Zhu & Kraemer, 2005; Zhu, Kraemer, & Xu, 2003; Zhu et al., 2004, 2006a, 2006b; Marques et al., 2011; Oliveira & Martins, 2010).

2.3.6 INSTITUTIONAL THEORY (DIMAGGIO & POWELL, 1983)

The institutional theory posits that organisations face pressures to conform to these shared notions of appropriate forms of behaviours, since violating them may call into question the organisation's legitimacy and thus affect its ability to secure resources and social support (DiMaggio & Powell, 1983; Tolbert, 1985).

DiMaggio and Powell (1983) distinguished between three types of isomorphic pressures—normative, mimetic and coercive—and suggested that coercive and normative pressures normally operate through interconnected relationships while mimetic pressures act through structural equivalence.

Ajzen and Fishbein (1980) explored the role of subjective norms and studied how it affects individual behaviour. Subjective norms, in other words, pressures from friends and family, play a vital role in the formation of the intention to use an innovation. When applied to organisations, a focal organisation can learn about an innovation and its associated benefits and costs from other user organisations to which it is directly or indirectly tied, and is likely to be persuaded to behave in a similar way (Burt, 1982). Many studies have considered normative pressure as an antecedent of organisational innovation adoption (Kuan & Chau, 2001; Teo et al., 2003).

Mimetic pressures are the influences of other structurally equivalent organisations that have initiated some innovations and have become successful. These pressures may cause an organisation to change over time to become more like the other organisations in its environment (DiMaggio & Powell, 1983). Many past studies have included mimetic pressures when looking at organisational ICT adoption behaviour (Premkumar & Ramamurthy, 1995; Teo et al., 2003).

Coercive pressures address various kinds of powers or influences, informal or formal, exercised by other organisations upon which an organisation is dependent. A dominant customer, supplier or parent organisation sometimes exercises their power or coercively influences the organisation to act in a certain way where the dependent organisation has no option other than to comply with the requirements. Coercive pressures are significant when studying ICT diffusion behaviour (Teo et al., 2003; Quaddus & Hofmeyer, 2007).

2.3.7 UNIFIED THEORY OF ACCEPTANCE AND USE OF TECHNOLOGY (UTAUT) (VENKATESH ET AL., 2003)

Venkatesh et al. (2003) proposed a new theoretical framework to explain user intentions and subsequent usage behaviour with regard to the use of information systems. This theory applies a theoretical structure similar to the TRA or TAM. That is, the intention explains the actual usage of ICT while it (behavioural intention) receives various influences from the antecedent factors—performance expectancy, effort expectancy, social influence and facilitating condition. Gender, age, experience and voluntariness of use are anticipated as possible moderators of the four key constructs on usage intention and behaviour. Venkatesh et al. (2003) developed the theory through a review and consolidation of the constructs of eight models that earlier research had employed to explain IS usage behaviour, namely, the theory of reasoned action (TRA), technology acceptance model (TAM), motivational model (MM), theory of planned behaviour (TPB), a combined technology acceptance model and theory of planned behaviour (C-TAM-TPB), model of PC utilisation (MPCU), diffusion of innovation (DOI) theory and social cognitive theory (SCT). Subsequent validation of UTAUT in a longitudinal study found that it accounted for 70% of the variance in usage intention.

Many past studies have shown the applicability of the UTAUT model for examining usage behaviour of a technological innovation in both developed and developing countries (e.g. Gupta, Dasgupta, & Gupta, 2008; Venkatesh & Zhang, 2010).

2.3.8 RESOURCE-BASED VIEW (RBV) (BARNEY, 1991)

The resourced-based theory, popularly known as the resource-based view (RBV) of the firm (Barney, 1991), has been widely used to examine organisational competitive advantage. The theory has received attention from numerous researchers who have been willing to investigate firm performance. The RBV is a promising contemporary theory that combines strategic insights on competitive advantage and organisational insights on firm existence. According to Barney (1991), valuable, rare, imperfectly imitable and imperfectly substitutable resources could generate sustainable competitive advantage for the firm with the prerequisite of heterogeneity and imperfect mobility of resources among competing firms. Peteraf (1993) focused on heterogeneity, ex-post limits to competition, imperfect mobility and ex-ante limits to

competition as the characteristics for strategic resources in the generation of sustainable competitive advantage for the firm.

Prior to the RBV framework (Barney, 1991; Peteraf, 1993), Porter (1985) indicated that competitive advantage and its constituents could measure the firm's success relative to its competitors. With the view to assess competitive advantage, numerous researchers have applied the RBV to investigate firms' performance (Bharadwaj, 2000; Powell & Dent-Micallef, 1997).

The RBV may also look at the performance impact of ICT taking into consideration that ICT resources and capabilities are intangible, unable to be imitated and unique. How IT resources and capabilities can generate firm performance or competitive advantage is the main focus of applying RBV within IS research. The traditional RBV of ICT is successfully applied to look at the impact of ICT on organisational performance (Bharadwaj, 2000; Powell & Dent-Micallef, 1997).

2.3.9 REVIEW OF THE EXISTING THEORIES

The theoretical frameworks that address ICT diffusion can be categorised into three groups based on their focus, scope and structures. The DOI theory (Rogers, 1983), TRA (Fishbein & Ajzen, 1975), TPB (Ajzen, 1985), TAM (Davis, 1986) and UTAUT (Venkatesh et al., 2003) all focus on the prospective users' behavioural intention to adopt an innovation. These theories primarily anticipate a positive link between users' perceptions about the innovation's characteristics and their behavioural intention. Adopters' perceptions about the innovation's characteristics are reflected in the perceived innovation characteristics in DOI theory (Rogers, 1983); attitude in TRA (Fishbein & Ajzen, 1975) and TPB (Ajzen, 1985); perceived usefulness and perceived ease of use in TAM (Davis, 1986); and perceived performance expectancy and perceived effort expectancy in the UTAUT (Venkatesh et al., 2003) model. Rogers (1983) stated that user intention is formed during the primary stage of the diffusion process, the persuasion stage, where perceived innovation characteristics play a vital role in explaining the intention. Innovation characteristics generally explain 49–87% of the variation in an innovation's adoption. Furthermore, Rogers (1983) indicated that the diffusion process starts from the knowledge stage, that is, when adopters are exposed to an innovation. Adopter demographics, risk-taking behaviour and innovativeness play a vital role in the early

adoption of an innovation. Table 2.2 summarises the existing theoretical frameworks.

The TRA, TPB, TAM and UTAUT show a similar structural relationship among the various internal and external factors, behavioural intention and actual behaviour, which is different from the DOI theory. All four of these theoretical frameworks anticipate that behavioural intention is the only antecedent of actual usage behaviour. User perceptions about an innovation influence behavioural intention which ultimately explains actual usage behaviour. For example, the impact of attitude on actual behaviour is mediated through behavioural intention under the TRA and TPB frameworks. Likewise, the TAM and UTAUT model are designed to study the impacts of perceived ease of use and perceived usefulness (TAM) as well as performance expectancy and effort expectancy (UTAUT) on actual usage behaviour mediated through behavioural intention. In addition to the internal variables, various external variables are used as antecedents of behavioural intention in the existing theories. For example, the TRA includes subjective norms—whether friends, family and peer groups like or dislike the performance of a certain behaviour—with attitude. The TPB includes subjective norms and perceived behavioural control—the ability to perform a certain behaviour. The UTAUT includes subjective norms and facilitating condition—the availability of the required technological and human resources to use a technological innovation—with perceived performance expectancy, effort expectancy and social influence.

The TOE framework (Tornatzky & Fleischer, 1990) anticipates a positive link between external and internal variables and organisational technology usage behaviour. This framework divides all external and internal antecedent factors into three different categories, namely:

- (i) Technological context—the existing technologies as well as new technologies relevant to the firm
- (ii) Organisational context—the descriptive measures about the organisation viz., size, and the amount of slack resources available internally

- (iii) Environmental context—the aspects of how a firm conducts its business, responds to its industry, customers and competitors, and deals with government, and the process by which the organisation chooses, adopts, implements and uses a technological innovation.

By definition, the environmental context includes various aspects of environmental factors related to the adoption of an innovation. The concerns arising from the organisation's responses to its customers, competitors and regulatory authorities are environmental factors. Institutional theory (DiMaggio & Powell, 1983) posits that organisations face pressures to conform to the shared notions of appropriate forms of behaviour in an institutional environment. Firms working in an environment are influenced by their customers, suppliers, parent organisations and other similar firms. Institutional theory describes these influences by categorising three types of isomorphic pressures —coercive, mimetic and normative—and suggests that coercive and normative pressures normally operate through interconnected relationships while mimetic pressures act through structural equivalence. Institutional theory and the TOE framework explain the effects of environmental factors on the process by which an organisation adopts, uses and implements an innovation; however, they do not explain how these factors affect the formation of intention or entrepreneurs' perceptions while forming the intention to adopt an innovation. The TOE framework, although it considers the organisational and technological context in conjunction with environmental factors, is silent about any influence from perceived innovation characteristics.

Furthermore, how organisations deal with government policies, relevant legislation and relevant infrastructural supports is another aspect of environmental factors which is related to country readiness. The issues related to how an organisation conducts its business, responds to society and proceeds to choose or use an innovation are again different from the other two types of environmental issues, namely, environmental pressures and country readiness. These phenomena are environmental concerns that are more culture-specific.

The above-mentioned theories explain the influence of diverse factors on behavioural intention or actual behaviour (technology usage); however, none of them address any aspect of organisational performance. The notion that a satisfied user

initiates repeat use and becomes a loyal user is a driver for the inclusion of organisational performance with technology diffusion research. Satisfied users also act as a reference for others who are willing to use the same innovation. Thus, the final outcome of an innovation adoption viz., enhanced organisational performance, has become an important concern in present IT research. The RBV (Barney, 1991) posits that resources which are valuable, rare, imperfectly imitable and imperfectly substitutable could generate sustainable competitive advantage. ICT usage is valuable and rare for the firm. However, combining the resources with organisational processes may make it imperfectly imitable and substitutable. Thus, the use and degree of utilisation of ICT in an SME play a vital role in enhanced firm performance.

The above-mentioned discussion spells out the fact that a single model doesn't comprehensively cover all relevant issues and also provides a platform to synthesise the theories (the TRA, TAM, TPB, DOI theory, UTAUT, TOE framework, institutional theory and RBV) and build a comprehensive theoretical framework to look at the innovation diffusion process of ICT in the SME sector and its resultant outcome in terms of organisational performance. The comprehensive theoretical framework combines relevant external and internal factors as antecedents of behavioural intention which influence ICT usage behaviour with a view to addressing the impact of ICT usage on organisational performance.

Table 2.2: Review of the Theoretical Frameworks

Endogenous variables	Exogenous variables								Proposed Theoretical Constructs
	DOI	TRA	TPB	TAM	UTAUT	Institutional Theory	Systems Use ¹⁰	RBV	
Behavioural Intention	Individual characteristics/innovativeness ¹¹	—	—	—	—	—	—	—	Owner/CEO characteristics
	Relative advantage	Attitude	Attitude	Perceived usefulness	Performance expectancy	—	—	—	Attitude
	Compatibility	—	—	—	—	—	—	—	—
	Complexity	—	—	Perceived ease of use	Effort expectancy	—	—	—	—
	Triability	—	—	—	—	—	—	—	—
	Observability	—	—	—	—	—	—	—	—
	—	Subjective norms	Subjective norms	—	Social influence	Normative pressure	—	—	—
	—	—	Perceived behavioural control	—	Facilitating condition	—	—	—	Facilitating condition (organisational resources)
—	—	—	—	—	Competitive pressure	—	—	Environmental pressure (industry environment)	
—	—	—	—	—	Coercive pressure	—	—	Country readiness (country infrastructure & resources)	

¹⁰ A theoretical framework employed to study system usage behaviour (Venkatesh et al., 2008).

¹¹ Personal demographics and innovativeness are the main influencers in the knowledge stage when adopters are exposed to an innovation. Early adopters intend to and adopt an innovation very promptly.

Endogenous variables	Exogenous variables								Proposed Theoretical Constructs
	DOI	TRA	TPB	TAM	UTAUT	Institutional Theory	Systems Use ¹⁰	RBV	
	—	—	—	—	—	—	—	—	Culture (societal environment)
Behavioural Expectation	—	—	—	—	—	—	Behavioural intention Facilitating condition	—	Behavioural intention
	—	—	—	—	—	—			
	—	—	—	—	—	—			
Use	—	Intention	Intention	Intention	Intention	—	Behavioural intention Behavioural expectation Facilitating condition	—	Behavioural expectation
	—	—	—	—	—	—			
	—	—	—	—	—	—		Facilitating condition	
Performance	—	—	—	—	—	—	—	Use and utilisation of organisational resources	ICT use Degree of utilisation
	—	—	—	—	—	—			
	—	—	—	—	—	—			

2.4 REVIEW OF EMPIRICAL STUDIES

This section highlights some important empirical findings which explore the research gaps in the existing literature and provides a logical grounding of various internal and external factors to be synthesised to develop an integrated theoretical framework for examining the diffusion of ICT and SME performance. When undertaking the critical review of the relevant literature, as shown in Table 2.3, the motivation for the research as well as the research direction were addressed.

The literature review revealed that studying the impacts of ICT usage on organisational performance is an important research issue which has not been widely documented.¹² Although the diffusion of ICT has been a much researched area of study in the past two decades, there remains a wide research gap between the perspectives of developed and developing countries on ICT diffusion behaviour. The applicability of existing diffusion theories to developing countries is also not clear. Contemporary researchers who wish to learn about the diffusion of an innovation from a holistic approach seek to analyse the important aspects of the ICT diffusion phenomena under an integrated and comprehensive model.

Previous studies have analysed various issues of the diffusion of an innovation by applying a wide range of theoretical frameworks. Most of them have investigated one aspect at a time of the contextual and environmental factors with the view of avoiding analytical complexity by creating a parsimonious research model. It is known that the inclusion of a large number of important and relevant variables improves the goodness of model fit and enhances the variation of the model explained. It is not unlikely that variables (endogenous or exogenous) have different effects in different contexts as well as with the number of different variables included in the model.

The literature review (see Table 2.3) and discussion in sections 2.5 and 2.6 have built the foundation of an integrated and comprehensive research model. The primary model based on the literature review is presented as Figure 2.1.

¹² A detailed review of some important literature has been provided in Table 2.3. The reviews take a tabular form to clearly address various aspects of research in detail. The literature are organised according to their contribution and relevance with the current study. Section 2.5 and 2.6 also deal with literature review for the construction of a primary research model.

Table 2.3: Review of Related Empirical Studies

Author (year published)	Research method	Independent variables	Results	Comments
Zhu & Kraemer (2005) <i>Activity analysed:</i> E-business usage and value (post-adoption variation)	Quantitative survey Structural equation modelling (PLS) was employed with a data set of 624 retail industry firms across 10 countries. The integrated research model was grounded in the innovation diffusion literature and resource-based theory which featured technological, organisational and environmental factors used to examine e-business usage and value creation.	<i>E-business use:</i> Technology competence Org. size Org. international scope Org. financial commitment Competitive pressure Regulatory support <i>E-business value:</i> Front-end functionality Back-end integration E-business use	<i>E-business use:</i> Technology competence Org. size Org. financial commitment Competitive pressure Regulatory support <i>E-business value:</i> Front-end functionality Back-end integration <i>E-business use</i> The study reported significant differences in the firms' e-business use and value between developed and developing countries.	The study addressed e-business diffusion and value creation while other aspects of ICT applications, such as general purpose ICT, ERP etc., were overlooked. The study, although featuring technological, organisational and environmental factors, did not include cognitive evaluation, culture and country readiness in the model. The study investigated the phenomena from the developed country perspective.
Zhu et al. (2003) <i>Activity analysed:</i> Electronic business (EB) adoption	Quantitative survey Data source was ECaTT, a data set developed by Empirica, a research institute based in Bonn, Germany. (The Logit model was used in a data set of 3100 businesses and 7500 consumers from eight European countries.)	Technology competence Firm scope Firm size Consumer readiness Lack of trading partner readiness Competitive pressure Industry dummies Country dummies	Technology competence Firm scope Firm size Consumer readiness Lack of trading partner readiness Competitive pressure Low EB intensity countries were similar to full sample while high EB intensity countries differed.	Only the adoption decision was examined which is not adequate for inferring the implementation process or its impact on firm performance. The study was based on a European countries' data set which poses the question as to whether the result would apply to developing or newly industrialised countries.

Author (year published)	Research method	Independent variables	Results	Comments
Zhu et al. (2006) <i>Activity analysed:</i> Assimilation of Internet-based e-business (initiation, adoption and routinisation)	Quantitative survey Structural equation modelling (AMOS) was employed for the estimations with a data set of 1857 firms in the retail industry across 10 countries. The model featured technological, organisational and environmental factors to examine the three stages of assimilation. The study also compared e-business assimilation between developed and developing countries to investigate whether there was any economic effect.	<i>E-business use:</i> Technology readiness Technology integration Firm size Global scope Managerial obstacles Competition intensity Regulatory environment	<i>Initiation:</i> Technology readiness Technology integration Managerial obstacles (-) Competition intensity Regulatory environment <i>Adoption:</i> Technology readiness Technology integration Firm size (-) Competition intensity <i>Routinisation:</i> Technology readiness Technology integration Firm size (-) Managerial obstacles (-) Competition intensity (-) Regulatory environment	The study focused on adoption and diffusion of e-business. From this study, it was not possible to predict if the diffusion of e-business had any positive impact on firm performance.
Molla & Licker (2005) <i>Activity analysed:</i> E-commerce adoption and institutionalisation (developing country perspective)	Quantitative survey Multiple discriminant function analysis was conducted with a data set collected in South Africa.	<i>Perceived org. e-readiness:</i> Awareness Resources Commitment Governance <i>Perceived external e-readiness:</i> Government e-readiness Market forces e-readiness Support industries e-readiness	Organisational factors, especially the human, business and technological resources, and awareness were more influential than environmental factors in the initial adoption of e-commerce. Environmental factors, together with commitment and the governance model that organisations installed, affected e-commerce institutionalisation.	The study focused on e-commerce adoption and institutionalisation while other applications of ICT were not included in the model. The study looked at the phenomena from the developing country perspective. However, it lacked the construction of a comprehensive model to analyse the phenomena. For example, cognitive evaluation, institutional pressures, culture and country infrastructure were not included in the model.

Author (year published)	Research method	Independent variables	Results	Comments
Hong & Zhu (2006) <i>Activity analysed:</i> E-commerce adoption and migration to e-commerce	Quantitative survey The theoretical framework was developed grounded in technology diffusion theory. Multinomial logistic regression was used with a data set of 1036 firms in a broad range of industries.	Technology integration Web spending Web functionalities Electronic data interchange (EDI) use Partner use Perceived obstacles <i>Control variables:</i> Firm size Industry type	<i>E-business adoption:</i> Technology integration Web spending Web functionalities Partner usage The adoption rate varied by firm size in the case of the overall sample and non-adopters vs. adopters sub-sample while it had no effect on potential adopters vs. adopters sub-sample. <i>Migration to E-business:</i> Web spending Web functionalities EDI (-) Partner usage (-) Perceived obstacle (-)	The study focused on e-commerce adoption and migration to e-commerce. The study was silent about the impact of e-commerce on firm performance. The study dealt with the phenomena from the developed country perspective.
Madden et al. (2013) <i>Dependent variable:</i> Small firms online market entry	Quantitative survey. Trivariate probit model estimations were conducted with a data set of 1001 small and medium-sized businesses in Australia.	The study included strategic reasons—efficiency, market expansion, introducing new goods, responding to customer requests, supplier requirements, anticipating competition—for entry into online business and the effect on market performance with various firm characteristics, industry characteristics and web investment.	Firms that enter into the online market for market expansion are successful while firms that targeted cost reduction were disappointed. The study had no evidence that blended firms enjoyed any important advantage over their virtual competitors.	This study basically proved that ICT application (online market entry) in SMEs improved firms' market performance (market expansion and profit). This study included environmental pressures—such as customer requests, supplier requirements and anticipating competition; however, it did not explain the effects of other technological, organisational and environmental factors on ICT use or subsequent firm performance.

Author (year published)	Research method	Independent variables	Results	Comments
Jehangir & Downe (2011) <i>Activity analysed:</i> Business performance	Quantitative survey. Linear regression was used with a data set of 243 Malaysian manufacturing firms.	<i>Business performance:</i> IT infrastructure IT human resources E-commerce capability	E-commerce capability: IT infrastructure IT human resources Business performance: E-commerce	IT infrastructure and IT human resources can create e-commerce capability which finally affects business performance.
Konings & Roodhooft (2002) <i>Activity analysed:</i> E-business effect on firm productivity and cost efficiency	Quantitative survey. The final sample included 836 firms. The survey was a postal survey in which survey instruments were sent to 5718 firms.	IT infrastructure IT human resources E-commerce	Use of e-business was substantially higher among large firms than in small firms which however varied in different industries. Large firms engaged in e-business have higher total factor productivity than large firms that are not. E-business has no effect on factor productivity of small firms.	E-business contributed positively to the productivity, i.e., the performance of the firm.
Oliveira & Martins (2010) <i>Activity analysed:</i> E-business adoption by European firms	Quantitative survey. The final sample included 6694 firms belonging to the EU27 members, excluding Malta and Bulgaria. Computer-aided telephone interview (CATI) technology was used with the randomly selected samples. Factor analysis and cluster analysis were conducted for estimates.	The research model included: Technology readiness Firm size Expected benefits and barriers of e-business Improved products or services or internal processes Internet penetration Competitive pressure Industry	Firms with high levels of TOE factors also had an enhanced level of e-business. High levels of competitive pressure led to high levels of e-business adoption. Industry-specific characteristics, not country-specific characteristics, better explained e-business adoption.	The TOE framework, in general, is applicable to the study of European firms' e-business adoption. Competitive pressures and industry-specific characteristics are related to high levels of e-business adoption.

Author (year published)	Research method	Independent variables	Results	Comments
Powell & Dent-Micallef (1997) <i>Activity analysed:</i> IT and firm performance	Empirical study Quantitative survey	Human resources Business resources Technology resources <i>Dependent variable</i> IT performance Overall performance Profitability Sales growth	Human complementary resources accounted for significant overall performance variance—with the human resources set yielding a large positive coefficient for all performance measures. Technology resources did not account for any significant firm performance variance: they only influenced IT performance.	The findings showed that IT alone did not produce sustainable performance advantages in the retail industry, but some firms gained advantages by using IT to leverage intangible, complementary human and business resources such as flexible culture, strategic planning—IT integration, and supplier relationships. The results also helped to explain why some firms outperform others using the same IT, and why successful IT users often fail to sustain IT-based competitive advantages.
Gupta, Dasgupta & Gupta (2008) <i>Activity analysed:</i> ICT adoption in a government organisation in a developing country	Quantitative survey. Data were collected from 102 employees of a government organisation in India. PLS-based SEM was employed for data analysis.	<i>Intention</i> Performance expectancy Effort expectancy Social influence <i>Usage</i> Facilitating condition Behavioural intention	The study found that <i>performance expectancy, effort expectancy</i> and <i>social influence</i> were significantly associated with intention to use ICT while <i>facilitating condition</i> was found to have a significant positive effect on ICT-use behaviour. The study did not find any significant relationship between behavioural intention and actual Internet usage. Intention to use is relevant in situations where the technology is new and the users have not used it which was not the case here.	This framework can be used to look into the technology diffusion phenomena in other organisations (government or private) from a developing country perspective. An interesting outcome of this study was that the intention variable was not relevant in contexts where the technology was already being used. The finding may suggest possible changes to the existing theoretical frameworks; thus, it should be re-examined in different contexts.

Author (year published)	Research method	Independent variables	Results	Comments
Venkatesh & Zhang (2010) <i>Activity analysed:</i> Use of IT at organisational level in USA and China	Quantitative survey. A longitudinal survey was conducted of the employees in an organisation which operated in USA and China. In all, 300 employees were surveyed in each country from one business unit. PLS-based SEM was used as the analytical tool.	<i>Intention</i> Performance expectancy Effort expectancy Social influence <i>Usage</i> Facilitating condition Behavioural intention Gender, age, experience and voluntariness of use were included as moderators in various relationships.	<i>Intention</i> Performance expectancy Gender and age positively moderate the effects of performance expectancy, while the interaction of gender, age and experience negatively moderates effort expectancy (for both countries); however, the interaction of gender, age, voluntariness and experience on social influence has a negative effect in the USA. <i>Usage</i> Behavioural intention Interaction of age and experience positively affects facilitating condition in both countries.	The framework which included performance expectancy, effort expectancy, social influence, behavioural intention and facilitating condition, is worth working with in different countries. Although this framework provided an illustration of the factors influencing ICT usage behaviour in a developed as well as in a developing country, it did not indicate whether the use of technology could generate organisational performance. Importantly, the study indicated that PLS-based structural equation modelling (SEM) was efficient in analysing the usage of IT.
Venkatesh et al. (2008) <i>Activity analysed:</i> Use of new information systems	Quantitative survey. In all, 321 users of new information systems were surveyed in a longitudinal field study.	<i>Behavioural expectation</i> Behavioural intention Facilitating condition <i>Usage</i> Behavioural intention Behavioural expectation Facilitating condition Gender, age and experience were used as moderators in various situations.	Behavioural intention and behavioural expectation played significant roles only in direct effects analysis while behavioural expectation emerged as the only significant factor in direct and interaction effects analysis for frequency and intensity of use; however, behavioural intention affected the duration of use.	Behavioural expectation emerged as a strong indicator for predicting the system usage behaviour addressing some of the key limitations of behavioural intention and facilitating condition and providing a better understanding of systems use. Behavioural expectation could be included as a new construct to study IT usage behaviour. PLS-based structural equation modelling (SEM) was functional in the analysis of IS usage behaviour.

Author (year published)	Research method	Independent variables	Results	Comments
Thong (1999) <i>Activity analysed:</i> Adoption of information systems (IS) in small businesses	Quantitative survey. Data analysis was carried out with a data set of 166 small businesses. To collect data, a mail order survey was conducted with 1200 small businesses in Singapore: while 294 responses were returned, only 166 were complete responses.	Decision-maker characteristics included innovativeness and IS knowledge. IS characteristics included relative advantage, compatibility and complexity. Organisational characteristics included business size, employees' IS knowledge and information intensity. Environmental characteristics particularly included competition.	CEO innovativeness and IS knowledge, relative advantage and compatibility, complexity, business size and employees' IS knowledge were significantly related to the likelihood of IS adoption while business size, employees' IS knowledge and information intensity played a significant role in explaining the extent of IS adoption.	CEO innovativeness and knowledge, relative advantage/compatibility, business size and employees' knowledge (skilled human resources) emerged as key constructs for examining the likelihood of IS adoption by small firms. Although CEO innovativeness and environmental pressures were not observed as significant in explaining the extent of information about IS, these factors should be looked into in different contexts.
Yap, Soh, & Raman (1992) <i>Activity analysed:</i> Success of computer-based information systems (CBIS) in small businesses	Quantitative survey Data analysis was carried out with a data set of 96 small businesses in Singapore.	Consultant effectiveness Vendor support CBIS experience Financial resources CEO support Level of user participation Number of administrative applications Presence of systems analyst	Consultant effectiveness Vendor support CBIS experience Financial resources CEO support Level of user participation	The study confirmed the significant effect of consultant effectiveness, vendor support, CBIS experience, financial resources, CEO support and level of user participation on CBIS success while administrative applications and the presence of a systems analyst had no significant effects.

Author (year published)	Research method	Independent variables	Results	Comments
Thong & Yap (1995) <i>Activity analysed:</i> IT adoption in small businesses	Quantitative survey Data analysis was carried out with a data set of 166 small businesses	Individual characteristics included CEO innovativeness, CEO attitude towards adoption of IT and CEO IT knowledge. Organisational characteristics included business size, competitiveness of environment and information intensity.	CEO characteristics Business size	With business size, CEO characteristics played a significant role in IT adoption by small businesses. Clearly, small businesses were more likely to adopt IT if CEOs were more innovative, had a positive attitude towards the adoption of IT, and had greater IT knowledge.
Kendall et al. (2001) <i>Activity analysed:</i> E-commerce adoption by SMEs in Singapore	Quantitative survey Data analysis was carried out with a data set of 58 SMEs in Singapore.	Perceived innovation characteristics included relative advantage, compatibility, complexity, trialability and observability	Relative advantage compatibility trialability	Relative advantage, compatibility and trialability played significant roles in the adoption of e-commerce by Singaporean SMEs while complexity and observability were not found to have any significant effect.
Teo et al. (2003) <i>Activity analysed:</i> Adoption intention of financial electronic data interchange (EDI)	Quantitative survey Data analysis was carried out with a data set of 492 individuals from 222 non-adopting organisations in Singapore.	Coercive pressures Mimetic pressures Normative pressures	Coercive pressures Mimetic pressures Normative pressures	Adoption of interorganisational systems was largely influenced by the environmental pressures arising from institutional environments.
Dada (2006) <i>Activity analysed:</i> Group support systems (GSS) in two developing countries—Tanzania and South Africa	Case study The study modified the framework of Molla and Licker (2003) reflecting the notion of the UTAUT framework (Venkatesh et al., 2003).	<i>Initial adoption and institutionalisation:</i> Organisational factors (factors leading to usage behaviour from UTAUT framework) Environmental factors (e-readiness measure)	The study found that organisational factors were influential in the adoption and institutionalisation of GSS while country-level factors did not have any influence on the intention and likelihood of using GSS.	The results may be used as validation of UTAUT factors particularly perceived effort expectancy and performance expectancy, facilitating condition and subjective norms. The study, however, was important as it looked at the effects of country level e-readiness, finally nullifying its effect which should be further looked into with a quantitative survey.

Author (year published)	Research method	Independent variables	Results	Comments
Marques et al. (2011) <i>Activity analysed:</i> Adoption of medical record system	Quantitative survey The study analysed the data set comprising 448 hospitals in Europe (data source: e-Business Watch 2006 decision-maker survey). The study added environmental aspects into the human, organisation and technology fit (HOT-fit) framework and built a new framework which it called the HOTE (human, organisation, technology and environment) framework.	Technology (equipment and processes), organisation (size, location, managerial structure), human context (user involvement) and environmental context (cultural environment of the country and regulatory influence) Three factors (country wealth, competition and technology readiness) were finally explored through principal component analysis.	Technology readiness, country wealth and education level were significantly associated with medical record systems adoption in European hospitals.	Country-level factors such as country wealth (GDP per inhabitant, % of households connected to the Internet, total spending on R&D as a % of GDP) emerged as antecedents for the adoption of a new information system. The study was conducted in the context of Europe; thus, it is not sure how this variable would behave in other countries particularly in developing countries.
Erumban & Jong (2006) <i>Activity analysed:</i> ICT adoption rate	Secondary sources of data were used. This study used data about cultural differences across countries based on Hofstede's dimensions. The proportion of ICT expenditure across 42 countries and per capita computers across 49 countries (from 1991–2001) were used to establish the ICT adoption rate. The study used ICT expenditure and per capita computer data for those countries for which the corresponding Hofstede indices were available.	Power distance Uncertainty avoidance Individualism Masculinity Long-term orientation Country dummy Education	Without country dummy and education: Uncertainty avoidance Individualism With country dummy: Power distance Uncertainty avoidance Masculinity Country dummy Education	The results of the study suggested that ICT adoption rate in a country was closely related to its national culture. The study revealed that power distance and uncertainty avoidance were the most important dimensions explaining ICT adoption rate in a country.

Author (year published)	Research method	Independent variables	Results	Comments
Gibbs & Kraemer (2004) <i>Activity analysed:</i> Scope of usage of e-commerce	Quantitative survey Data collected from 2139 establishments from three industries across 10 countries	External pressure Perceived benefits Government promotion Org. compatibility Legislation barriers Technology resources Financial resources Size Industry and country dummy	The study found significant effects of perceived benefits, external pressure, government policy, legislation barriers, technology resources, financial resources and all country dummies, except for Denmark, on the range of e-commerce usage.	The study confirmed the importance of strategic benefits, external pressure, technology and financial resources, and policy environment on the range of e-commerce use. US firms enjoyed significantly higher range of use than firms from other countries which also confirmed the significant country effects on the range of e-commerce use.
Thatcher et al. (2006) <i>Activity analysed:</i> Adoption of e-commerce systems in electronics and textile industries	The study adopted both qualitative and interpretive methodology. The four phases of the methodology were data collection, data reduction, data display and drawing conclusions.	<i>Organisational</i> IT sophistication; Top management support; Firm size <i>Industry</i> Importance of responsiveness; Importance of cost cutting; Multinational companies; Trend-setting companies <i>Government</i> Policies promoting B2B (business to business); Subsidies promoting B2B <i>Culture</i> Power distance; Uncertainty avoidance; Individualism vs. collectivism; Masculinity vs. femininity; Time orientation; High context vs. low context	All factors under organisational, industry, government and culture were significantly associated with B2B adoption in the Taiwanese electronics industry. However, the effects varied with the adoption of B2B e-commerce in the textile industry. More specifically, IT sophistication, importance of responsiveness and government subsidy promoting ICT had positive effects: firm size and being a trend-setting company had no effects while all other factors were negatively associated.	This study confirmed that cultural dimensions were associated with the adoption of B2B e-commerce in both Taiwanese electronics and textile industries. Interestingly, the effects were positive in the electronics industry while the cultural dimensions were negatively related to B2B e-commerce adoption in the textile industry.

2.5 DETERMINANTS OF ICT USE

2.5.1 COGNITIVE EVALUATION AND OWNER INNOVATIVENESS

Beliefs, evaluations, intention and actual behaviours are modelled in the theory of reasoned action (TRA) with subjective norms. Fishbein and Ajzen (1975) suggested that an overall affective evaluation, that is, one's beliefs (cognitive) towards performing a behaviour and the respective evaluations (affective) heavily influence an individual's intention of performing the behaviour. The evaluation is made based on one's cognitive evaluation of the consequences of that behaviour (Ajzen & Fishbein, 1980; Sheppard, Hartwick, & Warshaw, 1988). The evaluation process involves functional consequences, that is, outcomes which are immediate, direct and tangible, as well as psychological consequences, that is, the consequences are internal, personal and abstract in nature. These cognitive and affective evaluations form one's attitude, that is, negative or positive feelings about performing a behaviour with this having been widely researched in the consumer, marketing and IS literature (Fishbein & Ajzen 1975; Ajzen, 1985; Gehrt & Carter, 1992; Mehta & Sivadas, 1995; Liao & Cheung, 2001; Cho, 2004). Prior studies have shown the significant effect of attitude, that is, cognitive evaluation towards intention (Davis et al., 1989; Mathieson, 1991; Taylor & Todd, 1995a; Chang, 1998; Lu et al., 2003; Shih & Fang, 2004; Rhodes & Courneya, 2003; George, 2002; 2004; Ramayah et al., 2003, 2004, 2005, 2007).

Personal characteristics play a significant role in individual decision making or choice behaviour. Individuals affiliated with different demographic groups show different brand preferences. For example, variations in product preference and choice behaviour appear in educated versus non-educated, rich versus poor, urban versus rural and between individuals affiliated with different professional positions. Individuals are variously classified according to their receptivity and adoption of an innovation. Rogers (1995) categorised five different types of adopters according to the time of adoption as innovators, early adopters, early majority, late majority and laggards (Weber & Kauffman, 2011). Innovators are adopters who are innovative in

nature and who are prepared to bear the risks associated with the early adoption of an innovation. The adoption of an innovation in a small firm is highly influenced by the personal characteristics and preferences of the owner or CEO with most small businesses being managed by the owner who also acts as the CEO (Solomon, 1986; Steinhoff & Burgess, 1986; Yap et al., 1992). Thus, innovative SME owners adopt innovation at the early stage. Prior studies have shown that the innovativeness of the CEO or owner of an SME significantly affects the adoption (Thong, 1999; Thong & Yap, 1995) and the implementation of information systems (Thong, 1999).

2.5.2 BEHAVIOURAL INTENTION AND BEHAVIOURAL EXPECTATION

Intention is one of the strong predictors of the adoption of an innovation. From the earliest theories of adoption-diffusion, intention has been used to address the adoption of innovation. The theory of reasoned action (TRA) predicts intention as a function of attitude towards behaviour and subjective norms (Fishbein & Ajzen, 1975). The intention is measured through the function of five innovation characteristics, namely, relative advantage, perceived compatibility, perceived complexity, perceived trialability and perceived observability in the diffusion of innovation (DOI) model (Rogers, 1983). Perceived risk (Tan & Teo, 2000; Lim & Speece, 2002; Davila et al., 2002) and adopters' characteristics (Rogers, 1983, Thong & Yap, 1995) are also correlated with intention. Again, perceived behavioural control has a direct correlation with behavioural intention (Ajzen, 1985). Intention has also been elaborately presented as the function of attitude towards behaviour and subjective norms while attitude towards behaviour is analysed as a function of perceived ease of use and perceived usefulness (Davis, 1986).

Despite significant improvements of the past innovation adoption theories from the TRA (Fishbein & Ajzen, 1975) to the TAM (Davis, 1986), some major drawbacks still prevail. Diversified uses of technology, from individual level to different trading situations, have involved some modifications of findings from previous studies in order to adequately address technology adoption-diffusion behaviour. Some new dimensional constructs have therefore been included within the existing theories as is evident in the literature. Venkatesh et al. (2003) proposed some modifications in the existing behavioural theory by having their UTAUT model address performance

expectancy, effort expectancy and subjective norms as antecedents of behavioural intention to explain actual IT usage behaviour. Although intention, a reflection of the adopter's internal schema of beliefs, had great influence in earlier behavioural models, it cannot predict the situation when the adopter is not under full volitional control or the situation where a time gap exists between intention and actual behaviour (Venkatesh et al., 2008). However, a stronger predictor of actual behaviour may incorporate some other external (social and environmental) factors which need to be considered in the existing model. Venkatesh et al. (2008) further modified their UTAUT model (Venkatesh et al., 2003) and included behavioural expectation as a new construct which is a stronger predictor of behaviour than behavioural intention. Taking into consideration the scope and limitations of various previous theories, this study has included behavioural expectation as a possible predictor of actual ICT use.

2.5.3 FACILITATING CONDITION AND COUNTRY READINESS

The studies utilising the traditional resource-based view (RBV) have proposed that if firms can combine IT-related resources to create a unique IT capability, this can result in superior firm performance (Bharadwaj, 2000; Ravichandran & Lertwongsatien, 2005). IT capability is addressed as the facilitating condition in ICT diffusion studies (Venkatesh et al., 2008). The facilitating condition is defined as individuals' perceptions of the availability of technological and/or organisational resources (i.e. knowledge, resources and opportunities) that can remove barriers to using a system (Venkatesh et al., 2003). Thus, network connectivity, Internet speed, computer hardware resources, software and skilled manpower produce favourable facilitating conditions which foster the use of ICT. This phenomenon is also evident in the previous classical behavioural theory as behavioural control in the theory of planned behaviour (TPB) (Ajzen, 1985, 1991) and self-efficacy in social cognitive theory (Bandura, 1986).

The organisational ICT resource-based view and facilitating condition need to be stated differently as, although the organisation may have enough resources, this does not necessarily mean that these resources facilitate the achievement of better performance. The facilitating condition's effect on behavioural expectation and ICT use is not limited only to organisational resources.

The TOE framework (Tornatzky & Fleischer, 1990) includes environmental factors with technological and organisational factors for studying the adoption of ICT at firm level. Previous studies have considered various aspects of external environmental factors, such as institutional environmental concerns (Teo et al., 2003; Oliveira & Martins, 2010); country infrastructure and governance concern (Marques et al., 2011; Gibbs & Kraemer, 2004; Zhu et al., 2006b; Zhang, Cui, Huang, & Zhang, 2007; Xu et al., 2004); and cultural concerns (Thatcher et al., 2006; Erumban & Jong, 2006; Straub, 1994; Gefen & Straub, 1997; Burn, 1995).

The effects of country infrastructure, governance-related external factors and organisational facilitating conditions are alike. In reality, these aspects are related to country readiness (Marques et al., 2011) in the facilitation of ICT diffusion at individual, organisational and government level. The availability and geographical coverage of the Internet, speed and price of Internet service, ICT resources (hardware and software), regulatory framework, market conditions, delivery systems, government policy and support have direct effects on ICT adoption. The condition of the favourableness or unfavourableness of the infrastructural factors accelerate or inhibit ICT use at firm level. Thus, this phenomenon (country readiness) should be considered as a new aspect of the facilitating condition which is different to the facilitating condition (Venkatesh et al., 2008; Venkatesh & Zhang, 2010) explained in previous studies. This study thus considers both of these aspects which are logically added as separate predictors of behavioural expectation as the facilitating condition (firm-level resources) and country readiness (national-level infrastructure and governance).

2.5.4 CULTURE AND ENVIRONMENTAL PRESSURE

Culture is a broad spectrum of behavioural study which has been defined differently in different studies in the literature. In the broadest sense, culture may be defined as the sum total of shared learned beliefs, values, norms and customs which guide individual or group behaviour in a society. Hofstede (2001) treated culture as the collective programming of the mind that distinguishes the members of one group or category of people from another. Although the effects of culture on leadership and organisational processes as well as on individual behaviour have been explored in

many studies (House et al., 2004), its effects when studied in ICT adoption research are inconclusive.

The importance of culture in determining individual innovativeness relative to various personal and perceptual factors during adoption of an innovative or new product is a vital research issue. This aspect of cultural study is also neglected in consumer research. Parker and Sarvary (1996) suggest that culture has no significant impact on innovativeness at the individual level.

There is controversy about the role of culture in the use and adoption of IT. Some researchers favour the view that organisations adopt technology that is useful and provides them with some economic benefit with culture having no significant role. However, other researchers hold the alternative view that culture plays an important role in determining not only whether organisations in a particular country adopt a certain technology but it also impacts on the degree to which that technology is accepted and the ways in which it is used (Thatcher et al., 2006).

Although they are limited in number, some previous studies have reported a significant link between cultural dimensions and different facets of IT use (Bertolotti, 1984; Burn, 1995; Erez & Early, 1993; Gefen & Straub, 1997; Hill et al., 1998; Ho, Raman, & Watson, 1989; Straub, 1994; Harris & Davison 1999). Erumban and Jong (2006) found that the national culture and the ICT adoption rate of a country are closely related. They further reported that most of Hofstede's dimensions are important in influencing adoption with power distance and uncertainty avoidance dimensions seeming to be the most influential. Thatcher et al. (2006) supported this outcome in ICT adoption, particularly B2B e-commerce adoption, in the Taiwanese electronics industry context.

Organisations that operate within a cultural setting are believed to be influenced by the shared learned beliefs, values, norms and customs of the specific culture. Similar to national culture, organisational culture has been defined as the collective programming of the mind that distinguishes the members of one organisation from those of another.

In the "Global Leadership and Organizational Behavior Effectiveness" (GLOBE) study (House et al., 2004), culture has been examined in two ways: as the way of

carrying out behaviour (practice) and the way through which behaviour should be carried out (values). House et al. (2004) used nine different cultural dimensions to study the effects of the national culture on the organisation and its leadership, namely, power distance, uncertainty avoidance, in-group collectivism, institutional collectivism, humane orientation, assertiveness, gender egalitarianism, future orientation and performance orientation. On the other hand, Hofstede (1984) used five dimensions to study culture, namely, power distance, individualism versus collectivism, masculinity versus femininity, uncertainty avoidance and long-term versus short-term orientation. Although House et al. (2004) have defined culture by further elaboration of Hofstede's (1984) concepts, both theoretical frameworks have been used in multidisciplinary fields of study when addressing culture.

After reviewing Hofstede's (1984) concepts and House et al.'s (2004) dimensions as well as the context of Bangladesh, the following dimensions have been included in the proposed research model: power distance (refers to the inequality of the distribution of power in a country); in-group collectivism (the degree to which individuals express pride, loyalty and cohesiveness in their organisations or families); uncertainty avoidance (the extent to which a society, organisation or group relies on social norms, rules and procedures to alleviate the unpredictability of future events); and gender egalitarianism (the degree to which a collective minimises gender inequality). The measurement items for national culture and organisational culture have been adapted from House et al. (2004).

In addition to country readiness and national culture, the usage of ICT at the firm level may be influenced by some other factors arising from the institutional environment (see Teo et al., 2003).

The impact of these aspects of environmental factors and their characteristics has been well addressed in institutional theory. This needs to be synthesised with the adoption diffusion theories so as to reach the external variables reflected in Rogers' (1983) DOI theory and the subsequent TOE framework and other innovation diffusion frameworks.

Institutional theories have posited that organisations face pressures to conform to these shared notions of appropriate forms of behaviours, since violating them may

call into question the organisation's legitimacy and thus affect its ability to secure resources and social support (DiMaggio & Powell, 1983; Tolbert, 1985).

DiMaggio and Powell (1983) distinguished between three types of isomorphic pressures—coercive, mimetic and normative—and suggested that coercive and normative pressures normally operate through interconnected relationships while mimetic pressures act through structural equivalence.

Ajzen and Fishbein (1980) explored the role of subjective norms and studied how they affect individual behaviour. Subjective norms, in other words, pressures from friends and family play a vital role in the formation of intention to use an innovation. In organisational aspects, a focal organisation is able to learn about an innovation and its associated benefits and costs from other user organisations that are directly or indirectly tied to it, and is likely to be persuaded to behave similarly (Burt, 1982). Many studies have considered normative pressure as an antecedent of organisational innovation adoption phenomena (Kuan & Chau, 2001; Teo et al., 2003).

Mimetic pressures are the influences of other structurally equivalent organisations that have initiated some innovations and have become successful. This pressure may cause an organisation to change over time to become more like other organisations in its environment (DiMaggio & Powell, 1983). Many past studies have included mimetic pressures in exploring organisational ICT adoption behaviour (Premkumar & Ramamurthy, 1995; Teo et al., 2003).

Coercive pressures address various kinds of powers or influences, informal or formal, exercised by other organisations upon which an organisation is dependent. A dominant customer, supplier or parent organisation sometimes exercises their power or coercively influences the organisation to do a certain thing with the dependent organisation having no option other than to comply with the requirements. Coercive pressures are of great importance when studying the influences on ICT diffusion behaviour (Teo et al., 2003; Quaddus & Hofmeyer, 2007).

2.6 DETERMINANTS OF ORGANISATIONAL PERFORMANCE

2.6.1 ICT USE, INTEGRATION AND DEGREE OF UTILISATION

A large number of empirical studies have predicted IS usage behaviour by applying behavioural intention as the final dependent variable. The proposition “positive intention leads to positive behaviour” has provided the rationale for such studies. Some studies have also examined actual usage as a dependent variable for predicting actual behaviour. Different indicators of systems use, such as duration of use, frequency of use and intensity of use, have been used to reach actual usage behaviour (Venkatesh et al., 2008). Organisational ICT use has also been examined in different stages of assimilation such as *initial adoption* (the firm’s initial evaluation of an ICT-based operation at the pre-adoption stage); *adoption* (formal adoption of an ICT-based operation); and *routinisation* (full-scale deployment of ICT at the post-adoption stage in which the ICT-based operation becomes an integral part of the value-chain activities) (Fichman, 2000; Zhu et al., 2006b). Use of ICT has also been applied as the independent variable in examining the impact of ICT on organisational performance (Bharadwaj, 2000; Zhu & Kraemer, 2005; Zhu et al., 2006a). The results of such studies have revealed that greater ICT usage leads to greater impact on business performance.

Zhu and Kraemer (2005) explored beyond the dichotomous ‘adoption versus non-adoption’ phenomenon and examined the impact of actual ICT usage on organisational ICT value creation, that is, organisational performance. In analysing 624 firms across 10 countries in the retail industry, their study revealed that front-end capabilities and back-end integration of ICT had significant impact on organisational value creation while the impact of back-end integration appeared stronger than that of front-end functionalities. This outcome was consistent with the resource-based view (RBV) as back-end integration may create ICT resources which are firm-specific and difficult to imitate thus providing enhanced firm performance. Integration thus becomes an important dimension of the post-adoption stages of ICT usage behaviour.

Anandarajan et al. (2002) reported that the mere adoption of IT by organisations does not necessarily confer benefits as these would only be achieved by its effective usage. The ICT adoption phenomena in developing countries as well as in less

developed countries is assumed to be similar as other studies have shown that many information systems in least developed countries (LDCs) are under-utilised and hence do not make a significant contribution to improving the performance of the organisations that are using them (Forster & Cornford, 1992; Ordedra et al., 1993). In support of the previous studies, Song and Mueller-Falcke (2006) stated that SMEs are confronted with a number of challenges in adopting and using ICT with the result that they often under-utilise the available technologies (see United Nations Conference on Trade and Development [UNCTAD], 2006).

The above discussions have revealed that the adoption and post-adoption stages of ICT usage comprise various strategic uses of ICT which start from the initial stage of ICT usage through to the highly integrated ICT-based environment. Proper utilisation of ICT is an important issue for the productive use of ICT in developing countries. The various uses of ICT may be categorised as *ICT usage* (Venkatesh et al., 2008) (depth of use which deals with frequency and intensity of ICT use); *integration* (Powell & Dent-Micallef, 1997) (breadth of ICT use which is related to the strategic use of the technology, that is, to what extent the technology is integrated with the organisational goals, plans and processes); and *utilisation* (how appropriately the ICT is utilised and how much of the facilities of the technology are used in different functional areas in the organisation, that is, frequency of use and its strategic applications), all of which have implications for organisational performance.

2.6.2 ORGANISATIONAL PERFORMANCE

Defining and measuring business performance has been of interest to researchers for centuries (Pham & Jordan, 2007). Despite the controversy over the business value of computer investments, known as the “productivity paradox”, which still continues even in the face of successful evidence about pay-offs from IT (Brynjolfsson, 1993; Brynjolfsson & Hitt, 1996), numerous studies have found a positive link between IT use and organisational performance (Dvir et al., 1993; Cragg, King, & Hussin, 2002; Pilat & Wyckoff, 2005; Baldwin & Sabourin, 2001; Gretton, Gali, & Parham, 2004). However, the measurement of firm performance is not straightforward. Past researchers have used different conceptualisations to measure business performance. Szymanski, Bharadwaj and Varadarajan (1993) suggested studying business

performance based on market share and profitability while Voss and Voss (2000) viewed performance as the outcome of the company business process.

Organisational performance, an important indicator of economic development, has been conceptualised in different ways in different studies. It can be measured objectively based on historical data (Bharadwaj, 2000; Sanders & Premus, 2005) or measured subjectively based on respondents' perceptions of organisational performance in relation to their expectations and goals, or in comparison with the company's competitors (Powell & Dent-Micallef, 1997; Ravichandran & Lertwongsatien, 2005).

In previous studies, various dimensions of organisational performance have been considered for linkages with ICT such as profit growth, market share, productivity growth, improved performance and the firm's competitiveness. In this study, organisational performance was measured using the subjective approach by evaluating the organisation's performance in different functional areas according to the plans and goals of the organisation that had been previously determined.

2.6.3 MEDIATION OF INTEGRATION AND UTILISATION

Researchers and practitioners involved in studying ICT use and utilisation in the organisational context are interested in discovering the answer to the question of how and to what extent ICT usage is associated with organisational performance. The answer is equally important for the CEOs or owners of organisations that are currently using ICT or that intend to use ICT in different functional areas. The DOI theory contends that the impact of a new technology depends on the extent to which it is used in key value-chain activities. Previous studies have found different results when examining the impact of ICT usage on organisational performance, such as negative effect (Warner, 1987); no effect (Venkatraman & Zaheer, 1990; Sager, 1988); mixed effects (Powell & Dent-Micallef, 1997; Tippins & Sohi, 2003; Wu et al., 2006); and direct positive effects (Kettinger et al., 1994; Feeny & Ives, 1990; Clemons & Weber, 1990; Li & Ye, 1999; Clemons & Row, 1991; Schwarzer, 1995; Bharadwaj, 2000). Zhu and Kraemer (2005) suggested that merely examining the initial adoption might not reveal the variations in IT value, because IT creates

business value in sequential stages. They again stated that despite its theoretical importance, usage has been under-studied in empirical research which was therefore their motivation for analysing the linkage between usage and performance impact. Zhu and Kraemer (2005) found a positive link between ICT use (e-commerce) and value creation which was consistent with empirical findings of the importance of usage in different contexts such as electronic data interchange (EDI) (Mukhopadhyay, Kekre, & Kalathur, 1995) and decision support systems (DSSs) (Devaraj & Kohli, 2003). Their findings also complied with the notion that ‘without broad and deep use of e-business along the value chain, it would be impossible for e-business to generate any impact on firm performance in terms of sales, procurement, or internal operations’ (Zhu & Kraemer, 2005, p. 70). Although not statistically examined, the above-mentioned notion and interpretation of study results—significant positive effects of ICT usage, front-end functionalities and ICT integration into back-office databases on firm performance—imply the mediating roles of ICT integration on firm performance.

Kim, Cavusgil., and Calantone (2006) revealed a mediation role of inter-firm systems integration to explain supply chain communication systems (SCCS) innovation on firm supply chain performance. This current study focuses on studying the effects of ICT innovation on firm performance; thus, it is logically anticipated that ICT integration may have a mediation role to explain the effects of ICT usage on organisational performance.

The degree of utilisation, that is, whether ICT is used properly and effectively is another aspect of ICT use which may also correlate with firm performance. Despite its practical importance for developing countries, this aspect of usage, that is, the appropriate usage of ICT has been greatly under-studied. Anandarajan et al. (2002) stated that many information systems in less developed countries are under-utilised and, thus, do not make a significant contribution to improving the performance of the organisations that have implemented them (Forster & Conford, 1992; Ordedra et al., 1993). A conceptual linkage between ICT usage, degree of utilisation and

organisational performance may be forecast from those statements which imply a mediating role for the degree of utilisation. There is a paucity of research studies that have looked at the interrelationship of ICT usage, integration, degree of utilisation and organisational performance. This study has anticipated that ICT usage would impact on organisational performance with this impact mediated through integration and the degree of utilisation.

2.7 PRELIMINARY RESEARCH MODEL

Based on the above literature review, a preliminary research model (Figure 2.1) has been constructed to attain the research objectives. The model posits that the diffusion process of ICT starts with SMEs' intention to adopt the technology. The behavioural intention is largely influenced by the characteristics of the owner as Rogers (1983) stated that adoption of an innovation is a decision process in which an innovation passes through different states of adoption and is finally implemented or has its use confirmed. He further stated that the adoption starts from the knowledge stage where the adopter is first exposed to an innovation and passes through the persuasion, decision and confirmation stages. A variety of variables play different roles in various stages of an innovation adoption. Rogers (1983) affirmed that the personal characteristics of an adopter—such as demographics, income, risk-taking behaviour, innovativeness—largely influence the knowledge stage which is very important for early adopters.

'Cognitive evaluation' towards an innovation is an important factor which influences behavioural intention. The theory of reasoned action (TRA) (Fishbein & Ajzen, 1975) and the theory of planned behaviour (TPB) (Ajzen, 1985) explain the influence of cognitive evaluation on behavioural intention.

Environmental pressures that have arisen from the institutional environment are believed to have a positive influence on behavioural intention. The TRA (Fishbein & Ajzen, 1975) and TPB (Ajzen, 1985) explain these influences as subjective norms with this also supported by a number of ensuing theoretical frameworks (such as UTAUT, Venkatesh et al., 2003). These theories focus on the individual adoption process thus the influence of family, friends and peer groups become significant. The

organisational adoption behaviour is also influenced by similar variables which arise from the influence of close associates of the firms, partners and peer organisational groups. These phenomena have been addressed as environmental pressures (DiMaggio & Powell 1983; Kuan & Chau 2001; Teo et al., 2003) and have a significant effect on organisational adoption intention (Teo et al., 2003).

Venkatesh et al. (2008) explained behavioural intention as an important variable in the innovation diffusion process. They distinguished between intention and expectation stating that intention is a reflection of the adopter's internal schema of beliefs; thus, it cannot predict the situation which is not under the adopter's full volitional control. Furthermore, intention may also fail to adequately explain the situation where a time gap exists between intention and actual behaviour. Behavioural expectation is anticipated as a stronger predictor of actual behaviour (in comparison to intention) which may incorporate the influences of external variables arising from the socio-cultural environment. Venkatesh et al. (2008) also posited that behavioural expectation is highly influenced by behavioural intention, culture, country readiness and facilitating factors (or conditions).

As illustrated in Figure 2.1, the preliminary model shows that behavioural expectation plays a significant role in predicting ICT use. The model incorporates two aspects of ICT usage behaviour. The depth of ICT usage, that is, the frequency or intensity of use is indicated as ICT usage while the breadth of ICT use involves strategic uses of ICT. The breadth of ICT use is further categorised into two strategic variables, namely, integration which indicates the extent to which ICT is integrated into various functional areas, and utilisation which indicates how appropriately ICT is used in the organisation. Organisational performance is explained by the impact of ICT usage, integration and the degree of utilisation. The primary model also anticipates a mediating role for integration and utilisation to explain the impact of ICT usage on organisational performance.

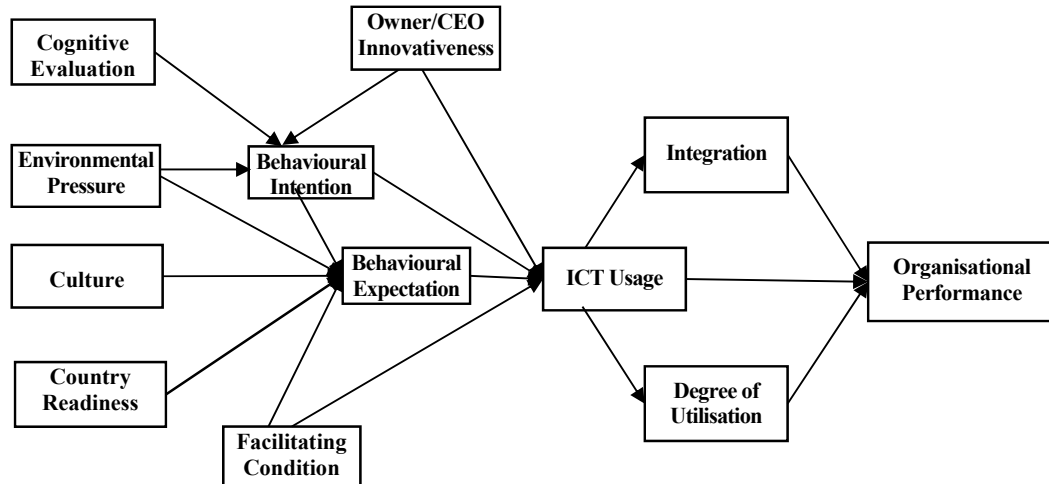


Figure 2.1: Primary research model based on literature review

2.8 SUMMARY

This chapter has presented the literature review which addressed various aspects of the research. The conceptual grounding of the study has been postulated through reviews of relevant theories such as the DOI theory, TRA, TPB, TAM, UTAUT, institutional theory and the resource-based view (RBV). Relying on the structure developed by analysing existing theoretical frameworks, this chapter also reviewed relevant contemporary empirical studies. Finally, a preliminary research model was constructed (which was later fine-tuned and contextualised by a field study) to attain the research objectives.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter presents the research design, research methods, and analytical tools and techniques employed to attain the objectives of the study. The study employed a mixed-method research approach which involved an exploratory qualitative field study followed by a comprehensive quantitative survey. The following sections discuss the entire research methodology employed in the study which includes the research paradigm, the qualitative field study design—process of transcription and qualitative interview analysis—and quantitative research design—survey instrument design, data collection, data screening, data validation and data analysis.

3.2 RESEARCH PARADIGM

A paradigm is a set of assumptions or beliefs that provides a conceptual framework which, in turn, guides us in looking at and interpreting the world around us (Suppe, 1977, cited in Deshpande, 1983). Guba and Lincoln (1994) considered a paradigm to be a set of basic beliefs (or metaphysics) that deals with first principles through which the nature of the world, the individual's place in it, and the range of possible relationships to the world and its component parts are defined. In reality, a paradigm comprises the principles or philosophies which guide a person, a professional or a researcher in selecting challenging issues, developing models and theories, establishing criteria for methodology, instrument design and data collection, and also providing principles, procedures and methods appropriate for looking at similar phenomena (Filstead, 1979, cited in Deshpande, 1983). Based on the epistemological, ontological, procedural and methodological concerns, several paradigms or dichotomies have shaped research approaches in the fields of behavioural studies, business, IS and social sciences, such as positivism versus interpretivism, quantitative versus qualitative, induction versus deduction, and exploratory versus confirmatory (Fitzgerald & Howcroft, 1998).

In general, two broad scientific paradigms, namely, the positivist and interpretivist research paradigms have guided most research in business, behavioural studies,

social sciences and IS (Hudson & Ozanne, 1988; Marsden & Littler, 1996). However, Myers and Klein (2011) emphasise critical research as an emerging stream in information systems research and support Orlikowski and Baroudi's (1991) classification of research paradigm. Orlikowski and Baroudi (1991) suggest three research paradigms: positivist, interpretive, and critical¹³. The recent IS literature is broadly guided by these philosophies.

The positivist research paradigm attempts to apply the methods and principles of the natural science model to explain behaviour or phenomena through causal relationships while the interpretivist approach attempts to interpret the inter-subjective meanings where a phenomenon is explained through multiple explanations or realities rather than by one causal relationship or one theory (Denzin & Lincoln, 1994; Neuman, 2006; Creswell, 2003). In critical research, a critical stance is taken toward taken-for-granted assumptions about organisations and information systems, and where the aim is to critique to status quo "through the exposure of what are believed to be deep-seated, structural contradictions within social systems" (Myers & Klein, 2011, p.19).

Although a mixed-method approach was undertaken, especially during the field study based on which the initial research model was examined and fine-tuned, this study is primarily guided by the positivist research paradigm by administering extensive use of quantitative methods to objectively measure the variables and determine the causal relationships among the constructs under study.

3.3 RESEARCH METHOD

The positivist and interpretivist paradigms have been supported by numerous researchers in their separate explorations of reality. As the positivist paradigm depends on the methods and principles of natural science, it has no flexibility when it comes to interpreting phenomena from multiple realities which is, in fact, what the interpretivist research paradigm employs. In reality, the interpretation or analyses of

¹³ Orlikowski and Baroudi's (1991) classification of research paradigm is not too dissimilar from Guba and Lincoln's (1994) suggestion: positivist, post-positivist, constructivist, and critical paradigm. Critical analysis is an emerging stream of research in information systems which usually focuses upon the opposites, conflicts, and contradictions (Myers 1997). However, positivist research paradigm is still a dominant paradigm which guides 75% researches in information systems while 17% and 5% researches apply interpretive and critical research respectively (Mingers, 2003).

various situations, events and phenomena in business, social sciences or behavioural sciences are not always straightforward when it comes to employing the principles of natural science in a single reality. On the other hand, the interpretivist paradigm has the flexibility to look at the event from multiple realities and can find the source of the problem while it does have a limitation regarding the generalisability of the results. Although both paradigms have their strengths and are successfully utilised in multidisciplinary fields of study, such as marketing, IS, organisational theory, social sciences and behavioural science, etc., in fact, each method, either qualitative or quantitative, has its own limitations (Greene, Caracelli, & Graham, 1989). A single-method study could lead to inaccurate and inadequate results.

Thus, a combination of the two paradigms, the mixed-method approach, has been proposed as a third paradigm view based on pragmatism (Tashakkori & Teddlie, 1998). A combination of qualitative and quantitative approaches within different phases of the research process is employed under this research paradigm. The mixed-method research approach is developed based on the notion that the combination of qualitative and quantitative methods would compensate for their mutual and overlapping weaknesses (Greene et al., 1989) as well as providing cohesive and coherent outcomes (Hohental, 2006).

Although purely qualitative researchers are not receptive to the idea of implementing a combination of two research-guiding philosophies in an integrated platform, a growing body of researchers are employing the mixed-method research approach in the field of IS and marketing.

In order to receive more insights from a mixed-method research approach, different types of research design are employed that may be classified as the triangulation design, the embedded design, the explanatory design and the exploratory design (Creswell, 2003). The triangulation design refers to the collection and comparison of the data from both qualitative and quantitative methods with the view to validate or expand the quantitative estimates using the qualitative data. The embedded design suggests the collection of both qualitative and quantitative data while either of the data types plays a supplementary role within the overall design. The explanatory design leads to the collection and analysis of quantitative data followed by the subsequent collection and analysis of qualitative data. Unlike the explanatory design,

the exploratory design starts with qualitative data to explore a phenomenon and then estimates quantitative data.

In determining the appropriate mixed method for the current research, it was essential to again reflect upon the objectives. As discussed in Chapter 1 (see section 1.3) , the main aim of this research was to explore the internal and external factors that affect SMEs' intention and actual usage of ICT and its resultant outcome in terms of organisational performance. The study, in its design, required the synthesis of various theories of innovation diffusion and the creation of a link with the theories and conceptual frameworks from different fields, such as, resource-based theory, institutional theory and cultural study (Hofstede, 1984; House et al., 2004).

Based on previous theoretical frameworks and empirical studies, the initial model (see Figure 2.1 in Chapter 2) was proposed. The model needed to be tested in terms of its applicability and validity to provide sufficient comprehensiveness to explain such behaviour. Thus, a field study through semi-structured interviews was employed. Finally, a survey was carried out to test the comprehensive model to ensure its generalisability and improve its explanatory power (the details of the process are in the next section). Based on the description of the process and the research objectives, a triangulation design was employed. This design allowed the data from both qualitative and quantitative methods to be compared and merged during the analysis to increase the reliability and validity of the research. Furthermore, triangulation has been acknowledged as the most common mixed-method approach (Creswell, 2003).

3.4 RESEARCH PROCESS

This study investigated the factors that affect SMEs' intention to use and their actual usage of ICT and also examined how the different levels of ICT application can influence organisational performance. This study employed a mixed-method research approach which involved qualitative and quantitative methodologies. Moreover, the study executed different tasks in different phases to conclude the research: these are discussed in the following sections.

Step 1: Literature Review

The first phase of the study employed an extensive review of the literature related to the theories of innovation diffusion such as the TRA, TPB, DOI theory and the TAM. Since the study was related to SMEs, the theories related to organisational technology diffusion were also reviewed. Thus, the technology, organisation and environment (TOE) framework and institutional theory have been reviewed. The resource-based view (RBV) was reviewed within the proposed framework when looking at the contribution of organisational ICT usage to organisational performance. The study also examined the effects of culture and environmental pressures on the diffusion of ICT by SMEs in Bangladesh. Thus, contemporary cultural studies—such as Hofstede (1984) and House et al. (2004) (GLOBE study)—were reviewed. Most recent related studies, namely, Venkatesh et al. (2003, 2008) have been duly inspected to develop a conceptual framework for the study. The cross-evaluation of relevant theories has resulted in the discovery of some strong points in each theory which could contribute to conceptualising the key constructs of behavioural intention, actual usage of ICT and organisational performance. In addition to the theories and conceptual studies, a good number of contemporary empirical studies were also reviewed to augment the theoretical model in terms of its scope and meaning and to establish the interrelationship between the constructs.

Step 2: Preliminary Research Model

The systematic and rigorous literature review, both of the theories and empirical studies, resulted in the development of a comprehensive model for examining the effects of different variables and their interrelationships. A theoretically grounded, comprehensive initial research model was developed which gathered together the potential constructs within the domain of the study (see Figure 2.1 in Chapter 2).

Step 3: Qualitative Field Study

The initial model developed through the literature review could be suitable for adequately explaining ICT diffusion by SMEs in Bangladesh, measuring organisational performance and exploring the appropriate antecedents of performance. The model was then evaluated for its consistency and suitability within the context and for its adequacy in explaining issues according to the study's

objectives. Next, a field study was conducted by interviewing 11 owners or decision-makers of SMEs who were selected through a convenience sampling technique.

The objectives of the interview were to: (1) seek out and identify concepts and procedures that might not be reported or recognised in the literature review, and (2) evaluate the worthiness of the concepts identified in the literature review. Each of the interviews was recorded and later transcribed by the researcher with the view of transforming it into text. Each of the transcripts was analysed by NVivo 10.

Step 4: Model Refinement

The preliminary model was refined based on the exhaustive related literature review as well as the findings from the field study. Where necessary, the model was augmented with new items and/or constructs, or simplified at that stage through elimination of duplicate constructs and items. The primary model was refined, fine-tuned and finalised through this process.

Step 5: Hypotheses Construction

Basing on the refined model, a number of hypotheses were constructed at this stage with these hypotheses also supported by prior theories and relevant research. The resource-based theory (RBT) and institutional theory were used together with innovation diffusion theories to guide the development of the hypotheses.

Step 6: Questionnaire Design

Based on the hypotheses developed in the previous stage, a tentative questionnaire was designed. Each of the questions was used as a source of data and was adapted from previous relevant research with slight modifications to adjust to the context and to ensure clarity in expression for the interviewees. Some new measurements were also developed through the qualitative field study with these later supported by relevant literature. A total of 84 items and 16 constructs were included in the questionnaire to investigate the research problems. The questionnaire was validated through pre-testing and a pilot survey before conducting the countrywide main survey in Bangladesh.

Step 7: Pre-testing of the Questionnaire

As mentioned in the previous stage, the questionnaire was pre-tested to ensure that it was ready for wide circulation for the final data collection. ICT experts, owners of SMEs or their representatives, and some academics were invited to pre-test the questionnaire. The objective of pre-testing was to contextualise the instruments and also to ensure reliability of the questions. During the questionnaire pre-testing phase, different professionals and experts scrutinised the questionnaire from different perspectives and provided their feedback which enhanced the content validity of the questionnaire.

Step 8: Questionnaire Refinement

The questionnaire was modified in accordance with feedback received from the expert respondents during pre-testing. The tentative instruments were refined through a careful revision of the questionnaire. The changes, adjustments and modifications adopted during this stage resulted in the final questionnaire for the study.

Step 9: Data Collection

The main data collection process entailed distributing the final structured questionnaires to the owners or decision-makers of different SMEs in Bangladesh seeking their responses. In Bangladesh, SMEs are divided into two classes, namely, the manufacturing industry and the services industry. In considering the nature of businesses and their potential to contribute to the national economy, the manufacturing industry in Bangladesh and, particularly, the ready-made garment (RMG) industry was considered as the subject of this study due to its high potential in terms of its contribution to the GDP, employment generation and export earnings. A total of 300 SMEs were targeted for data collection: they were selected through a stratified random sampling from a list of companies developed by using the databases of Bangladesh Garment Manufacturers and Exporters Association (BGMEA), Bangladesh Leather and Footwear Manufacturers and Exporters Association (LLMEB), databases of the Bangladesh Export Promotion Bureau, SMEs Foundation of Bangladesh and the Yellow Pages. From a comprehensive list of SMEs, a sample was selected using the principle of stratified random sampling. The target subjects were either the owner of the firm or their representative.

A total of 282 responses were gathered proportionately from the RMG (225) and leather industries (57) which was considered adequate for partial least squares (PLS)-based data analysis. Section 3.6.5 describes this step in detail.

Step 10: Data Analysis

A PLS-based structural equation modelling (SEM) (Chin, 2010; Barclay, Higgins, & Thompson, 1995) technique was employed to analyse the data collected through the comprehensive survey. A two-step procedure, involving assessment of the measurement model by examining its psychometric properties and estimation of the structural model, was followed for the quantitative data analysis.

Step 11: Result Interpretation and Report Writing

After successful completion of the entire data analysis (both qualitative and quantitative), the results were discussed and interpreted in accordance with the previously developed research questions and objectives. The write-up of the thesis, however, was a continuous process which, in fact, began during the literature search: the final write-up started with the reporting of the results and their interpretations. The outcomes of different phases of the research presented in various chapters were articulated and integrated during this stage. The process ended with a complete thesis which includes the research questions, study objectives, literature review, research methodology, qualitative field study analysis and final model specification, hypotheses development, data analysis, results interpretation, conclusion and references.

3.5 QUALITATIVE FIELD STUDY METHOD

This study has adopted a mixed-method research approach to attain its objectives. In accordance with the exploratory research design, this study has employed a qualitative field study followed by a quantitative survey. The study was dedicated to looking at the diffusion of ICT by SMEs in Bangladesh and the resultant outcome in terms of the organisational performance achieved through integration and proper utilisation of ICT. The study undertook an extensive literature review to develop the conceptual framework and primary model. Most of the literature reviewed for this study focused on developed countries' perspectives, and mainly the American

perspective. As this was an initiative to look at the phenomena from a developing country perspective and, more clearly, from the Bangladesh perspective, the research instruments and the constructs may not have been well suited to this perspective. Thus, a qualitative field study was appropriate in order to contextualise the model and any modification or extension. To validate and enhance the factors and variables identified through the comprehensive literature review, the study, during this phase, explored the phenomenon of ICT usage by SMEs in Bangladesh and its effects on organisational performance by interviews with the owners of SMEs and other stakeholders. Researchers have argued that the goal of understanding a phenomenon from the point of view of participants and its particular social and institutional context was difficult to achieve when textual data were quantified (Kaplan & Maxwell, 1994). Therefore, it was believed that a 'pseudo case study' that involved a qualitative study of a small number of participants would meet the objectives of this phase of the study.

As such, a field study approach (Patton, 1999; Zikmund, 2000) was adopted as the research method for the qualitative phase. Qualitative methods permit the evaluator to study selected issues in depth and detail. Approaching fieldwork without being constrained by predetermined knowledge contributes to the depth, openness and detail of qualitative inquiry (Patton, 1999). The field study enabled the researcher to be involved in investigating the factors influencing diffusion of ICT and its effects on organisational performance in the participating SMEs.

3.5.1 SAMPLE SELECTION

The study adopted the convenience sampling technique and selected 11 SMEs for qualitative interviews. This qualitative study began with the notion of an open-ended number of cases and stopped interviewing after the 11th case after taking into consideration informational redundancy and theoretical saturation (Denzin & Lincoln, 2003; Lincoln & Guba, 1985; Strauss & Corbin, 1998). The sample comprised 11 owners of different SMEs or their representatives who were selected by adopting a convenience sampling method. This is one of the most commonly used sampling methods in business research (Zikmund, 2000) as it relies on available subjects who are close at hand or easily accessible (Berg, 2004). The convenience or judgment sampling procedure is also effective for qualitative studies: appropriate and

resourceful people who can easily be identified and included in the sample may provide a valuable contribution to the research.

As diffusion of ICT among SMEs and organisational performance were the focus, the study considered organisations that were using any kind of ICT in various functional areas such as in shop floor management, account management, inventory control, etc. for qualitative interviews. The convenience sampling technique also allowed the researcher to include SMEs who were functioning at different user levels such as basic computing, e-commerce users and users of enterprise resource systems.

A wide range of SMEs operate in different sectors in Bangladesh. These sectors are broadly classified as the services industry and the manufacturing industry. SMEs play a substantial role in the economic development of a country. Despite the fact that the contribution of SMEs in economic development is similar, the definitions of SMEs are diverse in different country contexts. The Industrial Policy 2010 of the People's Republic of Bangladesh defines an SME as:

- A manufacturing firm having 100–250 employees or having fixed assets from 10 Crore BDT to 30 Crore BDT (excluding the value of land and factory) is considered a medium enterprise while any firm having 25–99 employees or having fixed assets from 55 Lakh BDT to 10 Crore BDT (excluding the value of land and factory) is considered a small enterprise.
- Also, a firm in the services industry having 50–100 employees or having fixed assets from 1 Crore BDT to 15 Crore BDT (excluding the value of land and factory) is considered a medium enterprise while a firm having 10–49 employees or having fixed assets from 5 Lakh BDT to 1 Crore BDT (excluding the value of land and factory) is considered a small enterprise.

Feasible organisations for the qualitative research were selected from the Yellow Pages directory. Personal connections and the nature of the organisation as well as the owner's availability and interest in participating in the interview were the criteria for sample selection.

3.5.2 DATA COLLECTION

The data collection and analysis method used in qualitative studies is different from that used in quantitative techniques (Lincoln & Guba, 1985). Interviews have been accepted as one of the major data collection techniques for qualitative studies (Maykut & Moorehouse, 1994) and are therefore employed as a method of qualitative data collection in various fields of study. The main three different categories of interviews employed in data collection are: standardised (formal or structured); unstandardised (informal or non-directive); and semi-standardised (guided semi-structured or focused) interviews (Babbie, 2001; Merriam, 2001; Nieswiadomy, 2011). The overall objective of the study, the nature of the problem and the research perspective help in selecting the type of interview appropriate for the study. It was mentioned earlier that the purpose of this study was to explore and examine the antecedents of ICT adoption and usage by SMEs and their effects on organisational performance. Utilising the outcomes of previous research and theories, this study developed a primary model in order to inquire about the phenomena. Although much research has been conducted in this field in the past few years, these studies have mainly focused on developed country perspectives and, particularly, on the American perspective (Watson, Kelly, Galliers, & Brancheau, 1997; Zhu et al., 2004). The theories or the empirical evidence, although relevant, should be contextualised before their execution in addressing the phenomena from a developing country perspective.

This study, thus, has adopted a semi-structured interview for collecting relevant qualitative data to explore various variables and factors in order to refine the model to address SMEs' ICT diffusion and organisational performance from the Bangladesh perspective. By design, the semi-structured interview ensures that the list of themes, issues to be addressed and questions to be asked are identified and pre-defined by the researcher. Even though its nature is to have a significant understanding about the context and nature of the variables associated with the study and their interrelationships, the semi-structured interview ensures that information is captured from respondents' perspectives rather than being imposed by the researcher (Burns & Bush, 2000).

The semi-structured questions and probing guide were developed through the comprehensive literature review. The primary guiding semi-structured questions were also pre-tested by interviewing some SME owners so that any adjustments or modifications could be made thus ensuring that the guide was useful for the interviews and also confirming the data from respondents' perspectives. The semi-structured interview questions focused on the following areas of information that were needed from the field study:

- General perceptions, beliefs towards ICT and intended ICT use
- The main factors that influenced SMEs' intentions to use ICT
- The usage of different applications of ICT
- Conceptualisation of the national culture and its role in the diffusion of ICT by SMEs
- Conceptualisation and the role of environmental pressures in shaping SMEs' intentions to use ICT
- Conceptualisation and the role of country readiness in intention to use and usage of ICT by SMEs
- Conceptualisation and the factors associated with organisational performance
- The role of ICT use in organisational performance.

Before the interviews, the selected interviewees were personally contacted and an appointment was made for the interview. An outline of the interview along with a cover letter specifying several important perspectives of the research—such as the objective, scope and perspective of the study, process of the interview and the role of the interviewee, etc.—were also sent beforehand so interviewees would be comfortable with the formalities and able to express their opinions freely. The interviews were recorded in their entirety by a micro-audio recorder with permission duly given by interviewees. Applying the rules of transcription, the recorded interviews were transformed into text immediately after the interview, generally, on the following day.

3.5.3 ANALYSES OF QUALITATIVE DATA

This study employed the content analysis technique to analyse the qualitative data (Siltaoja, 2006). Qualitative data analysis involves both inductive and deductive approaches to compare the qualitative data with the theoretical framework and also to develop a causal relationship between the constructs under study (Berg, 2001).

The themes, sub-themes and concepts explaining the variables and factors were explored by the inductive process. This process also explored the measurement scales of some variables or factors. The variables and factors explored by the induction process were further induced into a common framework. The ultimate objective of the field study was to prepare a comprehensive conceptual framework by comparing the induced framework with the initial research model developed from the literature review. This framework was therefore compared with the initial research framework.

In this study, NVivo (Version) 10 software was used to analyse the qualitative interviews. NVivo (registered under QSR International) is designed to facilitate common qualitative techniques for organising, analysing and sharing data. It can analyse unstructured or semi-structured data like interviews, surveys, field notes, web pages and journal articles from a range of sectors which includes social sciences, education, health care and business. The development of NVivo has provided greater convenience through using the program and has also enhanced the capacity of the researcher to undertake interpretive analysis (Bazeley, 2007)

With the intention being to analyse the qualitative data by NVivo, the recorded interviews were transformed into interview transcripts. The NVivo 10 software first imported all interview transcripts and provided the opportunity for analysis by nodes, modelling and query support.

Through these analyses, the qualitative study's findings assisted in developing a comprehensive model with this then used as a basis for the construction of hypotheses. The outcome of the field interviews and the extensive literature review provided the rationale for the construction of hypotheses. The qualitative study finally refined the study model and developed hypotheses that formed the basis for the quantitative study, the main concern of this research.

3.6 QUANTITATIVE STUDY METHOD

Although the theoretical framework of the study was developed through an extensive literature review which was contextualised and fine-tuned through an in-depth field study, the design and execution of quantitative research was a vital part of this study as the study stood under the positivist research paradigm. The quantitative survey explored the degree and magnitude of hypothesised relationships between the variables and constructs under study. Based on the theoretical framework discussed in the preceding section, a number of hypotheses were developed for possible rejection or acceptance which would help to infer the situation and policy implications (Anderson, 1983). As the study was seeking to empirically test some assumptions or hypotheses and the methods used in this phase were designed to be detached and independent of the specific situation under study, a quantitative method was considered most appropriate. The size and geographical dispersion of the sample units also provided the rationale for adopting a survey method and, in particular, a questionnaire-based survey.

3.6.1 DEVELOPING THE QUESTIONNAIRE

A questionnaire was the instrument used for data collection. Often, a questionnaire is called an interview form or schedule. Malhotra (2004) described a questionnaire as a formalised set of questions for obtaining information from respondents. A questionnaire is a very important research instrument for the researcher engaged in research based on quantitative primary data. A researcher must prepare a questionnaire to collect primary data. The notion of translating the information needed into a question format is the principle behind the development of a questionnaire. Researchers should pay heed to carefully developing the questionnaire so that it is effective for collecting the needed information. The style, language and symbols used in the questions should match prospective respondents' status, culture and ability to make them (respondents) comfortable and motivated to respond. A well-developed questionnaire encourages respondents to provide accurate information which not only ensures accurate information but also minimises response errors.

The questionnaire was designed to collect SMEs' owners' or decision-makers' perceptions or evaluations of SMEs' intention to use or usage of ICT and how they

were influenced by different factors and variables. The questionnaire also endeavoured to collect respondents' subjective assessments or evaluations about SMEs' performance and how performance was influenced by ICT utilisation and integration. The study adopted subjective or indirect measurements rather than direct or objective measures. As with many research debates, researchers have differences of opinion between applying subjective or objective measures. Some researchers believe that the responses to subjective measures are likely to be influenced by selection bias. In addition, it is also true that, in many cases, collection of quantitative data by observed measures is very hard and sometimes erroneous. For instance, small firms in developing countries are not formalised and they do not keep their business records formally. Sometimes, they hide some information due to reductions in tax and worry with regard to their competitors. In this situation, data from using objective measures would not be suitable or effective. Thus, although there was the possibility of selection bias, the use of subjective measures in this research was appropriate. The literature supported the general reliability of self-reported and subjective measures (Dess & Robinson, 1984). Nevertheless, care was taken to select measurement items that previous research had shown to be valid and reliable.

In general, the scaling technique is widely used to assess the variation in data collected by subjective measures. The scaling technique yields the highest level of information feasible in a given situation which permits the use of a great variety of statistical analyses. This study mainly used the Likert rating scale with the help of the semantic differential scale. The Likert rating scale has been widely used in psychology, sociology and business research as it is easy to construct and administer. A Likert scale provides the respondents with a complete picture of a phenomenon so they can easily indicate the degree of their agreement or disagreement with a variety of statements related to the phenomenon (Aaker, Kumar & Day, 2004).

Respondents readily understand how to use the scale, making it suitable for mail or telephone surveys or personal interviews. The main disadvantage of the Likert scale is that it takes longer to complete than other itemised rating scales because respondents have to read each statement. The points on the rating scale could vary between two to any higher number, but most researchers prefer rating scales of

between five and nine points (Cox, 1980; Reynolds & Neter, 1982). Although the literature shows that the correlation coefficient decreases with a reduction in the number of scale categories, affecting all statistical analyses based on the correlation coefficient (Givon & Shaphira, 1984), the convenience and ease of execution of the questionnaire and its ability to encourage respondents to accurately assess their feelings during the survey should be considered equally. By including rating scales with too many points such as a 9-point rating scale, respondents may be confused in assessing their feelings between so many points. It may also create a situation in which the respondent evaluates his/her position deeply again and again when indicating his/her feelings. This may lead to a longer response time while, at the same time, spontaneous perceptions or responses may not be provided which would in the end cause a biased response. Thus, the rating scale should include a fair number of points that, on one hand, can produce scope for variations in perception while, on the other hand, being easily perceivable and executable by the respondent. In showing the researcher's understanding of this situation, this study has adopted a 5-point rating scale.

3.6.2 QUESTIONNAIRE TRANSLATION

The study has endeavoured to investigate the diffusion of ICT and the effect of its usage on SMEs' performance by collecting primary data mainly from the owners of SMEs in Bangladesh. The native language of the study area is Bengali and a significant number of SME owners, particularly the owners of small industries in Bangladesh, are Bengali-dependent. Questionnaires in English were not suitable for data collection in this study context. The English version of the approved questionnaire was thus translated into Bengali before conducting the survey to achieve greater convenience and ease of operation. As the respondents easily understood the Bengali version of the questionnaire and could easily respond with the most appropriate answer, the questionnaire became very useful for data collection. Although the Bengali version of the questionnaire was easy to use and very useful for data collection, the translation of the questionnaire and creating equivalence between the Bengali version and the English version was not an easy task.

Four different procedures—namely, one-way translation (direct translation), back-translation (double translation), translation by committee and decentering—are used for translation of instruments. Among the above four alternatives, direct translation is the most frequently used translation procedure where a bilingual translator translates the questionnaire directly from a base language to the respondent's language. This procedure is considered as less expensive and less time-consuming than other translation procedures. It is important that the translator is fluent in both the languages and familiar with both the cultures otherwise direct translation of certain words and phrases may not project similar meanings and sentiments which may cause erroneous responses. However, back-translation is a two-way translation procedure which can overcome the errors of one-way (direct) translation procedure.

In back-translation, a researcher prepares material in one language and asks a bilingual translator to translate it into another (target) language. A second bilingual translator independently translates the material back into the original language. The researcher then has two original language forms to examine and even if he/she does not know the target language can make a sound judgment about the quality of the translation. However, several repeat translations and back-translations may be necessary to develop equivalent questionnaires, and this process can be expensive and time-consuming.

In the committee approach, a group of bilingual translators translate from the base language to the target language. The mistakes of one member can be caught by others on the committee. The weakness of this method is that committee members may not criticise one another and may even unify against the researcher. Werner and Campbell (1970) proposed decentering as a way to develop instruments that would be culturally appropriate when cross-cultural research is conducted. In the decentering process, the original language instrument is not considered final until the entire translation process is completed. Therefore, if a translator believes that a grammatical structure or word or tense must be changed to appropriately fit the cultural group under study, the original instrument should also be changed to reflect these linguistic and cultural characteristics. There is a constant comparison of the two instruments, and modifications are made to the first to account for limitations of the target language. Although the instrument may be more accurate culturally and

linguistically, this may also be more costly in terms of time and resources, and the length of the instrument may be increased.

The literature describes back-translation as one of the most adequate translation procedures (Marin & Marin, 1991). The researcher has therefore adopted the back-translation approach for translating the questionnaire and ensuring equivalence of the two versions. To explain in more detail, the researcher first translated the original English questionnaire, which had been approved by the university's Human Research Ethics Committee, into Bengali. The first version of the Bengali questionnaire was thoroughly checked by a university academic in Australia. The refined version of the translated questionnaire was further reviewed by two university academics from Bangladesh who were involved in research in Australia. The final version of the Bengali questionnaire was again translated back into English. A third person, a researcher from Bangladesh, performed the back-translation of the questionnaire into English. The back-translated version of the questionnaire provided the opportunity to check whether the translated version of the items was projecting a similar meaning and approach as in the original version. Interestingly, although some words were found to be different, all items in both versions of the questionnaire were observed as being similar in meaning which finally ensured equivalence of the two versions of the questionnaire.

3.6.3 PRE-TESTING OF THE QUESTIONNAIRE AND PILOT TEST

The initial questionnaire was refined through pre-testing prior to administering the actual survey. Five people in Australia who had direct experience in running an SME in Bangladesh were invited to pre-test the questionnaire. The objectives of pre-testing were to contextualise the instrument and to ensure reliability of the questions. During the questionnaire pre-testing phase, different respondents scrutinised the questionnaire from different perspectives and gave their feedback which finally enhanced the content validity of the questionnaire. In addition to respondents' feedback on the content of the questionnaire, the overall length of time taken and difficulties that arose during completion of the questionnaire were also inspected. A follow-up interview was conducted with each participant to identify any weaknesses in the instrument. Basing on the experience of the pre-testing and respondents'

feedback on several points, the questionnaire was finalised after initiating the necessary corrections and modifications.

A pilot test was also undertaken administering a mini sample survey using the final version of the questionnaire. A total of 35 SMEs were selected through a convenience sampling technique and surveyed. The questionnaire was further refined through the pilot test. During the pilot test, numerous errors in the questionnaire were detected and a number of suggestions were received from respondents. As the questions had been generated to assess respondents' perceptions or evaluation of different statements by rating them on a Likert scale and, in some cases, on a semantic differential scale, respondents perceived that many of the questions were very close to each other in their meaning. In addition, many respondents faced trouble in differentiating their exact evaluation using the given five points. More specifically, respondents faced difficulties judging the intensity between '4' and '5' as well as between '1' and '2' on the 5-point rating scale. In addition to respondents' comments, these errors were also detected in the analysis of the data from the pilot study. As the respondents could not differentiate between their feelings in their evaluations, they mostly chose the extreme value. Thus the factor loading of the different items of some constructs tended to reach value '1'. To overcome this error, a statement about each point of the scale was given in the questionnaire which helped respondents to select the right point. The questionnaire was again revised to incorporate respondents' suggestions (which the researcher felt were logical) to ensure a valid and reliable questionnaire. The final version of the questionnaire was used to collect data from a national survey.

3.6.4 SAMPLE SELECTION

Sample selection is one of the major tasks in a research project and, particularly, in survey research. Although this study was designed to draw the conceptual framework through the literature survey and to contextualise and fine-tune the framework through the findings from a qualitative field study, the main outcome was produced by analysing quantitative data (collected through a sample survey) to reject the null hypotheses and draw some policy implications. The results drawn from a survey are said to be representative if the sample contains characteristics that are similar to the population. The literature has suggested that the application of

probability principles in sample selection may help to produce a representative subset of the population. The results of data collected from a representative subset of the population strengthen the confidence in anticipating any situation. Researchers select probability sampling by applying different strategies which include simple random sampling, proportionate stratified random sampling, disproportionate stratified random sampling and cluster sampling. Stratified sampling involves the extraction of proportionate representation of multiple groups of firms considered in the research (Reynolds, Simintiras, & Diamantopoulos, 2003) where units within a group are similar and between groups that bear dissimilar characteristics. Each stratum includes the same characteristic of interest that facilitated the systematic random sampling procedure (Churchill, 1991; Malhotra, 2002). Contrary to random sampling, numerous researchers have adopted the convenience or judgment sampling technique. However, this study has adopted the disproportionate stratified random sampling technique for sample selection.

In addition to the sampling procedure, the size of the sample is also another important factor to ensure the representativeness of the sample as well as its suitability for executing the appropriate statistical tools. For example, in a qualitative field study, 4–8 cases are sufficient for analysis. However, the application of basic statistical tools in quantitative data analysis requires normal distribution. The rule of thumb suggests that more than 30 cases can justify the normality of data and may be used in any basic statistical analysis. However, requirements of sample size may vary in different types of statistical analysis and a variety of opinions was also observed in the literature even when applying the same tools (Tabachnick & Fidell, 1996; Hair, Anderson, Tatham, & Black, 1998). For example, the standard and sophisticated statistical analysis including structural equation modelling (SEM) recommends sampling of 200 as fair and 300 as good (Tabachnick & Fidell, 1996). Similar to that, Hair et al. (1998) recommended a sample size of 200 to test a model using SEM, because 200 is a ‘critical sample size’ (Hoelter, 1983) that can be used in any common estimation procedure for valid results.

Aaker et al. (2004) suggested an alternative approach which recommends using a comparable and similar extant study’s sample size with a satisfactory level of reliability as a guide. A number of closely related innovation diffusion studies

(Venkatesh et al., 2008; Twati & Gummack, 2006; Bayo-Moriones & Lera-López, 2007) used a sample size ranging from 200–300. Based on the above-mentioned examples and notions from previous studies, this study has adopted a sample size close to 300 as structural equation modelling (SEM) was the main tool being used for data analysis.

The SMEs in Bangladesh formed the population for this study while the owner of the firm or their designated representative engaged in the firm's decision making were the study's subjects. There are approximately seven million micro-industries and small and medium-sized enterprises in Bangladesh. Micro-industries were outside the scope of the study's objectives and therefore were excluded. According to Bangladesh's Industrial Policy 2010, the country's SMEs are categorised into two different industries—the manufacturing industry and the services industry. This study executed a multistage process to achieve a representative sample selection which started by categorising all industries in Bangladesh into the formal and informal sectors. Formal firms were considered for sample selection while informal firms were excluded. In a consecutive step, formal firms were categorised into large-scale enterprises and small and medium-sized enterprises (SMEs). In accordance with the objective of the study, large-scale firms were excluded and SMEs were considered for further treatment. Basing on their environment, SMEs were divided into two categories—rural firms and urban firms. Rural business firms were excluded from the sample frame as they lacked the infrastructure for ICT-dependent procedures in their rural environment while urban firms were given full attention. Urban firms were again classified into four distinct categories based on their location, namely, firms located in Khulna, Rajshahi, Chittagong and Dhaka.

Khulna, Rajshahi, Chittagong and Dhaka are four major cities in Bangladesh. Dhaka is the capital of the People's Republic of Bangladesh and 80% of Internet services are Dhaka-centric. One important locational benefit held by Dhaka is that almost every firm has its head office located there. Based on the number of organisations in their industry and their concentration and IT penetration, the firms located in Dhaka were considered for the study. Those firms were further divided into two groups based on the nature of the industry, whether it was the manufacturing industry or the services industry. Based on the export contribution and economic significance, the

manufacturing industry was logically considered for sampling and the services industry was excluded. The manufacturing industry comprises various industrial units. Although each of these industrial units contributes positively to the national economy, their performance varies. Based on their contribution and its potential in the economic development of the country, some industries have been announced as the thrust sector for the economy. Owing to their contribution and economic potential, the ready-made garment (RMG) industry and leather and leather product industry have attracted the attention of the Government of Bangladesh, are considered as the thrust sector and receive preferential treatment and trade benefits.

In the manufacturing industry sector, the RMG industry is the leading industry contributing around 70–80% of export earnings and is therefore considered to be the goose that laid the golden egg in Bangladesh while the leather and leather product industry is an emerging industry. The study has logically considered both the leading industry and an emerging industry to build a sample frame. The proportion of the contribution of the RMG and leather industries in Bangladesh is roughly 80:20. The sample frame, thus, was generated by taking sample units from these two industries according to the proportion of their contribution. Understanding the nature of the study and the statistical tools to be used for analysis, this study decided to select a sample of 300 cases by incorporating 240 (80%) from the RMG industry and 60 (20%) from the leather industry. The sample units were selected on a random basis from a list of related industries. In accordance with the rough contribution of the two industries being 80:20, the sampling procedure was justified as proportionate stratified random sampling. Interestingly, if the number of firms engaged in the sectors had been considered, the selection of the sample may be fallen into disproportionate stratified random sampling as a very large number of firms are engaged in the RMG industry while the number of firms engaged in the leather industry is small.

Blalock (1960) suggested that the disproportionate stratified random sampling method is better than the proportionate stratified method in studies in which the differences in numbers among groups are large. Thus, the process and method adopted for selecting firms from the RMG and leather industries by the 80:20 ratio were still justified as disproportionate stratified random sampling. Churchill (1991) supported

disproportionate stratified sampling as being a method by which to increase precision without increasing cost and to reduce the sample variation. This technique offers the opportunity to reduce sampling error to achieve an increased level of confidence by the representation of two different categories of pertinent sample characteristics that accurately reflect the population (Davis, 2000; Zikmund, 2000). A flow chart of the sample selection process has been provided in Appendix A.

3.6.5 QUANTITATIVE DATA COLLECTION

A list of companies was prepared from the Bangladesh Garment Manufacturers and Exporters Association (BGMEA) members' directory 2010–2011 which contained 2917 firms and the Bangladesh Knitwear Manufacturers and Exporters Association (BKMEA) members' directory 2010–2011 which contained 1987 firms. A list of firms engaged in leather and leather products manufacturing and exporting was developed from the Leather and Leather Product Manufacturers and Exporters Association of Bangladesh (LLMEB) members' list 2010–2011 which contained 58 firms, a list from the Bangladesh exporters' category on the Export India web page which contained 28 firms, and names and addresses of another 45 firms were collected from the records of the Ministry of Trade and Commerce. With the aim of collecting responses from 300 firms (or a number close to that figure), a total of 1320 questionnaires are sent out to respondents: 1200 questionnaires to the RMG industry and 120 questionnaires to the leather industry.

Before sending the questionnaires, respondents were contacted by telephone. The reason for the telephone calls before sending the questionnaires was to take the opportunity to judge the category of the firms selected as primary sample units through screening questions and also to receive prior consent from respondents. Upon receiving respondents' consent, the survey instrument together with a covering letter explaining the purpose and instructions for the survey were sent directly to the person contacted which was believed to be an efficient way to receive a satisfactory response.

The first round of survey packages was sent out in the third week of September 2011. Surprisingly, no survey responses were received until November 2011 even after follow-up calls. Respondents were contacted through email and telephone calls. However, sending emails was deemed to be not effective in this context. The

telephone follow-up, although calls reached the respondents, was not efficient for pursuing respondents to get them to complete and return the questionnaire. After realising the situation and having an extensive meeting with some experts including the supervisor of this research project, three educated surveyors were employed to follow-up and collect the completed questionnaires. Extensive training was provided to the surveyors to acquaint them with the research and survey. The surveyors also received training about remaining neutral during the follow-up process and the collection of responses. It was important to note that, at the preliminary stage, the researcher had planned to use an online survey procedure through Survey Monkey software in conjunction with a mail-out survey. A version of the questionnaire was also posted to the web for data collection. It was also surprising that the online data collection procedure was not successful. However, the final approach worked well, that is, using a combination of telephone follow-up and door-to-door physical visits resulted in a number of good responses. The first round of the study was conducted during the period from September 2011–March 2012. A total of 150 completed responses were received during this period.

The second round of the study was conducted during the period from April 2012–August 2012. During this phase, the researcher himself made repeated telephone calls to respondents. The surveyors also were more efficient in facilitating the procedure and were successful in boosting the number of responses. During the second phase, another package consisting of reminder letters, a copy of the questionnaire and a souvenir was once again sent to the contact persons. Thus, a more efficient result was achieved and a total of 132 responses were received during this phase.

Finally, 225 usable responses from the RMG industry and 57 useable responses from the leather industry were received. Finally, the data set containing 282 records was used for the entire data analysis of the study which included structural equation modelling (SEM). The final response rates were calculated as 22% from the RMG industry and 55% from the leather industry. As the size of the leather industry in Bangladesh is small, the researcher put in hard labour and paid extensive attention to collecting a suitable number of responses close to the targeted number of 60 which ensured a good response rate. However, administering a successful survey in a country like Bangladesh is a hard job as many of the popular modes for surveys are not suitable for Bangladesh. Previous

research experience has admitted to receiving a lower rate of responses when surveying organisations in Bangladesh with a response rate of 17.5% considered as satisfactory (Shamsuddoh4, 2002; Saleh, 2006). Thus, the response rate of 22% was valid for drawing inferences representative to the population. The sample size was also adequate for applying structural equation modeling (SEM).

3.6.6 QUANTITATIVE DATA ANALYSIS

This study employed structural equation modelling (SEM) for quantitative data analysis. Structural equation modelling, a second generation of the statistical analytical tool, incorporates a two-step procedure in data analyses which administers the assessment of the measurement model followed by undertaking the structural model estimation. The measurement model involves the assessment of the construct validity, convergent validity and discriminant validity of the reflective constructs. Convergent validity ensures that the items explaining a construct converge well through examining whether the items in each construct are highly correlated and reliable; while discriminant validity ensures that the reflective constructs are different from each other by estimating the average communalities, construct correlation and cross-loading matrix.

Structural equation modelling was appropriate for analysing the data in accordance with the proposed conceptual framework. A growing number of researchers are adopting causal or structural equation modelling as it allows the analysis of complex networks of constructs, each construct typically measured by multiple variables. Covariance structure analysis, as implemented by LISREL, EQS or AMOS, is the well-known approach to causal modelling. However, partial least squares (PLS) is a complementary approach with features that are well suited to the domain of technology research (Barclay et al., 1995).

Although a combination of software, including MS Excel (for data management); SPSS (for data manipulation and descriptive statistics); LIMDEP (for cross-correlation); and AMOS (for estimating some of the structural equation modelling components for cross-checking) was used for the treatment of the data, checking and rechecking of reliability and validity of the measurements, and facilitating data analyses in various stages of the research, the main part of the quantitative data analysis was performed by using PLS-Graph Version 3 software.

The decision by any researcher when selecting an appropriate analytical tool for reliable estimates is vital. Past research initiatives have employed both covariance-based structural equation modelling (SEM) and correlation-based structural equation modelling (SEM) to examine similar phenomena while these two different methods of structural equation modelling have some specialties and also some constraints. Chin (1995) reported that covariance-based SEM is superior on mathematical grounds while correlation-based SEM had superiority on practical grounds. The covariance-based structural equation modelling software, such as AMOS, LISREL, etc., considers reflective items when analysing both measurement and structural models while component-based structural equation modelling software, such as PLS-Graph, can handle both reflective and formative measures in estimating the measurement model and structural model.

The theoretical framework of the study involved a complex structure of hierarchical latent constructs comprised of both reflective and formative items. The nature of the study constructs and their measurement items thus justified the application of partial least squares (PLS)-based structural equation modelling (Barclay et al., 1995).

With the arguments as stated above, the PLS technique was considered to be the most appropriate data analysis tool for the quantitative study. This study attempted to use the PLS technique to establish the relationship between the different model constructs, thus testing the hypotheses. As such, the data collected in this study were analysed using the PLS technique utilising the PLS-Graph Version 3.0 computer software developed by Chin (2002) (www.plsgraph.com). In this regard, PLS path estimates were standardised regression coefficients, and the loadings of items on the constructs could be construed as factor loadings (Barclay et al., 1995). The PLS technique also produced R-squared (R^2) values for all endogenous constructs which could be interpreted in the same manner as R-squared (R^2) values produced by regression analyses (Igbaria et al., 1995).

3.6.7 PARTIAL LEAST SQUARES (PLS) PROCEDURES

In the preceding section, it was stated that structural equation modelling (SEM) incorporates a two-step procedure in data analyses which administers the assessment of the measurement model followed by the structural model estimation. The measurement model involves the assessment of the construct validity, convergent

validity and discriminant validity of the reflective constructs. This study, thus, followed the two-step sequential procedure by employing PLS-based structural equation modelling (Barclay et al., 1995).

Step 1: Assessment of the Measurement Model

The measurement model dealt with the relationships between the observed variables and the constructs. Items which represented the observed variables measured the constructs. The analysis of the measurement model led to the calculations of loadings providing the researcher with an indication of the strength of the measures.

Step 2: Assessment of the Structural Model

The structural model dealt with the relationships between the constructs in a structured relational framework or path diagram. Through the analyses, the PLS technique presented a clear picture of the magnitude and degree of contribution of various constructs under a common and structured path diagram which helped the researcher to test the hypotheses according to the theoretical framework.

3.6.8 ASSESSMENT OF MEASUREMENT MODEL

During the measurement model assessment phase, the relationships between indicators and their corresponding constructs were examined by assessing construct validity which consisted of convergent validity and discriminant validity. Individual item reliability and internal consistency were the measures for convergent validity which evaluated how closely the items in a single construct correlated with each other (Barclay et al., 1995; Santosa, Wei, & Chan, 2005). The discriminant validity of the study constructs was also assessed at this phase. Discriminant validity refers to the degree to which the study constructs differ from each other (Barclay et al., 1995). Adequate convergent and discriminant validity—such as item reliability, internal consistency and discriminant validity (Barclay et al., 1995; Hulland, 1999; Santosa et al., 2005)—build confidence and accuracy in the structural model estimation.

3.6.8.1 Convergent validity

The assessment of convergent validity was a fundamental part of assessing the measurement model. The psychometric properties of the measurement model were assessed by evaluating the reliability, convergent validity and discriminant validity

(Fornell & Larcker, 1981). The reliability of the constructs was assessed by considering composite reliability and Cronbach's alpha. Inter-item correlations were the strong measurement of convergent validity as it (convergent validity) assessed consistency across multiple operationalisations. The magnitude and significance of standard path loadings were considered to examine construct validity.

3.6.8.1.1 Item reliability

Item reliability assessed the loadings for each individual item. The loadings indicated the correlation of the items with their respective constructs. Therefore, maintaining low loading items would decrease the correlation between the items in the construct (Nunnally, 1994). Item reliability also measured the level of random error for each construct; the lower the item loading, the higher the level of random error. Therefore, this procedure could identify and eliminate the items in a particular construct that could increase the construct's level of random error (Fornell & Larcker 1981)

High item loadings indicated the reliability of the measures of the latent variable; however, the previous literature supported some agreed level of item loadings as thresholds for fairly reliable measures (Igarria et al., 1995; Hair et al., 1998). Igarria et al. (1995) deemed 0.4 as an acceptable minimum loading. Hair et al. (1998) suggested that loadings above 0.3 were significant, above 0.4 were more significant and above 0.5 were very significant. Chin (1998a) believed that item loadings should be above 0.5. Carmines and Zeller (1979) maintained 0.7 as the reliability limit whilst Barclay et al. (1995) specified 0.707 as the minimum limit. However, Nunnally (1994) argued that in the case of strong theoretical support, further reviews of low loading items were warranted. This would be especially pertinent if the low loading items added to the explanatory power of the model.

Taking into account all the recommendations in the literature and to maximise the measurement model's ability to fulfil the requirements of convergent validity, 0.5 was determined as the minimum value.

3.6.8.1.2 Internal consistency

Internal consistency was measured through calculating composite reliability (Fornell & Larcker, 1981). Composite reliability is considered to be superior to traditional measures of consistency (such as Cronbach's alpha) because it is not influenced by

the number of indicators (Hanlon, 2001). Equation 3.1 is the formula for how internal consistency was calculated:

$$\alpha = \frac{(\sum \lambda_{yi})^2}{(\sum \lambda_{yi})^2 + \sum \lambda Var(\varepsilon_i)} \quad \text{Equation 3.1}$$

where, α = Internal consistency, λ = Component loading to an indicator,
 Y = construct, i = item, $Var(\varepsilon_i) = 1 - \lambda_{yi}^2$

Constructs with a coefficient value of 0.70 and above in the estimates of composite reliability were accepted as reliable for further analysis (as suggested by Igbaria et al., 1997; Barclay et al., 1995).

3.6.8.1.3 Average variance extracted (AVE)

Fornell and Larcker (1981) specified that average variance extracted (AVE) should be at least 0.5 for convergent validity to be satisfied. Thus AVE, although it is not a usual measure of convergent validity, was rationally computed for robustness of the statistical analysis. The AVE was calculated using Equation 3.2:

$$AVE = \frac{(\sum \lambda_{yi})^2}{\sum \lambda_{yi}^2 + \sum \lambda Var(\varepsilon_i)} \quad \text{Equation 3.2}$$

where, λ = Component loading to an indicator, Y = construct, i = item,
 $Var(\varepsilon_i) = 1 - \lambda_{yi}^2$

3.6.8.2 Discriminant validity

The measurement model also involved evaluating the discriminant validity which was the extent to which different constructs diverged from one another. Discriminant validity, a proof of construct validity, is defined as the degree to which any given construct is different from any other (Barclay et al., 1995). The square root of the AVE and cross-loading matrix is a widely used measure for discriminant validity (Igbaria et al., 1995; Barclay et al., 1995). According to Igbaria et al. (1995), a model is assessed as having acceptable discriminant validity if the square root of the AVE of a construct is larger than its correlation with other constructs. On the other hand, the constructs may be considered as discriminant if the loading of items within a construct (shown in columns in a cross-loading matrix) are greater than the loading of any other item within the same column (Barclay et al., 1995). Both approaches for

assessing discriminant validity were important in adequately proving discriminant validity at construct level as well as at item level.

3.6.8.2.1 Discriminant validity at construct level

Fornell and Larcker's (1981) suggestion involving estimating the AVE is often used as an effective criterion to prove discriminant validity among reflective constructs. According to this criterion, discriminant validity is assessed by comparing the square root of AVE with the inter-construct correlations. The square root of AVE should be greater than the inter-construct correlations when the constructs are considered to have adequate discriminant validity.

The inter-construct correlations are presented in the off-diagonals while the square root of AVE is placed in the main diagonal in bold font on the matrix. In order to prove discriminant validity among the reflective constructs, the off-diagonal elements (correlation of latent variables) must be less than or equal to the bolded, diagonal elements (square root of AVE) in the corresponding rows and columns (Igbaria et al., 1997; Barclay et al., 1995; Gefen, Straub, & Boudreau, 2000).

3.6.8.2.2 Discriminant validity at item level

Barclay et al. (1995) suggested another way for assessing discriminant validity by using a cross-loading matrix which considers loadings and cross-loadings of measures to test discriminant validity at the item level. The cross-loading matrix displays the constructs in the columns and the measurement items in the rows which enables the researcher to check the item–construct correlation at any point. Thus, the correlation matrix provides an opportunity to compare the construct–item correlation for discriminant validity. The loading of items within a construct (shown in columns) should be greater than the loading of any other item within the same column in order to prove discriminant validity among the constructs (see Table 3.1 for threshold values and assessment procedures for convergent and discriminant validity).

Table 3.1: Threshold Values for Reliability and Validity

Measurement	Assessment procedure and threshold values
1. Convergent Validity	
a) Item reliability	<i>Item loading</i> ≥ 0.7
b) Internal consistency	
i. Composite reliability	<i>Calculated value</i> ≥ 0.7
ii. Average variance extracted(AVE)	<i>Calculated value</i> ≥ 0.5
2. Discriminant Validity	
a) Construct level	$\sqrt{AVE} > \text{correlation between the constructs}$
b) Item level	<i>Item loadings of construct</i> $>$ <i>all other cross-item loadings of the construct</i>
3. Nomological validity	$R^2 \geq 0.10$

3.6.9 STRUCTURAL MODEL ESTIMATION AND NOMOLOGICAL VALIDITY

The structural model was estimated to examine the degree and magnitude of the relationships between endogenous and exogenous variables. More specifically, the structural model, using the PLS technique, estimated path coefficients, *t*-statistics, standard errors and R^2 to examine the hypothesised relationships. The path coefficients indicated the strengths and direction of the relationships, and *t*-statistics and standard errors indicated the significance of the influence, while the R^2 value indicated the amount of variance explained. The variances associated with the endogenous variables determined the explanatory power of the proposed model. The nomological validity of the endogenous variables of the model was examined by the R^2 values (Santosa et al., 2005). As proposed by Falk and Miller (1992), this study used 0.10 as the cut-off value for nomological validity of the endogenous variables under the theoretical framework.

This study adopted a bootstrap resampling procedure to generate *t*-statistics and standard errors (Chin, 1998b; Gefen et al., 2000). The technique which bootstrapping employs for calculating the *t*-statistic is similar to the traditional *t*-test that is also used to interpret the significance of the paths between study constructs (Barclay et al., 1995). By utilising a confidence estimation procedure other than the normal approximation, the bootstrap procedure reproduced samples with replacements from the original sample set and continued to sample until it reached the specified number as required for the analysis. This study used 500 resamples for the bootstrap.

3.7 SUMMARY

The methods employed and processes undertaken to attain the purpose of this study were the key focus of this chapter. As the study adopted a mixed-method research approach, the methods and procedures employed for executing the qualitative field study and quantitative survey were stated separately in different sections. The data collection process carried out through field interviews and the methods for analysing the interviews were described. The design and structure of the questionnaire, the tests of reliability and validity of the measures, and the methods of data analysis and hypotheses testing were also discussed in detail. The following chapter deals with the analysis of the field interviews and the fine-tuning or re-constructing of the research model.

CHAPTER 4

FIELD STUDY ANALYSIS AND COMPREHENSIVE RESEARCH MODEL

4.1 INTRODUCTION

This chapter addresses the various stages of the qualitative research which was undertaken to provide a foundation for the comprehensive quantitative study. The field study was administered to compare the conceptual framework developed by the literature review with the context of the study. The main purpose of the qualitative research was to contextualise and fine-tune the research model. The field study also explored new constructs and their measurement items. The entire process of the qualitative research, from designing the field study questionnaire to the final outcomes, is reported in this chapter which concludes with a refined research model (Figure 4.1) for this study.

4.2 OPERATION OF THE FIELD STUDY

4.2.1 SAMPLE

Researchers have applied different principles to determine the sample size for qualitative data collection. Some researchers have agreed on an open-ended number of cases while other researchers have supported the idea of selecting a predefined range of cases. Eisenhardt (1989) and Perry (1998) favoured a restricted range of cases and suggested that 4–8 cases were appropriate for qualitative research while Sandelowski (1995) stressed that it was hardly possible to determine in advance the minimum number necessary to ensure an adequate sample size in qualitative research. The adequacy of the sample for credible research findings therefore becomes relative. Thus, the point of focus should be whether the sample strategy should be large or small to achieve the intended objectives of the investigation instead of judging a sample too small or too large. However, the sample size may be reasonably considered as adequate for analysis if either informational redundancy (Denzin & Lincoln, 2003; Lincoln & Guba, 1985) or theoretical saturation (Strauss & Corbin, 1998) is reached.

This study applied the notion of an open-ended number of cases and stopped interviewing after the 11th case taking into consideration informational redundancy and theoretical saturation. The sample comprised 11 owners of different SMEs or their representatives selected by adopting a convenience sampling method. Table 4.1 shows the demographic profiles of the interviewees who participated in the qualitative survey.

4.2.2 DEMOGRAPHIC PROFILES OF STUDY RESPONDENTS

A convenience sampling method was used to select the sample respondents. The sample comprised owners or their representatives from eight small and three medium-sized organisations. The study also included five organisations from the manufacturing industry and six organisations from the services industry. Personal judgment was applied to ensure diversity among the sample units. The market competitive position of six firms was good; two firms possessed a very good market position while only one firm possessed an extremely good competitive position. On the other hand, one organisation declared that they were experiencing bad market conditions while one organisation explained that they had neither a good nor a bad market position.

Table 4.1: Sample Profile for Qualitative Research

Firm ID	SME type	Employees	Size	Market position	Revenue
A	S	35	Small	Good	Increase
B	M	95	Small	Good	Increase
C	S	21	Small	Extremely good	High increase
D	S	47	Medium	Good	High increase
E	S	9	Small	Good	Increase
F	S	5	Small	Good	Substantial
G	M	21	Small	Good	High increase
H	S	92	Medium	Bad	Steady
I	M	35	Small	Neither good nor	Increase
J	M	35	Small	Very good	High increase
K	M	89	Medium	Very good	High increase

Again, 10 organisations had experienced revenue increases in the last few years: among them, five organisations showed highly increased revenue and one organisation had secured substantially increased revenue in the last few years. The sample also included an organisation which had no change in its revenue in that

period of time. It is important to note that all of the organisations included in the sample for the qualitative survey had experience of ICT use in their organisation.

4.2.3 DATA COLLECTION

The study employed direct and face-to-face interviews with the persons selected for the qualitative survey. The interviews were organised and recorded with the consent of the interviewee. The individuals participating in the field study were provided with a consent form which clearly outlined the purpose and ethical issues related to the study. It was also mentioned that his/her participation in the interview was completely voluntary and thus they could withdraw themselves from the study at any time. A semi-structured interview technique was used as the primary tool to collect data (the data collection procedure has been discussed in detail in Chapter 3). A complete English version of the semi-structured interview guide has been provided in Appendix B.

4.2.4 DATA ANALYSIS

The content analysis technique was employed to analyse the qualitative data (Siltaoja, 2006). During the qualitative data analysis, both inductive and deductive methods were utilised to compare the qualitative data with the theoretical framework and also to develop a causal relationship between the constructs under study (Berg, 2001).

The themes, sub-themes and concepts explaining variables and factors were explored by using the inductive process. The process also explored measurement scales of some variables or factors. The variables and factors explored by the induction process were further induced into a common framework. The ultimate objective of the field study was to prepare a comprehensive conceptual framework by comparing the induced framework with the initial research model which had been developed from the literature review. This common framework was then compared with the initial research framework presented in Chapter 2.

In the past, content analysis using Berg's (2001) guidelines was carried out through a completely manual process. In the manual process, the transcripts were read word by word, a process through which quite common phrases were identified. Similar patterns or relationships that existed were also marked and notes were taken of any

section that was quite similar or common from one transcript to another. These phrases, similarities or patterns were analytically coded with this finally categorised into various subsections known as factors and variables. The process for these analyses became easier and more sophisticated with the introduction of text analysis software, particularly NVivo.

NVivo provides some user-friendly tools which can be used to identify, record and analyse various themes, sub-themes and concepts, and the causal relationships among various concepts. It also provides options for inducing all of the concepts, variables or factors that were explored through the inductive process and provides options for model building. It becomes quite easy to explore categories and manage the themes, sub-themes and concepts using the free and tree nodes.

This study used Nvivo 10 to analyse the qualitative interviews. In order to analyse the interviews using NVivo, the recorded interviews were transformed into interview transcripts. NVivo first imported all of the interview transcripts. The researcher created numerous free nodes by labelling each segment of the data. Each 'free node' summarised and accounted for each concept in the data which provided the basis for developing various tree nodes comprising similar free nodes. The tree nodes were developed from the free nodes that had been developed in the immediate earlier stage. The tree nodes comprised a number of relevant free nodes with a similar concept which might become a construct. For example, 99 variables (free nodes) were explored while analysing the interviews for organisational performance. Further analysis was undertaken to combine similar variables into one which resulted in nine distinct variables. Later, those nine variables were grouped into three tree nodes named competitiveness, internal operation productivity and financial performance. These three distilled factors were again grouped into a distinct broader construct of interest which was called performance.

4.3 FINDINGS (1ST STAGE: INDUCTIVE ANALYSIS)

This section presents the findings from the field study analysis based on the first stage of content analysis. Factors and variables explored by the content analysis are firstly presented. Relationships among the study constructs and construction of the final combined model are presented in subsequent sections. A summary of the

findings of the 1st stage inductive analysis comprising a high-level list of the factors and variables with subsequent frequencies is presented in Table 4.2.

4.3.1 FACTORS AND VARIABLES

4.3.1.1 Owner innovativeness

The field study explored owner innovativeness as one of the important factors influencing ICT adoption by SMEs in Bangladesh. Six of the 11 respondents thought that the adoption of ICT was related to the risk-bearing ability of the owner of a firm. The respondents who noticed that the owners' or CEOs' risk-taking propensity or ability greatly impacted on ICT adoption by SMEs divulged the fact by saying; *"In my opinion, it is a big task [to implement ICT] and our owners have shown their courage by using such a high-cost and sophisticated software"* (Firm B), or *"... the owner of the company should be such a person who can take a high risk on his shoulder"* (Firm J), or *"[h]e loves to take high risks in various business situations"* (Firm C).

Seven respondents were also unanimous in recognising owners' or CEOs' innovativeness in the adoption and diffusion of ICT by SMEs in Bangladesh, saying that *"... our owners are knowledgeable and educated and once they felt the necessity of the technology in the organisation they decided to use it"* (Firm K), or *"[o]ur owner is highly educated and an innovative man"* (Firm C), or *"[t]hey [owner/CEO] have adequate knowledge on the use and utilisation of ICT"* (Firm B).

Seven other respondents expressed their feelings differently in terms of supporting the influence of owners' or CEOs' innovativeness in the adoption or use of ICT by SMEs as: *"I can mention the special quality of the owner of this organisation which is that they can easily receive new things particularly newly innovated technology ... They [owners] should come forward and receive new ideas in relation to the use of ICT in the company"* (Firm B); *"[w]ithout innovativeness, nobody can run a venture. Our owner is an innovative person"* (Firm F); *"[o]ur owner has given utmost importance with computerisation. Innovative [receptive to new ideas] and risk-taking behaviour are the fundamental qualities of the owner"* (Firm I).

4.3.1.2 Cognitive evaluation

The field study indicated that respondents' cognitive evaluation of technology mattered in regard to the intentions towards ICT usage by SMEs in Bangladesh. Firm G admitted the influence by saying: “[i]t (ICT) is entertaining. It is providing more scope for documentary evidence than telephone and other media. It is interactive, reasonable and easy ...” and “... customers send some documents which are easy to check, send or forward to the appropriate departments. It helps the employee to become confident ...” Firm K and Firm E also felt similarly. For example, Firm K stated that:

“[i]t [application of ICT] makes the operation easier. Suppose we have many departments. To run a business, I have to communicate with other departments and write a letter to the head of another department: maybe he is situated on the 8th floor while I am on the ground floor. If I have to send it physically to the department, it will take a lot of time and effort” (Firm K).

As with Firms G, K and E, most respondents indicated their evaluation of technology was driving them towards using it. The field study analysis revealed that cognitive evaluation resulted from user perceptions of the various benefits and barriers with regard to innovation. Various benefits and utilities were assessed from the field study which were associated with two perceptions—perceived usefulness and ease of use. The following subsections address users' perceptions about ICT through which a user or a prospective user can develop cognitive evaluation, that is, favourableness or unfavourableness towards the technology.

4.3.1.2.1 Perceived usefulness

The field study revealed that almost all respondents felt that organisations' perceptions about the usefulness of the technology influenced the adoption of ICT by SMEs in Bangladesh. For example, Firm H stated: “[w]e get information at the same time from every corner of the country. If we don't use ICT, we cannot get information at the same time from everywhere. In that case, some districts can get it earlier; some districts may get it later which may create a disparity among different units of the organisation. We receive information at the same time and very promptly and timely [currently] through ICT.”

Similarly, Firm D stated: “[i]t saves time, reduces the cost and increases efficiency as I can get access to the report from anywhere and can send my response also from anywhere. So it provides better opportunity to overcome the place and time barriers of the operations and business.”

The usefulness of the technology was also explored in other firms’ statements. Firm C indicated that ICT was a tool for organisational efficiency and productivity while Firm I mentioned ICT’s capability for creating effective and efficient communication in a flexible manner. For example, Firm I said: “[c]ommunication through ICT reduces the time [prompt], it produces evidence of communication. Cost reduction: place and time don’t matter with it.”

4.3.1.2.2 Perceived ease of use:

As with perceived usefulness, the field study also revealed that ‘perceived ease of use’ influenced the adoption and use of ICT by SMEs in Bangladesh. Nine of the 11 respondents felt that the ease of use of the technology mattered in their adoption intention or usage of ICT with this explored from various statements. As Firm A said: “[n]ow I am quite comfortable and friendly with the diverse use of ICT.” Firm H agreed with the notion and stated: “[i]t [use of ICT] is interactive, reasonable and easy (to use) ... when a customer sends some documents which are easy to check, send or forward ...” Firm F also supported this view by perceiving that international communication became easier through the use of ICT. Firm F stated: “ICT mainly makes communication from our country with other countries easier” (Firm F).

The analysis of the field interviews revealed that cognitive evaluation mattered in SMEs’ adoption and usage of ICT. The field study again explored two constituents of cognitive evaluation which were perceived usefulness and perceived ease of use. By applying an interpretive research approach, the field study thus anticipated that, by its nature, the conceptualisation—cognitive evaluation—would be reflected through perceived ease of use and perceived usefulness of the technology.

4.3.1.3 Culture

The field study revealed that all respondents felt that culture influenced the adoption of ICT by SMEs in Bangladesh. For example, Firm B stated: “[i]n terms of using

ICT, a formal and disciplined work environment and capable and educated manpower are required ... however, it [importance of culture] has been stated in several counts in the previous discussion. To me, national culture is one of the strong constructs affecting individuals' or groups' ICT use behaviour."

Similarly, Firm F stated: "*[t]he cultural aspects are related to ICT adoption [intention or usage decision] by SMEs in various counts."*

Firm J also felt the same and said: "*... as [we feel] the societal norms and practice deter [on many counts] automated and non-personal exchanges, we are facing trouble in getting upgraded and wide use of the technology."*

The above-mentioned statements and quotes inferred that the national culture affected cognitive evaluation and intention to use ICT by SMEs in Bangladesh. The field study also explored various dimensions of culture that were related to SMEs' ICT usage intention.

The interpretive research revealed that 'power distance', 'in-group collectivism', 'uncertainty avoidance', 'ethical culture' and 'Bengali values' were dominant in the formation of the Bengali culture which may also have some relationship to ICT adoption by SMEs in Bangladesh.

4.3.1.3.1 Power distance

All respondents mentioned that huge power distance was evident in the social or managerial hierarchy which characterised Bangladeshi national culture. For example, Firm B stated: "*[i]n our country, the general people blindly follow their leaders although they do not accept them in their mind."*

Firm G expressed a similar assessment about the power distance dimension of national culture by saying: "*I don't expect that the people would obey and follow their leader without any question [but, in fact,] people cannot challenge their leader's or superior's decision and reflect their own opinion or decision."*

Some interviewees reported that obeying the leader was a norm in the country's culture and, in reality, subordinates did not have any scope to question their leader. For example, Firm J stated: "*[t]hey [the common people] should not follow their*

leaders without question. In the present situation, in practice, there is no scope for the follower to question their leader.”

4.3.1.3.2 In-group collectivism

The field study also explored in-group collectivism as one of the strong cultural dimensions that influence ICT adoption by SMEs in Bangladesh. For example, Firm H said: *“I would feel pride with my affiliation to the organisation. In our organisation, workers take pride in the individual accomplishment of their managers and the managers also take pride in the individual accomplishment of their subordinates. I wish the organisation would be run collectively. I don’t prefer the autocratic environment.”*

Past studies have suggested that the cultures of Asian countries are collective cultures while the cultures of Western countries are mostly individualistic (Hofstede, 2001; House et al., 2004). The view that the culture of Bangladesh was also considered to be collective was supported by many statements. For example, Firm G said: *“I like transparency in our organisation and for any problems that arise to be settled with discussion among all members concerned. The members of our organisation are not obliged to do everything but they do so as expected.”*

4.3.1.3.3 Uncertainty avoidance

One respondent (Firm F) considered uncertainty avoidance as a strong part of culture by saying: *“[o]ur organisation is not a disciplined or organised entity. The formal approach is not evident everywhere in the organisation. Maybe there exist some rules but those are for a few people. In our organisation, the needs of the organisation and what is the responsibility of the general workers are not clearly explained and recorded.”*

Similarly, Firm G said: *“like our country, orderliness and consistencies are not stressed in different functional areas in the organisation. Although many needs of the organisation are conveyed to the general workers by word of mouth, who is responsible for what and what the organisation expects from individuals are not clearly stated ... many inconsistencies are evident in various stages in society as in*

our organisation. If people do anything wrong, they may be forgiven as the requirements and their responsibilities are not clearly stated.”

4.3.1.3.4 Ethical culture

Ethical issues are crucial for the development of Bangladesh. Unethical approaches and misdeeds are becoming an integral part of day-to-day life and corporate culture in the country.¹⁴ Politicians and bureaucrats are surrounded by nepotism, unfairness and corruption in their working environment. The field study explored the view that ethical culture was one of the strongest actors in the decision-making process of SMEs' ICT usage. For example, Firm A said: *“[i]n my personal experience, it is evident that inefficient workers or candidates are offered jobs in different areas in many organisations in Bangladesh. So they play bad roles to cover their inefficiencies ... The selection procedure should be transparent. In Bangladesh, the selection is full of nepotism.”*

Similarly, Firm J stated about politicisation and the bribery culture: *“[i]n our country, politicisation is quite common, and bribes have become a common phenomenon. I feel the individuals' qualifications and performance should be evaluated rather than their affiliation with politics, groups or economic strength.”*

Firm E emphasised the unethical issues of Bengali culture by saying: *“[i]n our country, we have championed in corruption several times around the world. Besides, corruption has become an integral part of our culture. We have achieved the championship in corruption for three consecutive years around the world.”*

4.3.1.3.5 Bengali values

The culture of Bangladesh is constituted with some values and norms called Bengali values that are different from the cultural dimensions stated by Hofstede (2001) and House et al. (2004). These values were explored in statements by Firms G, K and B. Firm G said: *“[i]n our country, people do exchange through [the language] Bengali. But ICT is not compatible with Bengali and there is no Bengali user interfaces for various ICT applications which is a vital problem for the mass use of technology.”*

¹⁴ See a Global Corruption Perceptions Index at <http://www.transparency.org/research/cpi/>.

Firm K emphasised people's preference for communicating in the Bengali language. For example, Firm K said: *"[w]e have pride in our language movement and independence. In honour of the language martyrs and their sacrifice in language movement and in respect of the Bengali language, the government of the country declared that all work and communication should be in Bengali which creates very easy communication among people with the same language."*

Furthermore, the people of Bangladesh live in a society that maintains very close bonds among community members. This aspect of culture was explored in a statement from Firm B: *"face-to-face communication and personal social exchanges are vital in the day-to-day lives of the country's population."*

4.3.1.4 Country readiness

Every respondent expressed their concern about infrastructure and other country readiness indicators with regard to establishing an ICT-based working and market environment. For example, Firm D said: *"[t]o develop ICT and SMEs, the government has prime responsibilities. Nobody can use ICT without government approval as the government has some policy and rules. The infrastructure for ICT cannot be developed by individuals. The government should provide the developed infrastructure for using ICT such as the submarine fibre optic cable network, telephone systems, etc."* The above-mentioned statement implied that country readiness was composed of various infrastructures. The field study revealed that country readiness comprised technology infrastructure, human infrastructure, legal infrastructure, financial infrastructure, policy and supports. The following subsections present respondents' assessments and predictions on different aspects of country readiness.

4.3.1.4.1 Technology infrastructure

Technology infrastructure was considered the most important aspect of country readiness which would enable an SME to implement ICT-based functionalities. Firm C indicated that Internet connectivity and Internet speed-related infrastructure were essential for developing an ICT-based business or society. Firm C addressed the issue as: *"[i]n our country, we are connected online through the submarine fibre optic cable network under the sea which connects our country to the east Asian*

countries and other countries around the world. Sometimes, this cable network is disrupted due to environmental uncertainty or man-made hostile activity and the whole operation stagnates.” Firm C again mentioned the discriminatory Internet speed and sophistication of Internet services across the country by saying: *“although we are not facing any difficulties in Internet speed as we are directly linked with DSE [Dhaka Stock Exchange], we sometimes receive complaints from our customers who are not receiving adequate speed.”* The discriminatory Internet services were also proved by another statement from the same firm: *“[w]e have 24 hour Internet connectivity. We use Ravi Internet. Those who are using laptops, they use Grameen Internet. We don’t have much problem with Internet speed.”*

Although power supply was not relevant to ICT operation particularly in developed countries, it was an important part of country readiness with regard to establishing an ICT-dependent working environment. This aspect of technology infrastructure was explored with the statement from Firm B: *“[w]e have a crisis with power supply in our country. Where it will go, we don’t know. We also have our back-up plan. We will set up our own generator. We are also willing to establish a 1 (one) megawatt electricity generation plant.”*

Similarly, Firm F said: *“firstly, we feel that electricity should be available. Computer accessories should be available. What information we use, there should be a back-up facility. UPS [uninterruptible power supply] should be available. And the UPS back-up time should be enhanced.”*

4.3.1.4.2 Human infrastructure

Human infrastructure was considered to be another important part of country readiness in facilitating ICT in the workplace. An ICT-based operation requires knowledgeable and expert human resources for its operation and maintenance. Analysing statements from the various SMEs, the field study explored the view that human infrastructure was an important component of country readiness. For example, Firm C stated: *“[w]e face some difficulties and time lapses in getting adequate support according to our needs. If we get an educated and technologically competent employee at first [entry level], then we could save some effort and time*

which we spend in educating our new employees. Another important concern in terms of the use of ICT is the quality and skill of employees.”

Firm E expressed concern about employee skills at entry level by saying: “[n]ew employees who come to work lack skills [ICT skills].”

On the other hand, Firm I highlighted the development aspects of human resources which are required for establishing an ICT-based working environment. Firm I stated: “[I]n our time, there was no computer education at school and college level, now it is included at school and college. More comprehensive computer education should be given as part of a general education to provide fundamental computer skills.”

4.3.1.4.3 Legal infrastructure

Legal infrastructure has implications for ICT-based operations. Communication and transactions via the Internet, in particular, require significant legislative supports. Organisations participating in online transactions and exchanges feel the necessity of having effective laws and practices to solve any dispute that occurs during an online transaction, communication or exchange. Firm K stated the importance of legal infrastructure: “[w]e don’t have adequate rules and regulations to solve any dispute of conflict arising from online communication, exchanges and transactions.”

Firm I described the importance of legal support in regard to accepting digital signatures which was essential for any digital contract by saying: “[t]o authenticate a digital contract, a digital signature should be accepted as valid in various contracts.”

4.3.1.4.4 Financial infrastructure

ICT has provided enormous opportunities for individuals, businesses and society. In particular, the introduction of Internet-based business operations has become a revolution in managing businesses and transactions leading to changes in the ways in which these were traditionally carried out. These changes are also reflected in banking operations. Success in online business and transactions requires an efficient online banking mechanism. Developed countries are now almost online banking-

dependent. Developing countries although lagging behind are also seeking to develop an efficient online banking mechanism. The field study explored the importance of financial infrastructure in the successful implementation of online business operations and transactions. For example, Firm K expressed their concern about online banking facilities by saying: *“[w]e don’t have adequate rules and regulations ... Our banking mechanism for online transactions and operations is also not satisfactory.”*

Firm C mentioned the importance of online banking in regard to customer compatibility with the mechanism by saying: *“[n]ormally most of our customers are not habituated with online money transfers.”* Firm I raised a deep concern by saying: *“[i]n our country, we don’t access bank accounts from home.”*

4.3.1.4.5 Policy and supports

Government policy and supports play a pivotal role in the implementation of ICT into different functional areas in a country. The field study explored the importance of government policy and supports in promoting ICT usage in Bangladesh and, in particular, for achieving organisational productivity and efficiency in the business sector. For example, Firm K stated: *“[a]t government level, they can reduce the tax and custom duties on ICT-related products. Once government has withdrawn all taxes and duties from ICT-related products, they can provide their other supports such as grants and subsidies to also encourage ICT usage at the organisational level and country level.”*

Firm C referred to the importance of government policy and supports. The present government’s move towards establishing an ICT-based society is an example of policy and supports to launch an ICT-based business environment. The importance of policy and supports was also explored in this statement by Firm C: *“Besides this, the present government is very much encouraging ICT utilisation in the country and building a digital Bangladesh by 2021 so we hope that, within a few years, we will see some improvement at our national level and we will also receive some supports and grants from government in this regard.”*

4.3.1.4.6 Environmental pressure

The field study explored the view that environmental pressure has direct and significant influence on SMEs' adoption and usage of ICT. For example, Firm H said: *"[w]e have our own distribution system. We have some suppliers and other collaborators for ingredient supply. They are in a developed country and they have highly sophisticated ICT usage. On the other hand, those who are taking our product as middlemen are not IT-based."*

Firm C mentioned the influence of environmental pressure on SMEs' adoption and usage of ICT focusing on the effects on competitors and suppliers: *"[w]e are encouraged to use better technology and upgrade our existing systems when we see that our competitors and suppliers are using better ICT. We also feel deterred from using and upgrading our technological standards when we see our customers do not have an adequate technological fit, and they are not receptive to or compatible with ICT and our systems."*

From the above-mentioned statement, it can be easily assumed that environmental pressure has diverse effects. The field study explored different dimensionalities of environmental pressure, such as coercive pressure, mimetic pressure, normative pressure and global pressure which affect the adoption and diffusion of ICT by SMEs in Bangladesh.

4.3.1.4.7 Coercive pressure

Many SMEs in Bangladesh have adopted ICT-based operations or have ensured their online presence in conducting or supporting a business in response to pressures from the regulatory authority or dominant customers. For example, Firm I stated: *"[o]ur customers and suppliers do all their work online. We have to comply with them. Besides the amount that we claim for the service should be claimed online and the money is transferred online. Accessories and cloth from different countries: India, Sri Lanka, Indonesia, China, the UK. A very limited portion we collect from domestic sources. They are more competent online. They require everything ordered online and require payment online. They have high bandwidth online, they have no power interruption, they have high mobile online access, so they can access from anywhere at any time. They don't have bandwidth fluctuations."*

Firm E also mentioned coercive pressure focusing on the demands of a powerful customer: *“our big customers encourage us to use sophisticated technology like them to make us compatible with their systems.”*

4.3.1.4.8 Mimetic pressure

Pressures from competitors influenced the adoption and diffusion of ICT by SMEs in Bangladesh. The study explored mimetic pressure as an important aspect of environmental pressure. For example, Firm B said that: *“[o]ur competitors are also using sophisticated technology. In fact, two of our competitors are using this software and they started [to do so] prior to our use. So, buyers can adequately know about their orders and their progress so he/she can understand the situation and the stage that it has reached, etc. at any time from their premises. They have given the customers these privileges and the opportunity to track their order so they are getting bigger advantages than us. Thus, they are achieving better performance and business than us. We are now at the initial stage. We have the intention to extend our technological support to the buyers’ premises.”*

Firm G also stated: *“[i]n the competitive market, a business, like the garments trade, is impossible to run without ICT although it was possible in earlier days.”*

4.3.1.4.9 Normative pressure

The field study explored normative pressure as a dimension of environmental pressure which influenced the adoption and diffusion of ICT by SMEs in Bangladesh. For example, Firm B stated: *“[o]ur customers are high-profile ICT users. They have their own server and own homepage, as well as an automated customer and supplier service environment. They use specialised software. They have provided us with some scanners. During the procedure, we are connected with them.”*

Similarly, Firm J said: *“[o]ur all customers are also communicating with us through emails and online communication. Our customers are also suggesting that we use ICT communication.”*

Firm G indicated the importance of normative pressure with regard to accessing suppliers, competitors and customers by saying: “[o]ur suppliers, customers, and competitors use the Internet, email and computer which is the same as what we use.”

4.3.1.4.10 Global pressure

In addition to coercive, mimetic and normative pressures, some pressures have been affecting SMEs’ ICT adoption and usage which differed from these existing three categories. These pressures, named as global pressure, were related to ongoing technological development and global market pressures. For example, Firm D stated: “[i]n the age of globalisation, without adopting ICT, we cannot think of a business. At what stage would we be if we didn’t use ICT or the Internet facility was closed? We would simply be paralysed/collapsed.”

Firm K agreed with Firm D by saying: “I can’t work without ICT in the age of globalisation.”

Firm K also said: “[i]t [ICT usage] is the same as the technology usage behaviour of the individual. Say I am using a mobile phone. After some days, I find that a new phone has arrived on the market. Then I go for the new phone to get the new features, style and benefits or model. It is actually the effect of innovation. The old technology was obsolete and new technology emerges and we are all following these cycles. In other ways, I can tell that we are each affected by the hype of using technology.”

Firm J mentioned the importance of global pressure in the adoption and diffusion of ICT by saying that: “[i]f ICT is seized from our company, our company will collapse. We can’t go one step without ICT. We are seriously ICT-dependent. We can’t even sustain communication through letters, phone or fax. It is not possible to run without ICT. It is the demands of time and our surroundings.”

4.3.1.5 Facilitating condition

The field study explored the view that some resources and competencies were essential for using ICT-based technology or systems: these were computer hardware, software, skilled manpower and a compatible working environment. These were resource-based although essential for ICT-based operations, and their adequacy and

diversity would accelerate or deter firms' ICT usage. For example, Firm I expressed this as: *“[g]ood quality computer, good bandwidth, computer literacy is required for ICT use.”*

Firm J mentioned the importance and effectiveness of a facilitating condition that focused on human resources by stating that: *“[w]e have skilled human resources and technology-competent employees. We have adequate hardware and software resources.”*

Similarly, Firm I said: *“We have Internet connectivity, computer hardware, skilled manpower, and other necessary resources [human resource and technology resources].”*

Firm A commented about the procedure they followed which reflected the necessity of having skilled manpower in the adoption and diffusion of ICT by SMEs in Bangladesh. Firm A stated: *“[o]ur working operations are directed and controlled by different departments and their head or person-in-charge. We have an MIS (Management Information Systems) department. The head of MIS deals with and controls all ICT-related tasks. In fact, they are the custodian of ICT and its utilisation. We have that skilled manpower. We also have computer hardware and software resources. We have the connectivity.”*

Many organisations mentioned the adequacy of resources which make them habituated to and almost dependent on ICT. For example, Firm I said: *“[i]t is not only a demand from our clients; it has become a part of our everyday work culture.”* Firm B supported this expression by saying: *“[n]ow I [as a leader of the organisation] am quite compatible and friendly with the diverse use of ICT”* while Firm I approached this differently as: *“[w]e have the problem that we are still depending on paper-based documentation.”*

The above-mentioned analyses indicated that the existing systems and working procedure may foster or deter technology usage by firms. This aspect referred to the facilitating condition of technology usage which was clearly reflected in the response of Firm J: *“[i]n each and every organisation, you will find some strengths and weaknesses; we have them also. But what I would like to state is that we have more*

strengths in our organisation in terms of using ICT. Our other organisational systems are ICT-compatible.”

4.3.1.6 Intention or expectation of ICT use

The field study explored whether the respondents evaluated their move towards the adoption of ICT in two phases, namely, intention and expectation. They had their plan and most had the firm’s willingness to move forward. Their plan was rational and did not fluctuate in considering different environmental factors or situations. For example, Firm C expressed the view that: *“[w]e can provide that support, as some of our competitors have already established this kind of set-up to support their customers. To make our organisation competitive, we will be able to establish the systems to integrate our customers and other stakeholders in the online environment.”*

Organisations rationally drew up their intention. The following statements also suggested that firms’ intentions were not simply a plan:

“The supports and surrounding facilities screen the intention. We are not in any doubt about whether we could do this according to our intention. We will upgrade the existing technology.” [Firm A]

“I think it is possible to implement our intention.” [Firm C]

The above-mentioned analyses indicated that the intention of the organisations was well-founded and rational and was not easily changed by the effects of external or environmental factors. Thus, this intention should actually be called ‘expectation’.

4.3.1.7 ICT use

The field study explored the situation that, to some extent, all respondents were using ICT in their firms. The results from the field study analyses categorised all responding firms into five different levels of ICT application users, namely, basic computing with Internet; static homepage; interactive homepage which supported product cataloguing; interactive homepage which supported online transactions, that is, e-commerce; and digitisation among different functional areas; and enterprise resource planning. For example, Firm A said: *“Yes, we use ICT. We use Internet. To support our Internet operation, we use a computer, printer, scanner, etc. Besides*

this, we have installed a cc [closed circuit] camera for security purposes.” Similarly Firm F said: “Yes, we are using ICT. We are using the Internet, only the Internet. We have our own homepage.”

Firm D mentioned the sophisticated operation of ICT in their organisation by saying: *“We also take orders through the Internet. We sell to some of our valued dealers and our branches. But the sales relate to any kinds of declarations and reports that we send through the Internet and also receive through the Internet. We collect dealers’ requirements through mobile phone: although for those who have the Internet facility, we get their requirements through the Internet.”*

Firm G also mentioned e-commerce participation and said: *“[t]he customer places an order online in detail. We send this to the merchandise dept. and scrutinise it in that section then send it to the sample section. We select the price and then bid the price. Send the price to the customer once ... Most of the works are [Inter]net-based.”* [Firm G]

The field study explored digitisation or automation as an application of ICT usage. More specifically, Firm B said: *“[b]esides, we have special software by which we analyse our production and other related works. Finally, I find that ICT is a very useful technology. Now I am quite compatible and friendly with the diverse uses of ICT. Our firm is also computerised.”*

4.3.1.8 ICT integration

The field study explored organisational concerns about the integration of the variety of technological facilities used in an organisation. The field study supported the view that the integration of diversified technologies was dependent on the level of ICT usage by SMEs in Bangladesh. Integration was also seen to affect organisational performance. For example, Firm K said: *“[a]fter that [introduction of ICT use], the scope of ICT use has widened and strengthened. It seems that a new technology is just introduced in some department and gradually it will spread over the organisation and work under the common system.”*

Firm B mentioned integration with other firms within the industry by saying: *“[w]e have accumulated some of our closely related similar group of companies in very*

close contact for those who are working with us in the same network environment through our server. We are doing the above-mentioned works through ICT.”

Similarly Firm K said: *“[i]f the external organisations are also integrated or communicated with entirely through ICT, the performance [organisational performance] will certainly be increased.”*

4.3.1.9 Degree of utilisation

The field study explored the view that the degree of utilisation was an important factor explaining organisational performance, as was ICT integration. The factor degree of utilisation was also developed from the firm’s usage of different levels of ICT applications. For example, Firm B said: *“[w]e can earn productivity and efficiency [organisational performance] through proper utilisation of ICT particularly through some software by which we can track, control and initiate alternative strategy ... those companies from whom we are getting benefits and gradually developing, they are actually developing due to the proper utilisation of the technology [ICT]. Some big companies from the world perspective are giving their employees Blackberries so, from anywhere around the world, they can mail and be connected with the network.”*

Similarly, Firm H said: *“[w]e are trying to develop the IT-literate competent employee day by day. We hope we shall be capable of the appropriate and comprehensive use of ICT.”* Some firms emphasised the importance of the appropriate use of technology for customer satisfaction as well as for organisational performance. For example, Firm I said: *“[i]f the ICT is not appropriate, we will not be able to satisfy the customer or target group.”* Firm J also said similarly: *“The performance depends on how well we will use ICT.”* Proper and appropriate use of ICT was considered crucial for organisational performance. By utilising ICT properly, organisations could attain improved organisational performance. However, ICT may cause decreased productivity or damaging output if not utilised properly. For example, Firm K stated: *“ICT enhances the employees’ performance. ICT normally reduces the errors. But it depends on the person who operates the ICT. It depends on their skill. I have a doubt because if the ICT is not properly handled, it may produce bad and damaging output.”*

4.3.1.10 Organisational performance

The field study explored the view that the use of different levels of ICT applications may foster the performance of the organisation. ICT integration and the degree of utilisation also had an effect on organisational performance. For example, Firm B said: *“[a]fter that [as we were not getting reasonable performance], I consulted with some external experts and learned that our existing technological set-up was good enough to do that job. We actually had a lack of operational knowledge about our set-up [which was not properly used] thus we were getting less productivity [organisational performance].”*

The field study also explored different factors under the conceptualisation of organisational performance such as competitiveness, internal operation productivity and financial performance. For example, Firm D said: *“[i]t [use of ICT] also enhances the sales growth in respect to our competitors.”*

4.3.1.10.1 Competitiveness

The field study explored competitiveness as a dimension of organisational performance. For example, Firm J said: *“[i]t [ICT use] enhances productivity. It enhances competitive position. It increases sales.”* Firm I also supported Firm J by saying: *“It is the tool which creates competitiveness.”*

Similarly, Firm H said: *“[t]he ICT helps to exchange information related to sales, marketing, HR, different policy strategy, market conditions, etc. which makes the company competitive ... To stay competitive, gaining the competitive advantage through IT [ICT] is essential.”*

4.3.1.10.2 Internal operation productivity

The field study explored the view that ICT use influenced productivity in the internal operation of the organisation. Firm D said: *“[w]e work in this process [by using ICT] transparently and promptly and in the age of globalisation we are able to provide international standard products and related facilities and opportunities in our country promptly.”* Firm G supported the view that the use of ICT enhanced transparency and productivity in internal operations by saying: *“[s]o the organisations, those that are operating and starting operations in this field, are*

using the Internet and ICT which make them transparent to each other. [Inter]net connection is obvious. ... When we use ICT, we save time and are able to make the the relationship transparent between all parties involved in the work.”

4.3.1.10.2 Financial performance

Firms (B, C, D, E, G, I and K) expressed their views agreeing with the concept that ICT use facilitated organisational performance. For example, Firm G said: *“[i]t [ICT use] is entertaining. It [ICT use] provides more scope of documentary evidence than telephone and other media. It [ICT use] is interactive, reasonable and easy. It [ICT use] is not only saving time, but also providing some documentary evidence. It [ICT use] is easy to control, and to have a conversation with a customer through ICT is also easier. It [ICT use] reduces errors. It [ICT use] helps increase performance ... When we use efficient ICT, it enhances performance. It increases our company’s service sales.”*

Firm K also supported Firm G by saying: *“[i]t [ICT use] enhances the productivity of the company. The financial performance, that is, the sales, profitability and overall performance of the company are enhanced by the use of ICT.”*

The field study explored nine different free nodes to address organisational performance (see Table 4.2). The interpretive analysis further categorised the nine free nodes into three sub-themes (1st order factors) of organisational performance. Further analyses included all of these three sub-themes (1st order factors) in a broader higher-order complex conceptualisation which is organisational performance. Thus, the field study explored organisational performance as a higher-order conceptualisation formed by three different aspects of organisational performance—competitiveness, internal operation productivity and financial performance—that were also measured by nine items.

Table 4.2: Factors and Items from Field Study

Factors/Variables	Participants										
	A	B	C	D	E	F	G	H	I	J	K
Owner Innovativeness											
Courageous		√	√	√		√			√	√	
Knowledge of ICT		√	√			√	√	√		√	√
Receptive to new ideas	√	√	√	√	√	√	√				
Cognitive evaluation											
<i>Usefulness</i>											
Useful in the organisation									√	√	√
Increases productivity		√	√	√		√		√	√	√	√
Enables performing tasks more quickly			√	√		√		√			
Helps increase chances of getting a raise	√	√							√		
<i>Ease of Use</i>											
The system is easy to use		√		√		√	√				√
Easy to become skilful using the system				√						√	
We find the technology easy to use										√	√
Learning to operate the technology is easy for us			√					√		√	√
Behavioural Intention & Expectation											
I don't find any differences between our intention to use ICT and what we are going to do in evaluating our ability or the facilities or constraints arising from the external environment	√	√	√	√	√	√	√	√	√	√	√
Environmental pressure											
<i>Coercive Pressure</i>											
Conformity with parent corporation's practice			√						√	√	
Dominance of customer adopters						√				√	
Our major suppliers demand we use ICT											
<i>Mimetic Pressure</i>											
Competitors use ICT						√		√	√		
Competitors are benefited by using ICT			√	√				√			
<i>Normative Pressure</i>											
Customers use ICT	√	√	√			√	√		√	√	√
Suppliers use ICT		√				√	√	√	√	√	√
Stakeholders (important business partners) use ICT		√						√			
Regulatory bodies use ICT		√				√	√	√			
<i>Global Pressure (Time Pressure)</i>											
Pressure from globalisation					√			√		√	√
Hard to sustain without ICT at present time						√		√		√	√
<i>Facilitating Condition</i>											
Existing system and process compatibility	√	√	√						√	√	√
Resources necessary to use the system	√	√	√			√			√	√	√
Training and maintenance facility						√			√	√	√
Country Readiness											
<i>Technology Infrastructure</i>											
Internet service availability				√	√	√				√	√
Speed and sophistication of Internet	√		√	√	√	√	√	√	√	√	√
Hardware and accessories	√		√	√		√			√		√
Uninterruptible power supply		√				√					√
<i>Human Infrastructure</i>											
Individual's knowledge of and skill in IT and Internet-based business	√	√	√		√				√	√	
Knowledge and skill in IT and Internet-based business at institutional level	√		√		√						
Institutional support for computer education (availability & affordability)	√		√						√		

Factors/Variables	Participants										
	A	B	C	D	E	F	G	H	I	J	K
<i>Legal Infrastructure</i>											
Law relating to online communication										√	√
Law relating to online consumer protection										√	√
<i>Financial Infrastructure</i>											
Online banking facility (adequate)			√							√	√
Debit and credit card service			√							√	√
<i>Policy and Subsidy</i>											
Government tax and customs policy			√	√							√
Government's motivational program		√	√	√	√			√		√	
Government grants			√		√					√	√
Government subsidies			√		√						√
<i>Culture</i>											
<i>In-group Collectivism</i>											
Group members take pride in the individual accomplishments of their group managers						√	√	√		√	
Group managers take pride in the individual accomplishments of their group members						√	√	√		√	√
Managers encourage group loyalty even if individual goals suffer	√	√	√		√	√					
<i>Power Distance</i>											
Power is highly concentrated at the top of society			√				√			√	√
People blindly follow the leader	√	√	√	√	√	√	√	√	√	√	√
<i>Uncertainty Avoidance</i>											
Orderliness and consistencies are not apparent			√			√	√	√	√	√	√
Lack of standard operational rules and procedures				√	√	√					√
<i>Bengali Values</i>											
Face-to-face communication is vital in daily lives		√					√			√	√
People respect and prefer to communicate through the Bengali language						√	√	√		√	√
Strong and close social bonds		√					√		√	√	
<i>Ethical Culture</i>											
Bribery and corruption	√				√	√				√	
Nepotism and politicisation	√									√	
<i>ICT Use</i>											
Basic computing and Internet	√	√	√	√	√	√	√	√	√	√	√
Have own homepage		√	√	√	√	√		√	√	√	√
Have interactive homepage which supports product cataloguing and order processing (online order receiving and processing)			√	√	√		√			√	
Interactive homepage which supports online transactions and account management (e-business)			√		√					√	
Online customer service and complete digitisation		√			√		√			√	
<i>Degree of Utilisation</i>											
Diversified use of the same technology		√								√	
Proper utilisation		√						√	√	√	√
Use full capacity		√						√			
<i>ICT Integration</i>											
Entire organisation is under single system		√					√				√
External organisations are under integrated systems		√									√
Front-office functions are digitally integrated with back-office functions and databases		√	√	√	√				√	√	
Extent of utilisation for external communication			√		√				√	√	

Factors/Variables	Participants										
	A	B	C	D	E	F	G	H	I	J	K
Performance											
<i>Competitiveness (Competitive Performance)</i>											
Sales area has been widened	√	√	√	√	√		√		√	√	
Interaction with customers has been increased			√				√		√		
Competitive position has been improved	√			√					√	√	√
<i>Internal Operation Productivity (Internal Performance)</i>											
The internal operation of the organisation has become transparent				√			√			√	
Productivity of the employees has been improved	√	√		√					√		
The internal operation of the organisation has become structured		√		√					√		
<i>Financial Performance (Financial Performance)</i>											
Sales of the company have been increased			√	√			√	√	√	√	
Profitability of the company has been increased	√	√		√				√	√	√	√
Overall performance is increased	√	√	√	√			√		√		√

4.3.2 LINKAGES AMONG THE FACTORS

The objective of the field study was to explore the variables and their measures. However, the development of the relationships between the factors is also considered to be an important task during a qualitative data analysis (Xu, 2003). Table 4.3 indicates the relationships between the factors that were explored in the qualitative analysis.

Table 4.3 is also an outcome of the analysis of field interviews presented in the previous section (section 4.3.1). The table presents all of the explored factors and establishes a link (a causal link) between them. For example, the notion of CE → EXP represents the influence of cognitive evaluation on intention to adopt ICT by SMEs. It was observed that all firms except Firms E, G and H found that cognitive evaluation had a direct influence on their intention to adopt ICT at their own firm. The relationship between the two factors was explored and justified as Firm B said: “... so I think mind set-up and attitude [cognitive evaluation] are largely related to ICT use. If I don't have a positive attitude, how can I accept [intention to adopt] the new thing? I wouldn't accept and use ICT ... I think they [similar SMEs] will change their attitude [cognitive evaluation] and would be interested to utilise ICT's potential in their organisation.” Firm D expressed a similar feeling indicating as follows that cognitive evaluation created a positive intention to adopt ICT:

“... what types of work are being done in Bangladesh? If ICT is not used in that area, the nation will stay backward. So attitude plays a positive role in ICT-related decisions. It creates [a] strong intention to use ICT.”

The relationships between constructs were developed from the direct statements. In some cases, it was not possible to find the relationship from a direct statement. In those cases, detailed data analysis was performed and interpretive research philosophy was applied to interpret the underlying relationship between the factors. For example, Firm C stated that: *“[t]o operate ICT in an organisation, some resources are required. We should have competent employees who have adequate knowledge and capacity to understand and use ICT ... The monetary resources are required to buy the ICT resources, that is, the hardware, computer, printer, scanner, Internet connectivity, server, etc. and the software support which will manage the operation of ICT according to the company’s needs in an integrated environment.”*

From the above-mentioned statement, it was inferred that some resources were necessary for ICT use. The resources indicated the facilitating condition. The statement might also be used to develop the causal link between the facilitating condition and ICT use by the organisation. Although the statement was not directly expressing any distinct relationship, by analysis utilising the interpretive philosophy, a positive relationship may be indicated between the facilitating condition and ICT use.

Table 4.3: Causal Links Explored from the Qualitative Survey

Construct	Participants										
	A	B	C	D	E	F	G	H	I	J	K
<i>Cognitive evaluation</i>											
CE & EXP	√	√	√	√		√			√	√	√
<i>Owner innovativeness</i>											
OI & CE		√	√	√	√	√	√	√	√	√	√
OI & EXP				√	√	√	√	√		√	√
OI & USE	√		√	√	√	√	√	√		√	√
<i>Behavioural expectation</i>											
EXP & USE	√		√	√				√	√	√	
<i>Environmental pressure</i>											
EP & EXP			√				√	√	√	√	√
EP & USE			√		√	√	√		√		
<i>Facilitating condition</i>											
FC & EXP	√		√	√					√	√	√
FC & USE			√			√		√	√	√	√
<i>Country readiness</i>											
CR & EXP	√			√	√				√		√
CR & USE						√			√		√
<i>Culture</i>											
CUL & CE	√			√					√	√	√
CUL & EXP	√			√					√	√	√
<i>ICT use</i>											
USE & PERF	√		√	√		√				√	√
USE & INT	√		√	√		√				√	√
USE & UTL	√		√	√		√				√	√
<i>Degree of utilisation</i>											
UTL & PERF						√			√		√
<i>Integration</i>											
INT & PERF						√					√
<i>Performance</i>											
USE → INT → PERF				√			√	√			
USE → UTL → PERF				√						√	
USE → $\left(\begin{smallmatrix} INT \\ UTL \end{smallmatrix} \right) PERF$						√					√

CE = Cognitive evaluation, OI = Owner innovativeness, EXP = Expectation, EP = Environmental pressure, CUL = Culture, CR = Country readiness, FC = Facilitating condition, USE = Actual usage, INT = Integration, UTL = Utilisation, PERF = SME performance

4.3.3 COMPARISON BETWEEN FIELD STUDY FINDINGS AND THE INITIAL MODEL (2ND STAGE: DEDUCTIVE MODEL)

Most of the variables in the field study were supported by the literature which was discussed earlier in Chapter 4. This section discusses the factors which either evolved from the field study or were different from the existing literature.

The initial model developed through the literature review projected that ICT use, integration and degree of utilisation influenced SME performance. Similar to the literature review, the field study revealed that ICT usage in conjunction with integration and utilisation strongly affected SME performance. The field study also supported the mediating role of ICT integration and degree of utilisation to explain the influence of ICT usage on SMEs' performance.

The existing literature suggested that behavioural intention towards the adoption of an innovation leads to behavioural expectation which may be affected by many external factors like facilitating condition, country factors, culture, environment, etc. The primary model thus included two factors to indicate the firms' two different levels of willingness to adopt ICT. The field study, analysing the interviews, explored this situation which was different to what had been revealed in the existing literature. The field study justified one factor for addressing firms' willingness to adopt an innovation. The field study explored that the firm's intention was not only cognitive, it was rational with this screened through external factors and forces; that is, intention acted as expectation in the context of SMEs' ICT adoption behaviour in Bangladesh. Thus, behavioural intention has been screened out and only one factor, behavioural expectation, was justified for testing the hypothesised relationship.

The field study also revealed two new constructs—*Bengali values* and *ethical culture*—for addressing national culture. The field study distilled the cultural dimensions explained in the existing literature (House et al., 2004; Hofstede, 1984) and discovered that three among the five cultural dimensions, *power distance*, *uncertainty avoidance* and *in-group collectivism*, may have some influence on ICT adoption or usage by SMEs in Bangladesh.

The field study explored various country-level factors that may have some influence on ICT adoption and usage by SMEs. The field study also revealed a new dimension

of *environmental pressure*. The qualitative analysis explored the view that “pressure from globalisation” was an important factor which may have some influence (in conjunction with coercive pressure, mimetic pressure and normative pressure) on the adoption of ICT by SMEs in Bangladesh.

The existing literature suggested that positive attitude led to positive intention which was formed through favourable or unfavourable perceptions about the innovation. Similar to the primary model, the field study explored this factor as a state of cognitive evaluation which was formed by SME owners’ perceptions about the *usefulness* and *ease of use* of the innovation. The field study justified the formation of the constructs: *cognitive evaluation*, *culture*, *environmental pressure*, *country readiness* and *organisational performance* as a higher-order complex hierarchical conceptualisation.

4.3.4 JUSTIFICATION OF THE FINDINGS IN THE LITERATURE REVIEW

With support from the literature, this section has provided the justification for the selected constructs and dimensions that were developed from the field study. It has emphasised that the factors and dimensions that were derived from the field study, on the basis of commonality and consistency, were also supported by the existing literature. Therefore, this justification has established the competency and adequacy of each construct and dimension in the existing literature. Table 4.4 presents the factors and the dimensions that have been finalised and the relevant support from the literature.

Table 4.4: Justification of the Field Study Variables by the Literature

Constructs	Subconstructs	Reference
Cognitive Evaluation	Ease of use	Venkatesh et al. (2003)
	Usefulness	Venkatesh et al. (2003)
Owner Characteristics	Owner's innovativeness	Thong & Yap (1995) Thong (1999)
Environmental Pressure	Coercive pressure	Quaddus & Hofmeyer (2007)
	Mimetic pressure	Teo et al. (2003)
	Normative pressure	Teo et al. (2003)
	Global pressure	Field study
Facilitating Condition	-----	Venkatesh et al. (2008)
Country Readiness	Technology infrastructure	Field study
	Human infrastructure	Field study
	Legal infrastructure	Zhu & Kraemer (2005)
	Financial infrastructure	Zhu & Kraemer (2005)
	Government policy and supports	Roessner (1988), Goldsmith (1990)
Culture	Power distance	House et al. (2004), Hofstede (1984)
	Uncertainty avoidance	House et al. (2004), Hofstede (1984)
	In-group collectivism	House et al. (2004)
	Bengali values	Field study
	Ethical culture	Field study
Behavioural Expectation	----	Venkatesh et al. (2008)
ICT Use	----	Davis (1989), Venkatesh et al. (2008)
Integration	----	Zhu & Kraemer (2005)
Degree of Utilisation	----	Field study
Performance	Competitiveness	Zhu & Kraemer (2005)
	Internal operation productivity	Zhu & Kraemer (2005)
	Financial performance	Zhu & Kraemer (2005)

4.3.5 JUSTIFICATION OF COMBINING BEHAVIOURAL INTENTION AND EXPECTATION

Behavioural intention plays a vital role as a strong and immediate antecedent in predicting actual behaviour. The past theories in behavioural studies have recognised the strong and important role of intention in predicting actual behaviour such as the theory of reasoned action (TRA) (Fishbein & Ajzen, 1975); theory of planned behaviour (TPB) (Ajzen, 1985); technology acceptance model (TAM) (Davis, 1986) and diffusion of innovation (DOI) theory (Rogers, 1983). The pattern and formation of these theoretical models have demonstrated the mediating role of intention which

has been reflected in successive research initiatives around the world which have explored innovation diffusion in multidisciplinary fields of study such as in psychology, business, social sciences and IS research.

Taking into consideration the role of behavioural intention, many diffusion researchers have studied innovation diffusion behaviour involving intention as the final dependent variable (e.g. Pavlov & Chai, 2002; Lal, 1999; Gefen & Straub, 2000; Kendall et al., 2001). On the other hand, some researchers who have investigated actual usage behaviour (e.g. Venkatesh et al., 2008) have also included intention as an strong antecedent reflected by a number of cognitive, individual, social and environmental factors.

The innovation adoption theories have explained the adoption and diffusion phenomena mainly through intention (Rogers, 1983; Fishbein & Ajzen, 1975; Ajzen, 1985; Davis, 1986; Venkatesh et al., 2003). The existing theories have been criticised as intention is a reflection of the adopter's internal schema of beliefs which may fail to adequately explain actual behaviour in a situation in which the adopter is under incomplete volitional control. Intention, furthermore, may not be reflected in the decision if a time gap exists between intention and actual behaviour. A stronger antecedent, termed as behavioural expectation, was therefore proposed to explain technology adoption behaviour which was not a cognitive factor which would thus be able to address the roles of all external and internal antecedents (Venkatesh et al., 2008).

Warshaw and Davis (1985) explained behavioural intention as 'the degree to which a person has formulated conscious plans to perform or not perform some specified further behaviour.'

Warshaw and Davis (1984) explained behavioural expectation as 'an individual's self-reported subjective probability of his or her cognitive appraisal of volitional and non-volitional behavioural determinants.'

Venkatesh et al. (2008) argued that the role of intention logically involved a new construct, behavioural expectation, to address the reflections of numerous internal as well as external influences with the view to predicting actual behaviour. The limitations of intention in predicting actual usage behaviour were also reflected in

subsequent research. Venkatesh et al. (2003) suggested that the conclusion of previously studied conceptualisations of systems use such as duration, frequency and intensity of use (these conceptualisations were used in many studies rooted back to Davis et al. [1989]) was true only within an intentionality framework, where external factors were taken into account via facilitating conditions (FC), defined as ‘the degree to which an individual believes that an organisational and technical infrastructure exists to support use of the systems’ (Venkatesh et al., 2008, p. 484). To overcome the limitations of behavioural intention and the facilitating condition in predicting actual behaviour, a new construct, behavioural expectation, was proposed (Warshaw & Davis, 1984). Venkatesh et al. (2008) recognised the rationale and importance of behavioural expectation in explaining the limitations of behavioural intention and the strengths of behavioural expectation which was stronger than intention in predicting actual behaviour from a systems usage perspective in the organisational context. They proved it through a cross-sectional empirical study in a different time period.

The innovations and changes in models and theories have encouraged the investigation of existing issues in a developed and comprehensive setting of conceptualisations and underlying relationships among the study constructs. The chronological arguments and developments in IS research to address actual systems usage behaviour (e.g. Warshaw & Davis, 1984, 1985; Venkatesh et al., 2003, 2008) have suggested the inclusion of behavioural intention and behavioural expectation as predictors of actual behaviour.

Venkatesh et al. (2008) proved the strength of behavioural expectation and behavioural intention in an organisational setting by looking at the behaviour of newly innovated systems where the recipients or adopters had no experience during the first phase of the research. In supporting the outcome and recommending that the conclusion of the research was to introduce behavioural expectation as a new construct to predict actual behaviour, we doubted the applicability of behavioural expectation in a situation where the adopters had some experience with the innovations. In addition, would it perform similarly in a setting where adopters were carrying out rational behaviours?

Prior experience was found to be an important determinant of behaviour (Ajzen & Fishbein, 1980; Bagozzi, 1981; Fishbein & Ajzen, 1975; Triandis, 1979). Specifically, it has been suggested that knowledge gained from past behaviour will help to shape intention (Eagley & Chaiken, 1993; Fishbein & Ajzen, 1975). This is, in part, because experience makes knowledge more accessible in memory (Fazio & Zanna, 1978; Reagan & Fazio, 1977) and also because past experience may make low probability events more salient, ensuring that they are accounted for in the formation of intentions (Ajzen & Fishbein, 1980). Thus, direct experience will result in a stronger, more stable behavioural intention–behaviour relationship (Ajzen & Fishbein, 1980). This stable behavioural intention was reflected in behavioural expectation as conceptualised by Warshaw et al. (1984) and Venkatesh et al. (2008).

Where the adopters have proceeded with logical steps and realistically evaluated every situation, the behavioural intention was formed through the reflections of various realistic and possible benefits, the favourableness or unfavourableness of the innovations as well as the expected outcomes which were similar to the concept ‘behavioural expectation’. Furthermore, respondents of this study were SME owners or their representatives who were responsible for organisational prospects and prosperity; thus, they behaved rationally in any decision involving the running of their businesses. They thought, planned and had realistic intentions to stay competitive in the ongoing changing globalised market environment. In this situation, we may conclude that the intention used in this study, in fact, indicates the rational intention, that is, expectation. Thus the final model has combined intention and expectation (these were proposed in the initial model separately) and has used rational intention (expectation) as an immediate antecedent of SMEs’ technology usage behaviour.

4.3.6 THE COMPREHENSIVE RESEARCH MODEL

As discussed earlier, a comparison was made between the initial model and the findings of the field study. Justifications of the selected constructs and dimensions were then made. As a result, this section proposes a comprehensive model for the current research. Figure 4.1 illustrates this comprehensive model.

The comprehensive model (cognitive evaluation, expectation, use and organisational performance) states that cognitive evaluation and entrepreneurs’ innovativeness are

the primary antecedents of behavioural intention. The model argues that in the situation of having prior experience, the outcome and predictions are almost known to the adopters thus the intention becomes rational which is similar to expectation. Thus, the model uses expectation instead of intention to explain the actual technology usage behaviour. Expectation is again logically used in the model to adequately receive the influences of external forces—culture, environmental pressure and country readiness—along with the internal and organisational factors—cognitive evaluation, entrepreneurs’ innovativeness and facilitating condition.

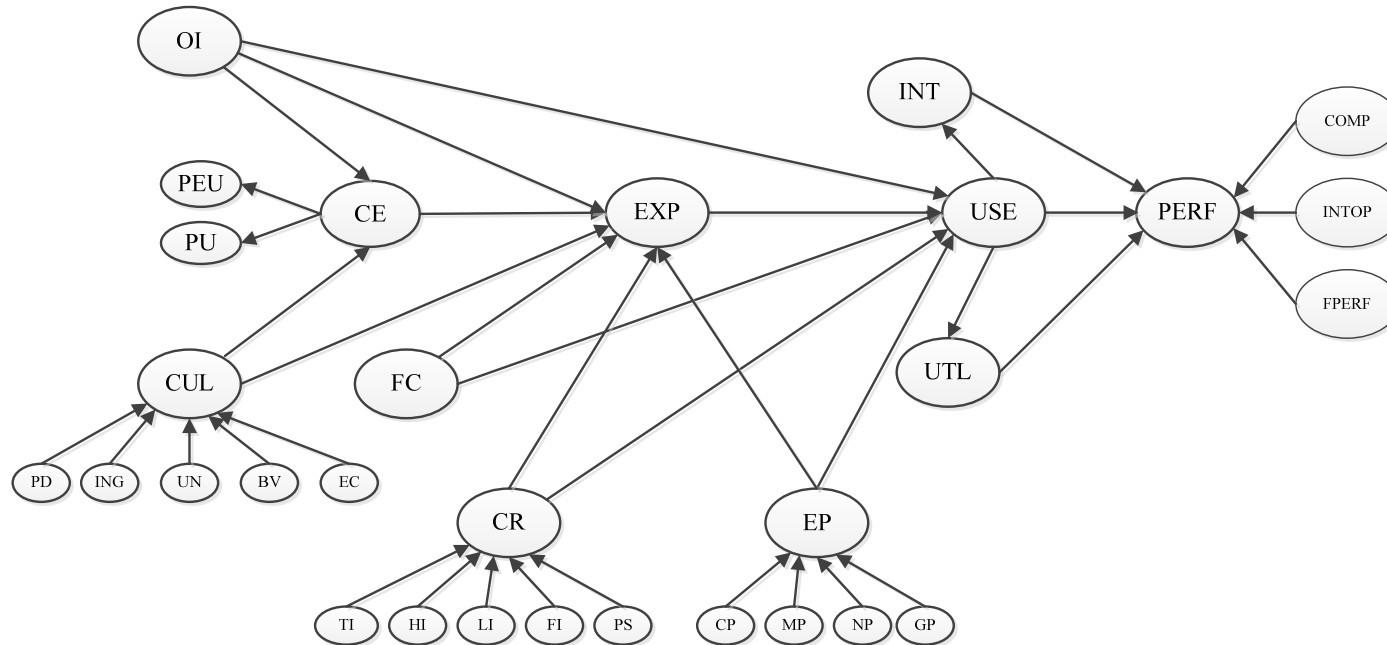
The model has extended one further step in comparison to the TRA, TPB, TAM, the DOI theory or other traditional innovation diffusion frameworks as it includes performance as the final outcome which is explained by the usage of the innovation. The model emphasises that straightforward use of the technology may not be fruitful for enhanced organisational performance. The usage of the innovation will generate organisational performance growth if it is properly utilised within an integrated framework. Thus two new constructs, ICT integration and utilisation, have been included as immediate antecedents of performance: they also act as mediators on the effects of ICT usage on organisational performance.

The model applies higher-order modelling to conceptualise cognitive evaluation, culture, environmental pressure, country readiness and organisational performance. That is, each of those constructs is conceptualised as a higher-order construct of two or more latent variables. The performance construct has been conceptualised as a higher-order construct of competitiveness, internal operation productivity and financial performance.

4.3.7 SUMMARY

This chapter has presented the findings of the field study and has proposed a research model. Qualitative data were generated from 11 interviews conducted in Bangladesh to assess the experience, expertise and perceptions of SME owners or decision-makers on the adoption and diffusion of ICT at firm level. The main objective of this field study was to test the applicability of the proposed initial model based on the prior literature, and to explore the dimensionality of related constructs. Overall, the content analysis technique consisting of inductive and deductive phases was employed to analyse the data. Moreover, theoretical as well as lateral replication was

used in the deductive phase. Factors and variables, as well as some measures, have been explored with these being further scrutinised in light of the relevant literature. Furthermore, relationships among factors have been established. Based on the analysis, a combined model (integrating all factors and variables from each interview) has been developed. Later, this model was compared with the initial model (derived from the literature review) to propose the comprehensive research model. The final model has demonstrated a wide and comprehensive process of ICT diffusion and its resultant outcome as organisational performance in the context of SMEs in Bangladesh. On the basis of the comprehensive model, several hypotheses have been constructed which are reported in Chapter 5. The following chapter (Chapter 6) reports the data analysis and findings of the quantitative survey.



CE = Cognitive evaluation, OI = Owner innovativeness, EXP = Expectation, EP = Environmental pressure, CUL = Culture, CR = Country readiness, FC = Facilitating condition, USE = Actual usage, INT = Integration, UTL = Utilisation, PERF = SME performance.

(First-order constructs, PU = Perceived usefulness, PEU = Perceived ease of use, PD = Power distance, ING = In-group collectivism, UN = Uncertainty avoidance, BV = Bengali value, EC = Ethical culture, TI = Technology infrastructure, HI = Human infrastructure, LI = Legal infrastructure, FI = Financial infrastructure, PS = Government policy and supports, CP = Coercive pressure, MP = Mimetic pressure, NP = Normative pressure, GP = Global pressure, COMP = Competitiveness, INTOP = Internal operation productivity, FPERF = Financial performance)

Figure 4.1: The comprehensive research model

CHAPTER 5

HYPOTHESES AND QUESTIONNAIRE DEVELOPMENT

5.1 INTRODUCTION

This chapter presents the development of the hypotheses and quantitative research instruments based on the comprehensive research model (see Figure 4.1). The model was primarily developed from a rigorous literature review process which was then contextualised and modified by the qualitative field study analysis. The hypotheses are presented in different subsections under section 5.2. Following the presentation of the hypotheses, section 5.3 discusses the development of the research instrument.

5.2 HYPOTHESES DEVELOPMENT

5.2.1 HYPOTHESIS RELATED TO COGNITIVE EVALUATION

The theory of reasoned action (TRA) (Fishbein & Ajzen, 1975) suggests that a structured model be used to examine the relationships between one's beliefs, evaluations, intention and actual behaviour. Fishbein and Ajzen (1975) suggested that an overall affective evaluation, that is, one's beliefs (cognitive) with regard to performing a behaviour and the respective evaluations (affective) heavily influence an individual's intention to perform the behaviour. The evaluation is made based on one's cognitive evaluation of the consequences of that behaviour (Ajzen & Fishbein, 1980; Sheppard et al., 1988). The evaluation process involves functional consequences, that is, the outcomes which are immediate, direct and tangible, as well as the psychological consequences, that is, the consequences which are internal, personal and abstract in nature. These cognitive and affective evaluations form one's attitude, that is, negative or positive feelings about performing a behaviour with this having been widely researched in the consumer, marketing and information systems (IS) research (Fishbein & Ajzen 1975; Ajzen, 1985; Gehrt & Carter, 1992; Mehta & Sivadas, 1995; Reynolds, 1974 (for catalogue shopping); Schlosser et al., 1999 (for Internet advertising); Liao & Cheung, 2001 (for e-shopping); Cho, 2004 (for intended online transactions). In this study, the affective and cognitive aspects were associated with SMEs' intention to use various applications of ICT. The owners' or

managers' feelings about using ICT were formed through their beliefs and the formation of the owners' or managers' feelings (favourableness or unfavourableness) towards using ICT, with this termed as 'attitude' in many previous research studies (Mehta & Sivadas, 1995; Reynolds, 1974; Schlosser et al., 1999; Liao & Cheung, 2001) as a higher conceptualisation of perceived ease of use and usefulness of the technology. The construct was measured by the owners' or managers' evaluation of the usefulness of the technology in their firms' current settings as well as the extent to which the technology was considered easy to use by their respective employees or operators. Thus, this evaluation, although similar to attitude, is termed 'cognitive evaluation'.

The outcome of the field study was supportive of previous studies with the 'cognitive evaluation' being positively related to the SMEs' intention to use ICT. All participants agreed upon the relationship between attitude and intention. The participants expressed the view that the owners' or managers' positive evaluations about the usefulness as well as ease of use of the technology led to the positive intention to use ICT. Unlike the formation of consumers' attitudes towards an innovation, the SMEs' owners had prior knowledge about the innovation and tried to make a rational decision by justifying the prospective gain and sacrifice in using the technology. To make the firm profitable, the owners or entrepreneurs avoided acting on impulse or making an emotional decision both of which are common in the consumer decision process. The intention of SMEs' owners or managers regarding ICT was not simply a dream or aspiration but rather a rational and justified intention which was at least screened through basic financial and managerial concerns. Thus, the intention was termed as an expectation which is a more expressed state of will than intention and can explain the effects of both internal and external factors (Venkatesh et al., 2008; Warshaw & Davis, 1984). The implication was that a positive 'cognitive evaluation' was an important indicator that would influence SMEs' expectation to use ICT. Based on the above discussions, the following hypothesis is proposed:

H₁: Cognitive evaluation has direct and positive influence on SMEs' expectation to use ICT.

5.2.2 HYPOTHESES RELATED TO OWNER INNOVATIVENESS

The adoption of a new product is a diffusion process that moves through different stages over time. Moreover, diffusion is defined as the process by which an innovation is communicated through certain channels over time among the members of a social system (Kendall et al., 2001). According to the diffusion of innovation (DOI) theory (Rogers, 1983, 1995, 2003), the diffusion process begins with knowledge of the existence of the innovation which is followed by persuasion, decision, implementation and confirmation stages. Rogers (1995) indicated that the decision-maker's characteristics, such as, socio-economic characteristics, personality variables and communication behaviours, play a vital role during the knowledge stage which also provides the basis for intention formation. Individuals' innovativeness has a significant influence on the formation of adoption intention of an innovation although it is formed during the persuasion stage.

The adoption of an innovation in a small firm is highly influenced by the personal characteristics and preferences of the owner or CEO of the organisation as most small businesses are managed by the owner who also acts as the CEO (Solomon, 1986; Steinhoff & Burgess, 1986; Yap et al., 1992). Interestingly, the SMEs have a flat organisational structure (Raymond & Magnenat-Thalmann, 1982; Steinhoff & Burgess, 1986). The CEO in a SME usually performs more than one function in running the business operations, makes most decisions, and has full control of organisational resources (Yap et al., 1992; Quaddus & Hofmeyer, 2007). Yap et al. (1992) explained how a CEO could play supportive roles in computer-based information systems (CBIS) in a small business by establishing the firm's appropriate CBIS goals, identifying critical business information needs, allocating sufficient financial resources to achieve CBIS goals and making decisions relating to CBIS implementation and control.

Rogers (1995) also categorised five different adopters according to the time of adoption as being innovators, early adopters, early majority, late majority and laggards (Weber & Kauffman, 2011). The innovators are the adopters who are innovative in nature and bear some risks associated with the early adoption of an innovation. The innovativeness of the CEO or owner of an SME has a significant effect on the adoption and implementation of information systems (Thong, 1999;

Thong & Yap, 1995). Therefore, based on the above discussion, it is hypothesised that:

H_{2a}: Owner innovativeness has direct and significant effects on cognitive evaluation.

H_{2b}: Owner innovativeness has direct and significant effects on SMEs' expectation to use ICT.

H_{2c}: Owner innovativeness has direct and significant effects on SMEs' use of ICT.

5.2.3 HYPOTHESES RELATED TO ENVIRONMENTAL PRESSURE

The technology, organisation and environment (TOE) framework (Tornatzky & Fleischer, 1990) posits the effects of some external or contextual variables such as organisational and environmental factors on the organisational aspects of technology diffusion.

The TOE framework identifies three aspects of a firm's context that influence the process by which it adopts, implements and uses technological innovations. The environmental context is an important context among them referring to the aspects of how a firm conducts its business, responds to its industry, customers and competitors, and deals with government. This framework has received more attention and acceptance from diverse fields of study as it is consistent with the classical diffusion of innovation (DOI) theory (Rogers, 1983). Rogers emphasised the technological characteristics, and both internal and external characteristics of the organisation, as drivers for technology diffusion.

The impact of environmental factors and their characteristics are well addressed in institutional theory which posits that organisations face pressure to conform to these shared notions of appropriate forms of behaviours, since violating them may call into question the organisation's legitimacy and thus affect its ability to secure resources and social support (DiMaggio & Powell, 1983; Tolbert, 1985).

DiMaggio and Powell (1983) distinguished between three types of isomorphic pressure—coercive, mimetic and normative—and suggested that coercive and normative pressure normally operate through interconnected relationships while mimetic pressure acts through structural equivalence.

Ajzen and Fishbein (1980) explored the role of subjective norms and studied how they affect individual behaviour. Subjective norms, in other words, pressure from friends and family plays a vital role in the formation of intention to use an innovation. In the organisational aspect, a focal organisation is able to learn about an innovation and its associated benefits and costs from other user organisations with whom it is directly or indirectly tied, and is likely to be persuaded to behave similarly (Burt, 1982). Many studies consider normative pressure as an antecedent of organisational innovation adoption phenomena (Kuan & Chaum 2001; Teo et al., 2003).

Mimetic pressure is the influence of other structurally equivalent organisations that have initiated some innovations and have become successful. This pressure may cause an organisation to change over time to become more like other organisations in its environment (DiMaggio & Powell, 1983). Many past studies have included mimetic pressure when looking at organisational ICT adoption behaviour (Premkumar & Ramamurthy, 1995; Teo et al., 2003).

Coercive pressure addresses various kinds of power or influence, informal or formal, exercised by other organisations upon which an organisation is dependent. A dominant customer, supplier or parent organisation sometimes exercises their power or coercively influences the organisation to do a certain thing with the dependent organisation having no option other than to comply with the requirement. Coercive pressure has had great importance in previous studies on ICT diffusion behaviour (Teo et al., 2003; Quaddus & Hofmeyer, 2007). This study has applied a hybrid concept of environmental pressure combining all aspects of isomorphic pressure in a higher-order construct. Thus, the effect of environmental pressure in the ICT adoption/diffusion process at firm level is hypothesised as:

H_{3a}: Environmental pressure has a significant influence on SMEs' expectation to use ICT.

H_{3b}: Environmental pressure has a significant influence on SMEs' actual use of ICT.

5.2.4 HYPOTHESES RELATED TO FACILITATING CONDITION

Within the environmental context, the TOE framework (Tornatzky & Fleischer, 1990) also posits the influence of technological context and organisational context. The technological context is concerned with the existing technologies as well as new technologies relevant to the firm while the organisational context addresses descriptive measures of the organisation such as its scope, size and the amount of slack resources available internally. These factors are particularly important for information systems' (IS) diffusion at organisational level as some resources such as technological resources and human resources are required for the operation of ICT. The presence of such resources may facilitate the adoption and use of the technology (Venkatesh et al., 2003).

The facilitating condition—the existence of technological or organisational support infrastructure—is grounded in the theory of planned behaviour (TPB) (Ajzen, 1985). This construct is also included in other successive models such as the decomposed theory of planned behaviour (DTPB) (Taylor & Todd, 1995c), combined TAM and TPB (C-TAM-TPB) (Taylor & Todd, 1995a) and the model of PC utilisation (MPCU) (Thompson, Higgins, & Howell, 1991) which have looked at its effects on intention and actual usage of technological innovations. The construct *facilitating condition* (or PBC [perceived behavioural control]) is included as an antecedent of intention (Ajzen, 1985; Taylor & Todd, 1995c; Thompson et al., 1991) and actual use (Ajzen, 1985; Tornatzky & Fleischer, 1990). Thus, based on the above-mentioned discussion, it is hypothesised that:

H_{4a}: Facilitating condition has a significant influence on SMEs' expectation to use ICT.

H_{4b}: Facilitating condition has a significant influence on SMEs' actual use of ICT.

5.2.5 HYPOTHESES RELATED TO COUNTRY READINESS

Country readiness, an important external factor, has been discussed in various past studies that have examined the adequacy and access costs of basic information infrastructure (Kraemer & Dedrick, 1994; Shich et al., 2005); government policy and legislation ((Teo, Tan, & Buk, 1998; Lee & Shim 2007); regulatory supports (Zhu & Kraemer, 2005; Zhu et al., 2006b); the rule of law, political openness and property

rights protection (Caselli & Coleman, 2001; Oxley & Yeung, 2001; Shih et al., 2005); and education levels (Caselli & Coleman, 2001). Dewan and Kraemer (2000) reported that developed and developing countries differed in terms of the level of IT use and the factors shaping that use. In referring to Rogers (1983), Tornatzky and Fleischer (1990), and Caselli and Coleman (2001), Zhu and Kraemer (2005) mentioned that, at the general level, technology diffusion studies presented evidence of an unevenly occurring diffusion across countries with different environments which indicated that country-specific characteristics mattered when it came to technology diffusion. Likewise, a variety of economic, social and political factors, including income, education, technology policies, cultural norms, and access to formal and informal communication networks impact on the extent of diffusion.

Iacovou, Benbasat, & Dexter (1995) and Kuan and Chau (2001) considered readiness primarily as the availability of resources (financial and technical) as well as strategic readiness. Country readiness has become an important factor to be investigated in the area of organisational technology diffusion studies as, even though an organisation has enough resources, this does not necessarily mean that they facilitate the situation towards better performance. Thus, the facilitating condition's effect on behavioural expectation and ICT use (Venkatesh et al., 2003, 2008) is not limited solely to organisational resources. Internet availability and facilities at national level, Internet speed, the cost of Internet access and ICT resources, regulatory framework, market conditions, delivery systems, and government policy and supports also have direct effects on ICT adoption producing a regulatory environment that accelerates or hinders ICT use at firm level.

The field study also supported the inclusion of country readiness as an antecedent of expectation and actual ICT usage behaviour. Participants in the field study indicated that country-level technology infrastructure, human infrastructure, legal infrastructure, financial infrastructure and government policy and supports were important concerns that created country readiness for rapid adoption and diffusion of ICT. The above-mentioned four dimensions of country readiness should not be considered in isolation from each other, but should be treated in a collective and mutually reinforcing manner. Hence, the country readiness construct represents an integrative measure of the level of readiness along these four dimensions. A second-

order factor modelling approach can capture correlations among the four first-order factors and explain them using a higher-order construct that is an integrative latent representation of country readiness. Previous studies have noted that this operational approach represents a theoretically strong basis for capturing complex measures (Venkatraman, 1990; Sethi & King, 1994; Segars & Grover, 1998; Stewart & Segars, 2002; Zhu & Kraemer, 2002; Zhu et al., 2003). Country readiness is not quite evenly reflected in the four dimensions.

This factor is considered as a new aspect of the facilitating condition which is different from the facilitating condition (organisational-level resources and capabilities) explained in previous studies (Venkatesh et al., 2003, 2008) and is termed 'country readiness'. This study thus logically added country readiness as a separate predictor of behavioural expectation and actual use behaviour. Based on the above discussion, it is hypothesised that:

H_{5a}: Country readiness has a significant influence on SMEs' expectation to use ICT.

H_{5b}: Country readiness has a significant influence on SMEs' use of ICT.

5.2.6 HYPOTHESES RELATED TO CULTURE

The existing theories have admitted the effects of various external environmental factors on the adoption and diffusion of an innovation in the organisational context (Rogers, 1995, Tornatzky & Fleischer, 1990). The theoretical frameworks developed by Hofstede et al. (2001) and House et al. (2004) stressed the effects of culture on organisational leadership. Hofstede (2001) treated culture as the collective programming of the mind that distinguishes the members of one group or category of people from another and studied culture in five dimensions—power distance, collectivism, uncertainty avoidance, masculinity versus femininity, and long-term versus short-term orientation.

House et al. (2004) addressed culture differently with nine dimensions—performance orientation, assertiveness, future orientation, humane orientation, institutional collectivism, in-group collectivism, gender egalitarianism, power distance and uncertainty avoidance. House et al. (2004) indicated that national culture has effects on leadership and organisational processes. Thus, the planning,

execution and controlling aspects of an organisation are highly influenced by culture. By utilising Hofstede et al.'s (2001) and House et al.'s (2004) frameworks, many previous studies have examined the impact of culture on organisational technology adoption. Thatcher et al. (2006) reported that culture plays an important role in the adoption of a certain technology by organisations in a particular country and it also impacts on the degree to which the technology is accepted and the ways in which it is used. Past studies have also supported the link between cultural dimension and different facets of IT use (Bertolotti, 1984; Burn, 1995; Erez & Early, 1993; Gefen & Straub, 1997; Hill et al., 1998; Ho et al., 1989; Straub, 1994; Harris & Davison, 1999). Erumban and Jong (2006) found that the national culture and ICT adoption rate of a country are closely related. They further reported that most of Hofstede's dimensions were important in influencing adoption with power distance and uncertainty avoidance dimensions seeming to be the most influential.

This study has undertaken a qualitative research study to explore and justify the effects of various cultural dimensions in the diffusion of ICT among SMEs in Bangladesh. The analysis of the interview transcripts resulted in anticipation of the effects of five dimensions of culture, namely, power distance, uncertainty avoidance, in-group collectivism, ethical culture and Bengali values on the intention to use ICT.

The exploratory search also anticipated negative structural relationships between cultural dimensions and SMEs' intention to use ICT. Based on the above discussion, it is hypothesised that:

H_{6a}: Culture has a significant influence on cognitive evaluation.

H_{6b}: Culture has a significant influence on SMEs' expectation to use ICT.

5.2.7 HYPOTHESIS RELATED TO EXPECTATION

The majority of the innovation diffusion theories included intention as a strong predictor of actual usage behaviour (Fishbein & Ajzen, 1975; Ajzen, 1985; Davis, 1986; Rogers, 1983; Venkatesh et al., 2003). As an immediate antecedent of actual innovation usage behaviour, behavioural intention can explain the effects of various internal or external factors in predicting actual behaviour. For example, intention is formed through the adopter's characteristics (Rogers, 1983; Thong & Yap, 1995);

perceived behavioural control (Ajzen, 1985); subjective norms (Fishbein & Ajzen, 1975); perceived ease of use and perceived usefulness (Davis, 1986); and performance expectancy and effort expectancy (Venkatesh et al., 2003). Although intention, a reflection of the adopter's internal schema of beliefs, had a significant influence in earlier behavioural models, it cannot predict the situation which is not under full volitional control of the adopter or the situation where a time gap exists between intention and actual behaviour (Venkatesh et al., 2008). However, a stronger predictor of actual behaviour could incorporate some other external (social and environmental) dimensions which would need to be considered in the existing model. Venkatesh et al. (2008) further modified their UTAUT model (Venkatesh et al., 2003) and included behavioural expectation as a new construct which is a stronger predictor of behaviour than intention.

The field study did not find any differences between intention and expectation. Furthermore, it proved that the SME owner who intended to adopt a new technology did not simply dream about it nor was it unachievable. The intention was formed by justifying the feeling through taking into consideration several business and resource factors. For example, Firm A indicated that: *"[t]he supports and surrounding facilities screen the intention. We are not in any doubt whether we could do so according to our intention. We will upgrade the existing technology."*

Based on the previous literature (Venkatesh et al., 2008) and the field study results, this study has hypothesised that behavioural expectation is a possible predictor of actual ICT use. Thus,

H₇: Expectation has a significant influence on actual ICT usage.

5.2.8 HYPOTHESES RELATED TO ICT USE

ICT use is included as the final dependent variable in most of the theoretical frameworks which involve IT innovation diffusion behaviour (Davis, 1986; Taylor & Todd, 1995a; Venkatesh et al., 2003, 2008). Past studies have employed ICT use as the final dependent variable based on the notion that ICT use would generate performance. Researchers have applied different aspects of IS use such as duration of use, frequency of use and intensity of use to measure the actual behaviour in relation to any IT usage (Venkatesh et al., 2008).

Some studies have employed different forms of IT usage such as ICT/system use (Zhu & Kraemer, 2005; Zhu et al., 2006a; Davis, 1986; Taylor & Todd, 1995a; Anandarajan et al., 2002); electronic data interchange (EDI) integration (Iacovou et al., 1995); e-business initiation, adoption and routinisation (Zhu et al., 2006b); and e-commerce migration (Hong & Zhu, 2006). Although the investigation of ICT use was found to be the focus of a number of ICT innovation diffusion studies in the past few years, ICT's impact on performance growth has become a vital issue in recent years. The literature has supported a direct and positive relationship between IT usage by SMEs and firm performance (Zhu et al., 2006a; Zhu & Kraemer, 2005).

Anandarajan et al. (2002) indicated a concern relating to the productivity paradox and stated that the mere adoption of IT by organisations does not necessarily confer on them the benefits that could only result from its effective usage. Past literature has enunciated that many information systems in LDCs are under-utilised and thus do not make a significant contribution to improving the performance of the organisations that are using them (Forster & Cornford, 1992; Ordedra et al., 1993). In support of the previous studies, Song and Mueller-Falcke (2006) stated that SMEs are confronted with a number of challenges in adopting and using ICT and they often end up under-utilising the available technologies (see UNCTAD, 2006). Information systems usage implies the role that information systems utilisation plays in generating organisational performance.

Zhu et al. (2005) also indicated the positive and effective role of ICT integration on organisational performance. Thus, the motivation for organisational ICT adoption or usage is to integrate or properly utilise the technology for performance growth.

The field study supported the view that the integration of diversified technologies is dependent on the level of ICT usage by SMEs in Bangladesh. For example, Firm K stated: *"[a]fter that [introduction of ICT use], the scope of ICT use has widened and strengthened. It seems that a new technology is just introduced in some department and gradually it will spread over the organisation and work under a common system."*

The field study further explored the view that the degree of ICT utilisation is also developed from the firm's usage of different levels of ICT applications. For example,

Firm B stated: “[we] can earn productivity and efficiency (organisational performance) through proper utilisation of ICT particularly through some software by which we can track, control and initiate alternative strategy ... those companies [from whom] we are getting benefits and gradually developing, they are actually developing due to the proper utilisation of the technology (ICT). For example, in [the] international context, some big companies are giving their employees ‘Blackberries’ so they (employees) can mail and be connected with the network from anywhere around the world.”

Based on the above discussion, it is hypothesised that:

H_{8a} : ICT usage has a significant influence on integration.

H_{8b} : ICT usage has a significant influence on utilisation.

H_{8c} : ICT usage has a significant influence on performance.

5.2.9 HYPOTHESIS RELATED TO ICT INTEGRATION

The resource-based view (RBV) (Barney, 1991) emphasises combining ICT resources to build unique IT capabilities which would generate organisational performance. The IT capabilities are dependent on how ICT is integrated and utilised among different functional areas. Recent studies have shown that ICT integration facilitates transactional efficiencies and expansion of existing channels. Zhu and Kraemer (2002, 2005) revealed that integration (of the front-end functionalities of e-business) helps firms to provide real-time product information to customers, offers customisation capability, and facilitates self-service via online account management, thereby improving transactional efficiencies and expanding the existing channels: ICT integration (back-end integration) also enables information sharing within the firm and along the value chain.

The field study has justified the effects of ICT integration on organisational performance. For example, Firm B stated that: “[w]e have accumulated some of our similar closely related group of companies into very close contact between those are working with us in the same network environment through our server. We are performing the above-mentioned work through ICT (as we have got good results).”

“It (ICT integration) makes our communication and interaction with customers easy.”(Firm J). Firm J also indicated the positive effect of ICT integration on organisational performance by saying, *“[w]e find the ICT is working better when we see that [ICT by integration] makes the communication with our supplier easy.”*

Based on past studies and the results of the field study, it is hypothesised that:

H₉: ICT integration has a significant influence on performance.

5.2.10 HYPOTHESIS RELATED TO ICT UTILISATION

As with ICT integration, appropriate utilisation of ICT can contribute to organisational ICT capabilities. Thus, according to the RBV, organisational performance also logically depends on the utilisation of ICT. Past studies have revealed that many information systems in least developed countries (LDCs) are under-utilised and hence do not make a significant contribution to improving the performance of the organisations that are using them (Forster & Cornford, 1992; Ordedra et al., 1993).

In analysing the field study interviews, it was anticipated that utilisation of ICT would influence organisational performance as the field study had explored whether ICT utilisation has a direct positive link with organisational performance. For example, Firm H stated that: *“[w]e are trying to develop the IT-literate competent employee day by day. We hope we shall be capable of appropriate and comprehensive use of ICT.”* Firm I expressed the importance of ICT utilisation on organisational performance in terms of ensuring customer satisfaction when it stated that: *“[i]f the ICT is not appropriate [appropriately utilised], we will not be able to satisfy the customer or target group.”* Firm J, agreeing with Firms H and I, also stated the importance of ICT utilisation by saying: *“[t]he performance is dependent on how well [how appropriate] we will use [utilise] ICT.”*

The field interview analysis revealed that most of the organisations, such as Firms H, I and J recognised the importance of ICT utilisation to secure improved organisational performance. However, Firm K expressed their strong concern about the erroneous process or bad organisational performance which may happen if ICT is

not properly utilised. The importance of ICT utilisation on organisational performance is clearly reflected in the following statement:

“ICT enhances the employees’ performance. ICT normally reduces the error. But it varies from person to person operating the ICT. It depends on their skill. I have a doubt if the ICT is not properly handled [properly utilised], it may produce bad and damaging output.” [Firm K].

Based on the above discussion, it is thus hypothesised that:

H_{10} : ICT utilisation has a significant influence on performance.

5.2.11 HYPOTHESIS RELATED TO THE MEDIATION EFFECTS OF INTEGRATION AND UTILISATION

Numerous studies have found a positive link between IT use and organisational performance (Dvir et al., 1993; Cragg, King, & Hussin, 2002; Pilat & Wyckoff, 2005; Baldwin & Sabourin, 2001; Gretton et al., 2004). Although achieving enhanced organisational performance is the motivation for organisations using ICT, past studies have also revealed differing results such as research by Warner (1987) who found a negative effect; Venkatraman and Zaheer (1990) and Sager (1988) who found no effect; and Powell and Dent-Micallef (1997) and Tippins and Sohi (2003) who found mixed effects; while Bharadwaj (2000) and Zhu and Kraemer (2005) found direct positive effects. Previous subsections (subsections 5.2.8, 5.2.9 and 5.2.10) have analysed ICT usage, integration and utilisation and have also hypothesised relationships between them. Hypotheses H_{8a} , H_{8b} and H_{8c} proposed that ICT usage would have positive effects on integration, utilisation and organisational performance. On the other hand, Hypotheses H_9 and H_{10} proposed that integration and utilisation would have positive effects on organisational performance. The above-mentioned relationships may imply that integration and utilisation have mediational effects which has not been widely investigated in previous studies.

Kim et al. (2006) revealed the mediation role of inter-firm systems integration in explaining the effects of supply chain communication systems (SCCS) innovation on firm supply chain performance. Although the mediation effects of integration have been empirically justified, there remains a paucity of empirical findings in support of the role of utilisation. This study thus looked at the interrelationship of ICT usage,

integration, degree of utilisation and organisational performance through the use of the field study analysis in which the mediation effect of utilisation was found. For example, Firm I indicated that: “[i]f the ICT is not appropriate [appropriately utilised], we will not be able to satisfy the customer or target group” and Firm J also stated the relationship by saying: “[t]he performance is dependent on how well [how appropriate] we will use [utilise] ICT.” The field study also justified the mediating roles of both integration and utilisation. For example, Firm K stated that: “... if the technology is used [utilised] completely in different working areas in the entire organisation as well as if the external organisations are also integrated or communicated with entirely through ICT, the performance [organisational performance] will certainly be increased.” Based on the above discussion, it is hypothesised that:

H_{11a}: Integration plays a significant mediation role in explaining the effects of ICT usage on SME performance.

H_{11b}: Utilisation plays a significant mediation role in explaining the effects of ICT usage on SME performance.

H_{11c}: Integration and utilisation jointly play a significant mediation role in explaining the effects of ICT usage on SME performance.

5.3 QUESTIONNAIRE DEVELOPMENT

The previous section has discussed the various constructs under study and has anticipated possible relationships between them with the result that 10 sets of hypotheses (see Figure 5.1) have been formulated. These hypotheses were tested by the survey data. The data were collected by a questionnaire survey in which the questionnaire contained a set of questions which specifically examined different hypotheses developed for this study. The following sections describe the questionnaire development.

5.3.1 OVERVIEW OF THE QUESTIONNAIRE

This study collected data in two phases. The first phase was confined to collecting qualitative data by interviews which were conducted using a semi-structured questionnaire. The final phase involved data collection in order to test the

hypotheses. An extensive survey was administered through a structured questionnaire which was designed to test the research hypotheses according to the comprehensive model as shown in Figure 4.1.

The questionnaire was developed from the existing relevant literature and field study. The questionnaire included a wide range of questions specific to the study hypotheses. A variety of forms, patterns and scales were used in different questions which included, where applicable, open-ended, closed-ended, dichotomous, numerical, categorical questions and questions with answers rated on a Likert-type scale. In order to assess respondents' perceptions, both semantic differential scales and Likert scales were used. The questionnaire was broadly divided into three main sections: questions related to respondents' demographic details; questions related to different factors of ICT use; and questions related to organisational performance. The next section is divided into the following subsections: questions related to cognitive evaluation; owner innovativeness; expectation; environmental pressure; country readiness; culture; ICT use; integration and utilisation.

5.3.2 MEASUREMENT INSTRUMENT

This section discusses the development of the measurement instrument which includes the form of the instrument and its sources. The main sources of the instrument were the existing literature and the field study.

5.3.2.1 Cognitive evaluation

In accordance with the theoretical framework developed for this study (see Chapter 4), *cognitive evaluation* reflects the adopter's favourableness or unfavourableness towards an innovation with this view formed through various attitudinal beliefs and respective evaluations. Fishbein and Ajzen (1975) addressed various attitudinal beliefs and their evaluations as determinants of attitude towards an innovation. Many past studies have measured adopter favourableness or unfavourableness (attitude) towards an innovation by a few reflective items such as '*using the innovation is good/bad idea*', '*the innovation makes work more interesting*', '*working with the innovation is fun*', and '*I like/dislike working with the innovation*' (Venkatesh et al., 2003; Davis et al., 1989). In measuring the theory of planned behaviour (TPB) constructs, Taylor and Todd (1995b) combined all belief items with the evaluative

components using the expectancy-value approach suggested in the TPB (Ajzen (1985, 1991), for example, $\sum_{i=1} b_i e_i$ for measuring the attitude, $\sum_{j=1} n b_j m c_j$ for the subjective norm, and $\sum_{k=1} c b_k p f_k$ for perceived behavioural control. Shih and Fang (2004) followed this approach in predicting customers' intention to adopt Internet banking.

With reference to Ajzen (1991), Taylor and Todd (1995b) stated that the relationship between the belief structures and the determinants of intention (A [attitude], SN [subjective norm] and PBC [perceived behavioural control or facilitating condition]) are particularly not well understood due to two factors. Firstly, the belief structures are combined into unidimensional constructs (i.e. $\sum_{i=1} b_i e_i$, $\sum_{j=1} n b_j m c_j$, $\sum_{k=1} c b_k p f_k$) in the theory. Such monolithic belief sets may not be consistently related to attitude, subjective norm or perceived behavioural control (Bagozzi, 1981, 1982; Miniard & Cohen, 1979, 1981; 1983; Shimp & Kavas, 1984). Secondly, the belief sets, especially those relating to attitude, are idiosyncratic to the empirical setting, making it difficult to operationalise the theory. In contrast to the TPB, the technology acceptance model (TAM) (Davis et al., 1989) proposed a belief set, consisting of ease of use and usefulness that was consistent and generalisable across different settings. Based on the above discussion, Taylor and Todd (1995b) recommended a set of stable, decomposed belief structures for the TPB model.

The field study explored eight different items which measured SME owner favourableness or unfavourableness towards ICT. Interestingly, all eight measurement items belonged to two distinct factors. The past literature has recognised these two factors as *perceived usefulness* and *perceived ease of use* (Davis, 1986, 1989; Taylor & Todd, 1995b; Venkatesh, 2003). Guided by the field study and following the suggestion by Taylor and Todd (1995b), this study combined all eight reflective items to measure *cognitive evaluation*. Applying the principle of hierarchical modelling—molecular model (Chin & Gopal, 1995)—*perceived usefulness* and *perceived ease of use* were used as reflective first-order constructs of a hybrid conceptualisation called '*cognitive evaluation*'. The measurement items of the first-order constructs, although developed from the field

study, were also supported by the existing literature. Items for the first-order manifest variables of the higher-order *cognitive evaluation* and their sources are stated in Table 5.1.

Table 5.1: Cognitive Evaluation

Items	Statement	Sources
<i>Ease of use</i>		
PEU1	My interaction with the technology would be clear and understandable	Field study, Venkatesh et al. (2003)
PEU2	It would be easy for me to become skilful at using the technology	Field study, Venkatesh et al. (2003)
PEU3	I would find the technology easy to use	Field study, Venkatesh et al. (2003)
PEU4	Learning to operate the technology is easy for me	Field study, Venkatesh et al. (2003)
<i>Usefulness</i>		
PU1	I would find ICT useful in my job	Field study, Venkatesh et al. (2003)
PU2	Using the technology enables me to accomplish tasks more quickly	Field study, Venkatesh et al. (2003)
PU3	Using the technology increases my productivity	Field study, Venkatesh et al. (2003)
PU4	If I use the technology, I will increase my chances of getting a raise	Field study, Venkatesh et al. (2003)

5.3.2.2 Owner innovativeness and facilitating condition

Owner innovativeness was modelled as an antecedent of ICT adoption by SMEs. Thong and Yap (1995) adopted the *risk-taking ability* of the owner and the owner’s ‘ability to produce original ideas’ to face the competitive environment as measurement items for owner innovativeness. The field study explored two items for measuring *owner innovativeness* which were similar to the measurement items adopted by Thong and Yap (1995) (see Table 5.2).

This study modelled *facilitating condition* as an antecedent factor of expectation as well as ICT usage. Past studies have adopted a few items related to the adopter’s assessment of their firm’s ability and resources, such as, assessing whether the adopter has the resources necessary to use the innovation, if the adopter has the knowledge necessary to use the innovation, if the innovation is incompatible with other systems, and if a specific person (or group) is available for assistance with any operational difficulties (Venkatesh, 2003; Venkatesh & Zhang, 2010).

The field study explored the items relating to the existing systems or processes of the organisation (i.e. whether the systems or processes were compatible with ICT usage), the resources of the organisation (whether the organisation had the resources necessary to use the systems) and the skill of the employees (whether employees had the knowledge and skills necessary to use the systems). The measurement items for facilitating condition explored through the field study were similar to the measurement scales adopted by Venkatesh et al. (2003). Measurement items for *owner innovativeness* and *facilitating condition* along with their sources are presented in Table 5.2.

Table 5.2: Items for Owner Innovativeness and Facilitating Condition

Items	Statement	Sources
<i>Owner innovativeness</i>		
OI1	He often risks doing things differently	Field study, Thong & Yap (1995)
OI2	He has original ideas	Field study, Thong & Yap (1995)
<i>Facilitating condition</i>		
FC1	The ICT system is compatible with other existing systems that we use	Field study, Venkatesh et al. (2008)
FC3	Our employees have the knowledge and skill necessary to use the system	Field study, Venkatesh et al. (2008)
FC4	We have the resources necessary to use the system	Field study, Venkatesh et al. (2008)

5.3.2.3 Environmental pressure

This study modelled *environmental pressure* as an antecedent of behavioural expectation and usage of ICT by SMEs with a view to examining the effects of ICT on organisational performance. The institutional theory (DiMaggio & Powell, 1983) suggests that organisations face three dimensions of environmental pressure, namely, coercive pressure, mimetic pressure and normative pressure. Past studies have examined the effects of one particular dimension or the joint effects of these three dimensions to estimate the impacts of environmental pressure on organisational ICT adoption behaviour. For example, Teo et al. (2003) studied coercive pressures, mimetic pressures and normative pressures, Zhu et al. (2003) studied competitive pressures which are known as mimetic pressures, and Quaddus and Hofmeyer (2007) studied coercive pressures.

Past studies have employed various scale items to measure different dimensions of environmental pressure. For example, Teo et al. (2003) used seven subconstructs to measure the three dimensions of environmental pressure. Specifically, they adopted the subconstructs, *extent of adoption among competitors* and *perceived success of competitor adopter* for mimetic pressures; *perceived dominance of suppliers*, *perceived dominance of adopter customers*, *conformity with parent corporation's practices* for coercive pressures; and *extent of adoption among suppliers*, *extent of adoption among customers* and *participation in industry, business and trade associations* for normative pressures. As they were also latent variables, these subconstructs were measured by multiple indicators (Teo et al., 2003). In contrast to predictive estimates, the dimensions of environmental pressure were directly measured by multiple items such as coercive pressure being measured by the adopter's assessment on *whether the parent company liked the adopting firm's use of ICT*, *whether major customers demanded firms' ICT use* and *whether major suppliers demanded firms' ICT use* (Quaddus & Hofmeyer, 2007); and competitive pressures were measured by the adopter's assessment about *the degree affected by competitors in the local market* and *the degree affected by competitors in the national market* (Zhu & Kraemer, 2005).

The field study explored 11 items which belonged to four distinct groups. Three of the four constructs, namely, *coercive pressure*, *mimetic pressure* and *normative pressure* (Teo et al., 2003), were similar to the dimensions adopted in previous studies. The field study explored a new dimension of environmental pressure named *global pressure* which had arisen from the ongoing initiatives of globalisation.

In accordance with the results of the field study analysis, coercive pressure was measured by the extent to which dominant customers and parent organisations forced SMEs to use the technology. Mimetic pressure was measured by items relating to the extent to which competitors used ICT and to those competitors who had largely benefited from their use of ICT. Normative pressure was measured by items relating to the extent of ICT use by customers, by suppliers, by important stakeholders or business partners, and by regulatory bodies. The pressure relating to globalisation was measured through items which enquired about the extent to which the organisation used ICT to attain the business opportunities arising from globalisation,

and about the extent to which the organisation believed that no business at present could be sustained without utilisation of ICT. All of the above-mentioned measurement items were supported by the existing literature except the items for global pressure which were explored from the field study.

Table 5.3: Items for Environmental Pressure

Items	Statement	Sources
<i>Coercive pressure</i>		
CP1	My parent company likes us to use ICT	Field study, Quaddus & Hofmeyer (2007)
CP2	Our major customer demanded our ICT use	Field study, Quaddus & Hofmeyer (2007)
CP3	Our major suppliers demanded our ICT use	Field study, Quaddus & Hofmeyer (2007)
<i>Mimetic pressure</i>		
MP1	What is the extent of ICT adoption by your firm's competitors currently?	Field study, Teo et al. (2003)
MP2	My main competitors that have adopted ICT have benefited largely	Teo et al. (2003)
<i>Normative pressure</i>		
NP1	What is the extent of ICT adoption by your firms' customers currently?	Field study, Teo et al. (2003)
NP2	What is the extent of ICT adoption by your suppliers currently?	Field study, Teo et al. (2003)
NP3	What is the extent of ICT adoption by your important business partner currently?	Field study, Quaddus & Hofmeyer (2007)
NP4	What is the extent of ICT adoption by your regulatory bodies?	Field study
<i>Global pressure</i>		
GP1	I am encouraged to adopt ICT in accessing opportunities arising by globalisation	Field study
GP2	I feel this is the time when nobody can sustain [their business] without utilising ICT	Field study

Importantly, the final research model included overall environmental pressure as an antecedent of SMEs' expectation to use ICT. In accordance with the results of the field study, the effects of overall environmental pressure were measured by the four dimensions, coercive pressure, mimetic pressure, normative pressure and global pressure. These four dimensions were used as index of the higher-order conceptualisation. Past studies used composites of various dimensions to measure a compound variable; for example, Taylor and Todd (1995b) used a composite of *peer influences* and *superior influences* to measure *normative pressure*. Analysis of the field study findings, and particularly the interpretation of the free node and tree node structures, suggested the application of a molar model structure (Chin & Gopal,

1995) to measure overall environmental pressure as a second-order construct developed by these four constructs instead of through aggregation or averaging their effects. Table 5.3 presents contents and sources of all measurement items for the first-order latent variables of the higher-order *environmental pressure*.

5.3.2.4 Country readiness

This study modelled *country readiness* as an antecedent of behavioural expectation and usage of ICT by SMEs. Past studies have addressed various environmental factors related to the preparedness of the country which may impact on fostering the usage of ICT by organisations, particularly SMEs. Important country readiness dimensions explored in the existing literature included *national infrastructure* (Kurnia & Peng, 2010; Huy & Filiatrault, 2006); *regulatory environment* (Zhu et al., 2003); *government supports* (Jeon et al., 2006); *technology vendors supports* (Doolin et al., 2003); and *technology readiness, country wealth and level of education* (Marques et al., 2011).

The field study explored 16 items to measure the impact of country readiness. During the analysis, those 16 items were further grouped into five dimensions of country readiness, namely, *technology infrastructure, human infrastructure, legal infrastructure, financial infrastructure and government policy and supports* (see Table 5.4).

The availability and coverage of Internet services in Bangladesh, Internet speed, availability of necessary hardware and uninterrupted power supply were the items explored by the field study to measure technology infrastructure.

Items that measured human infrastructure related to the general people's *level of education, knowledge of ICT, ICT skill and institutional supports for ICT training and education*.

The measurement items for legal infrastructure were *legal protection for digital communication and online business, and online consumer protection*.

Financial infrastructure was measured by items related to *the extent to which online banking services are available and trend of debit or credit card use in the country*.

Government policy and supports was one of the major constructs explored through the qualitative field study. The measurement items were *government's tax and customs policy, motivational program, government grants and supports*.

Table 5.4: Items for Country Readiness

Items	Statement	Sources
<i>Technology infrastructure</i>		
TI1	Availability and coverage of Internet service in the country	Field study
TI2	Speed and sophistication of Internet	Field study
TI3	Availability of necessary hardware and accessories	Field study
TI4	Uninterrupted power supply	Field study
<i>Human infrastructure</i>		
HI1	Level of education of the general people	Field study
HI2	General people's knowledge of ICT	Field study
HI3	Computing skill of the general people	Field study
HI4	Institutional support for computer education	Field study
<i>Legal infrastructure</i>		
LI1	Legal supports for digital communication and business through the Internet	Field study
LI2	Law relating to online consumer protection	Zhu & Kraemer (2005)
<i>Financial infrastructure</i>		
FI1	Online banking facility	Field study
FI2	Credit and debit card usage trend	Zhu & Kraemer (2005)
<i>Government policy and supports</i>		
GOV1	Government tax and customs policy	Field study, Zhu & Kraemer (2005)
GOV2	Government's motivational program	Field study
GOV3	Government grants	Field study
GOV4	Government subsidies	Field study

By applying an interpretive research approach, a careful analysis of the field study, particularly the structures of theme, sub-themes and nodes, suggested that *technology infrastructure, human infrastructure, legal infrastructure, financial infrastructure, and government policy and supports* were subconstructs for measuring the construct of interest—*country readiness*. Past studies have used composites of various dimensions to measure a compound variable, for example, Taylor and Todd (1995b)

used a composite of *efficacy* and *facilitating condition—technology* and *facilitating condition—resources* to measure *perceived behavioural control*.

As with the formation of the construct *environmental pressure*, the field study suggested that *country readiness* be formed as a higher-order construct by applying the molar model structure (Chin & Gopal, 1995). Measurement items for all first-order constructs and their sources are shown in Table 5.4.

5.3.2.5 Culture

Culture has been variously defined in the past literature. Kroeber and Kuckhohn (1952) considered 160 different definitions of culture while attempting to develop an acceptable general definition of culture. The variations in conceptualisation of the term ‘culture’ have also been widened in the past 60 years.

Contemporary studies have followed Hofstede et al.’s (2001) framework to conceptualise national culture (Erumban & Jong, 2006). A more recent framework for cultural study developed by the GLOBE cultural study (House et al., 2004) has received numerous researchers’ attention with this also having been developed based on Hofstede et al.’s (2001) framework. However, Hofstede et al.’s (2001) and House et al.’s (2004) frameworks have been the most recent developments in the study of culture.

In Hofstede et al.’s (2001) model, *culture* is conceptualised by five dimensions: *power distance*, *collectivism*, *uncertainty avoidance*, *masculinity versus femininity* and *long-term versus short-term orientation* while House et al. (2004) explained culture through nine dimensions: *performance orientation*, *assertiveness*, *future orientation*, *humane orientation*, *institutional collectivism*, *in-group collectivism*, *gender egalitarianism*, *power distance* and *uncertainty avoidance*.

Numerous past studies, investigating the effects of culture in the field of management, have considered a portion of Hofstede et al.’s (2001) or House et al.’s (2004) models as being relevant to their studies (Mustamil, 2010; Wahab, 2010).

Table 5.5: Items for Culture

Items	Statement	Sources
<i>Power distance</i>		
PD1	In this society, followers are expected to obey their leader without question/ question their leader when in disagreement	House et al. (2004)
PD2	In this society, power is concentrated at the top/shared throughout the society	House et al. (2004)
PD3	I believe that followers should obey their leader without question/question their leader when in disagreement	House et al. (2004)
PD4	I believe that power should be concentrated at the top/shared throughout the society	House et al. (2004)
<i>Uncertainty avoidance</i>		
UN1	In this society, orderliness and consistency are stressed, even at the expense of experimentation and innovation	House et al. (2004)
UN2	In this society, social requirements and instructions are spelled out in detail so citizens know what they are expected to do	House et al. (2004)
UN3	In this society, orderliness and consistency should be stressed, even at the expense of experimentation and innovation	House et al. (2004)
UN4	In this society, social requirements and instructions should be spelled out in detail so citizens know what they are expected to do	House et al. (2004)
<i>In-group collectivism</i>		
INGR1	Group members take pride in the individual accomplishments of their group managers	House et al. (2004)
INGR2	Group managers take pride in the individual accomplishments of their group members	House et al. (2004)
INGR2	Managers encourage group loyalty even if individual goals suffer	House et al. (2004)
<i>Bengali values</i>		
BVAL1	Face-to-face communication is vital in our daily lives	Field study
BVAL2	In honour of the language movement, the Bengali language is available everywhere	Field study
BVAL3	Very close and tight social bond	Field study
<i>Ethical culture</i>		
ECUL1	Bribery/corruption are seen as common phenomena everywhere in the main institutions of society	Field study
ECUL2	Politicisation/nepotism are seen as common phenomena everywhere in the main institutions of society	Field study

This field study explored 14 items to measure the impact of culture. Through analysis, the field study grouped these 14 items into five dimensions of culture. Three of the five dimensions of culture that may affect the diffusion of IT among SMEs in Bangladesh and that were explored through the field study were related to the dimensions explained by Hofstede et al. (2001) and House et al. (2004). The field study explored two new dimensions of culture which were Bengali values and ethical behaviour-related cultural issues. Although these aspects of culture were beyond the scope of Hofstede et al.'s (2001) and House et al.'s (2004) frameworks, it was

considered that they may play an influential role in shaping SMEs' ICT diffusion behaviour. This study, thus, included five dimensions—*power distance*, *collectivism*, *uncertainty avoidance*, *Bengali values* and *ethical culture*—to measure the effects of culture.

As with environmental pressure and country readiness, culture was also measured as a higher-order construct by applying the molar model structure (Chin & Gopal, 1995). Items measuring the first-order cultural dimensions for culture and their sources are stated in Table 5.5.

5.3.2.6 Expectation and ICT usage

This study modelled *expectation* and *ICT usage* as antecedents of *ICT usage* and *organisational performance*, respectively. *Expectation* was included in the research model to indicate the state of rational intention towards adoption of ICT. Past studies have applied a variety of measurement items for intention and expectation as well as for actual usage behaviour (Davis, 1989; Kendall et al., 2001; Venkatesh et al., 2003; Venkatesh et al., 2008). For example, Davis (1989) applied three items to measure intention, namely; *I plan to use the system in the next <n>month*, *I predict to use the system in the next <n>month* and *I am going to use the system in the next <n>month*. On the other hand, Kendall et al. (2001) measured Singaporean SMEs' e-commerce adoption intention by assessing their intended state of various e-commerce applications. The intention was measured using a 6-point scale by categorising six different intended states of e-commerce applications; 1 = *Current year*, 2 = *Intend to use within 1 year*, 3 = *Within 1–2 years*, 4 = *Within 2–5 years*, 5 = *Within 5–10 years*, and 6 = *No intention*. The order of these intended states was applied to assess various levels of e-commerce. The construct was estimated as a latent variable comprising multiple items, for example, *willingness to have a homepage in the company*, *willingness to conduct sales through Internet*, *willingness to purchase the supplies through Internet*, etc.

Venkatesh et al. (2008) differentiated the expectation from the intention and applied a relatively expressed state of intention for measuring *expectation* such as *I will use the system in the next <n> month*, *I am likely to use the system in the next <n> month* and *I am going to use the system in the next <n> month*. Interestingly, this current study did not find any differences between *intention* and *expectation* (see the

field study analysis in Chapter 4). The field study analysis revealed that this state of willingness was different from the 'intention' that was used in past studies. More clearly, SMEs' intention to use any level of ICT was not only a cognitive wish or simply a plan or a dream, it was definite and rational. Based on the field study results, this study used 'expectation' as an logical immediate antecedent of actual usage behaviour: expectation was directly influenced by various individual, organisational and environmental factors.

Furthermore, the previous innovation diffusion studies have mostly focused on a particular technology or systems usage such as Internet, email, personal computers, e-commerce, EDI, etc.; thus assessment using items like *I plan ...*, *I will ...* or *I predict ...* may be logical grounds from which to measure potential users' intentions. This study has focused on the diffusion of ICT in general which has comprised a range of ICT applications. The field study explored various levels of ICT applications that were being currently used by different SMEs in Bangladesh. To overcome possible ambiguity in construct measurement, these ICT applications were categorised into five distinct levels of ICT operation: (i) basic computing which includes computer and basic Internet operation such as email; (ii) homepage operation (static homepage); (iii) interactive homepage which supports product cataloguing and order processing (e-commerce); (iv) interactive homepage which supports online transactions and account management (e-business); and (v) complete digital communication and exchanges within and outside the organisation (ERP [enterprise resource planning]). Applying the measurement approach adopted by Kendall et al. (2001), respondents' assessments about their expected use of those ICT applications were used as measures for *expectation*. Various states of expectation were assessed through a differential scale: 1 = current user; 2 = expect within 6 months; 3 = within 12 months; 4 = within 1–3 years and 5 = expectation is not specified.

As with intention, actual usage was measured variously in previous studies. Venkatesh et al. (2003) measured actual usage behaviour as the duration of use via system logs; Venkatesh et al. (2008) used observed scale items including duration of use, frequency of use and intensity of systems use to measure IS use; and Zhu and Kraemer (2005) measured e-business usage as a latent variable of multiple observed

variables such as percentage of consumer sales conducted online, percentage of B2B sales conducted online, percentage of goods for resale ordered online, etc. For assessing actual ICT usage, this study used a similar set of questions for *expectation*. While measuring actual ICT usage, respondents were asked about how often they used those five different levels of ICT applications. A semantic differential scale was used to collect details of respondents' actual ICT usage with '5' representing 'use quite often' and '1' denoting 'not used at all'. The measures for *expectation* and actual *ICT usage* and their sources are stated in Table 5.6.

Table 5.6: Items for Expectation and ICT Usage

Items	Statement	Sources
<i>Expectation</i>		
<i>Scale: 1 = current user; 2 = expect within 6 months; 3 = within 12 months; 4 = within 1–3 years, 5 = expectation is not specified.</i>		
EXP1	ICT basic operation (computer, email, web surfing, etc.)	Field study
EXP2	Internet with own homepage (static homepage)	Field study
EXP3	Interactive homepage which supports product cataloguing and order processing	Field study
EXP4	Interactive homepage which supports online transactions and account management	Field study
EXP5	Complete digital/electronic communication and exchanges within and outside the organisation	Field study
<i>ICT use</i>		
<i>Scale: 5 = use quite often; 1 = not used at all.</i>		
USAGE1	ICT basic operation (computer, email, web surfing, etc.)	Field study
USAGE2	Internet with own homepage (static homepage)	Field study
USAGE3	Interactive homepage which supports product cataloguing and order processing	Field study
USAGE4	Interactive homepage which supports online transactions and account management	Field study
USAGE5	Complete digital/electronic communication and exchanges within and outside the organisation	Field study

5.3.2.7 Integration and utilisation

This study modelled *integration* and *utilisation* as antecedents of organisational performance. Integration and utilisation were also predicted to be intervening variables between ICT usage and organisational performance. Past studies used integration as a latent variable which was measured through multiple items, for example, *to what extent company web applications are electronically integrated with*

back-office systems and databases and to what extent company databases are electronically integrated with suppliers and partners (Zhu & Kraemer, 2005).

Although a few studies stated the importance and consequences of ICT utilisation (particularly under-utilisation) in generating enhanced organisational performance from a developing country perspective, there was a paucity of empirical studies which quantified the variable, *degree of utilisation*, and measured its effects on organisational performance. The field study supported the importance of ICT integration in enhancing SMEs' performance and also reiterated the importance of the degree of utilisation of ICT in different functional areas such as production (or services), administration and accounts, as well as marketing and sales.

Table 5.7: Items for Integration and Utilisation

Items	Statement	Sources
<i>Integration</i>		
INT1	ICT is utilised in entire working areas in the organisation	Field study
INT2	All departments and functional areas of this organisation are integrated through a single ICT system	Field study
INT3	Our website is well developed for front-end functionality which supports information, product catalogue, customer customisation and account management	Field study, Zhu & Kraemer (2005)
INT4	Our web applications are electronically integrated with back-office systems and databases	Field study, Zhu & Kraemer (2005)
INT5	Company's databases are electronically integrated with suppliers and partners	Field study, Zhu & Kraemer (2005)
<i>Utilisation</i>		
UTL1	Utilisation of ICT in production and service-related functions	Field study
UTL2	Utilisation of ICT in admin and accounts-related functions	Field study
UTL3	Utilisation of ICT in sales and marketing-related functions	Field study

Combining the field study results with the relevant literature, *integration* was measured by the respondents' assessment of: (i) *ICT is utilised in entire working areas in the organisation*; (ii) *all departments and functional areas of this organisation are integrated through a single ICT system*; (iii) *our website is well developed for front-end functionality which supports information, product catalogue, customer customisation and account management*; (iv) *our web applications are electronically integrated with back-office systems and databases*; and (v) *company's*

databases are electronically integrated with suppliers and partners. The respondents' assessment was quantified using a 5-point Likert scale.

Due to the paucity of literature, measurement items for the degree of utilisation were explored from the field study. The degree of utilisation was measured by the respondents' assessment of the extent of appropriate utilisation of ICT into various functional areas such as production, administration and accounts, as well as marketing and sales. A differential scale was employed to measure utilisation with the measures being: 1 = ICT not at all utilised; 2 = utilised to conduct 20% of functions; 3 = utilised to conduct 20–50% of functions; 4 = utilised to conduct 50–80% of functions; and 5 = utilised to conduct more than 80% of functions. Measurement items for *integration* and *utilisation* as well as their sources are given in Table 5.7.

5.3.2.8 Performance

This study has examined the diffusion of ICT by SMEs in Bangladesh: it has extended the scope of the traditional innovation diffusion model by including two stages of post-adoption phenomena relating to ICT, namely, ICT use and value creation in terms of organisational performance. Previous studies have measured organisational performance in various ways (Powell & Dent-Micallef, 1997; Bharadaraj, 2000; Zhu & Kraemer, 2005; Madden et al., 2013; Beard et al., 2014). The measurement items for organisational performance used in this study have been mainly adapted from prior studies such as those by Zhu and Kraemer (2005) and Powell and Dent-Micallef (1997). In addition to the items adapted from the existing literature, the field study also explored new items for measuring organisational performance. The results of the field study provided support for items previously used for organisational performance measurement and also suggested a second-order latent variable measurement structure.

The field study analysis revealed nine items for measuring organisational performance which were further categorised into three distinct groups, namely, competitiveness, internal operation productivity and financial performance. The overall organisational performance was measured as a higher-order conceptualisation comprising these three performance dimensions. Prior research has supported the measurement of organisational performance as a second-order construct (Zhu et al.,

2003; Zhu & Kraemer, 2005; Rai et al., 2006). This study employed higher-order modelling and measured organisational performance as a composite of first-order constructs: *competitiveness*, *internal operation productivity* and *financial performance*. All items for the first-order latent constructs of organisational performance and their sources are stated in Table 5.8.

Table 5.8: Items for Performance

Items	Statement	Sources
<i>Competitiveness</i>		
COMP1	Interaction with customer has been increased	Field study, Zhu et al. (2004), Zhu & Kraemer (2005)
COMP2	Our sales area has been widened	Field study, Zhu et al. (2004)
COMP3	Competitive position has been improved	Field study
<i>Internal operation productivity</i>		
INTOP1	The internal process of the organisation became transparent	Field study
INTOP2	The internal process of the organisation became structured	Field study, Zhu et al. (2004)
INTOP3	Productivity of the employees has been improved	Field study, Zhu et al. (2004)
<i>Financial performance</i>		
PERF1	Overall performance is increased	Field study, Powell & Dent-Micallef (1997)
PERF2	Profitability of the company has been increased	Field study, Powell & Dent-Micallef (1997)
PERF3	Sales of the company have been increased	Field study, Zhu & Kraemer (2005), Powell & Dent-Micallef (1997)

5.4 QUESTIONNAIRE TRANSLATION

It was stated in previous chapters that the main objective of the study was to look at the diffusion of ICT and its resultant outcome as organisational performance in the Bangladeshi context. The owners of different SMEs were the subjects of the study: they were comfortable with and used to communication and exchanges in the Bengali language. Thus, the English version questionnaire was translated into Bengali before conducting the survey to achieve greater convenience and ease of operation. A complete English version of the survey questionnaire has been provided in Appendix C.

A back-translation method (Marin & Marin, 1991) was employed to create an accurate Bengali-version questionnaire and ensure equivalence of the two versions (see Chapter 3). The back-translation process underwent a series of translations, check–recheck and modifications. The researcher first translated the original English questionnaire, which had been approved by the university’s Human Research Ethics Committee, into Bengali. The first version of the Bengali questionnaire was thoroughly checked by a university academic in Australia who was a native Bangladeshi. This refined version of the translated questionnaire was further reviewed by two university academics from Bangladesh who were involved in research in Australia. The final version of the Bengali questionnaire was again translated back into English. A third person, a researcher from Bangladesh, performed the back-translation of the questionnaire into English. This back-translated version of the questionnaire provided the opportunity to check whether the translated version of the items projected a similar meaning and approach to the original version. Interestingly, although some words were found to be different, all items in both versions of the questionnaire were observed to be similar in their meaning which finally ensured equivalence of the two versions of the questionnaire. A complete Bengali-translated version of the survey questionnaire has been provided in Appendix D.

5.4.1 QUESTIONNAIRE REFINEMENT AND PILOT TEST

The initial questionnaire was refined through pre-testing prior to administering the actual survey (as described in Chapter 3). The primary version of the questionnaire was distributed to five respondents in Australia who had direct experience in SMEs in Bangladesh. The feedback from these five respondents was used to modify the questions for the final survey. The questionnaire was translated into Bengali before being used to conduct the final survey.

Although the questionnaire had been refined and modified through pre-testing, a pilot test was also conducted by administering a mini sample survey with the final version of the questionnaire. A total of 35 SMEs were surveyed after being selected through a convenience sampling technique.

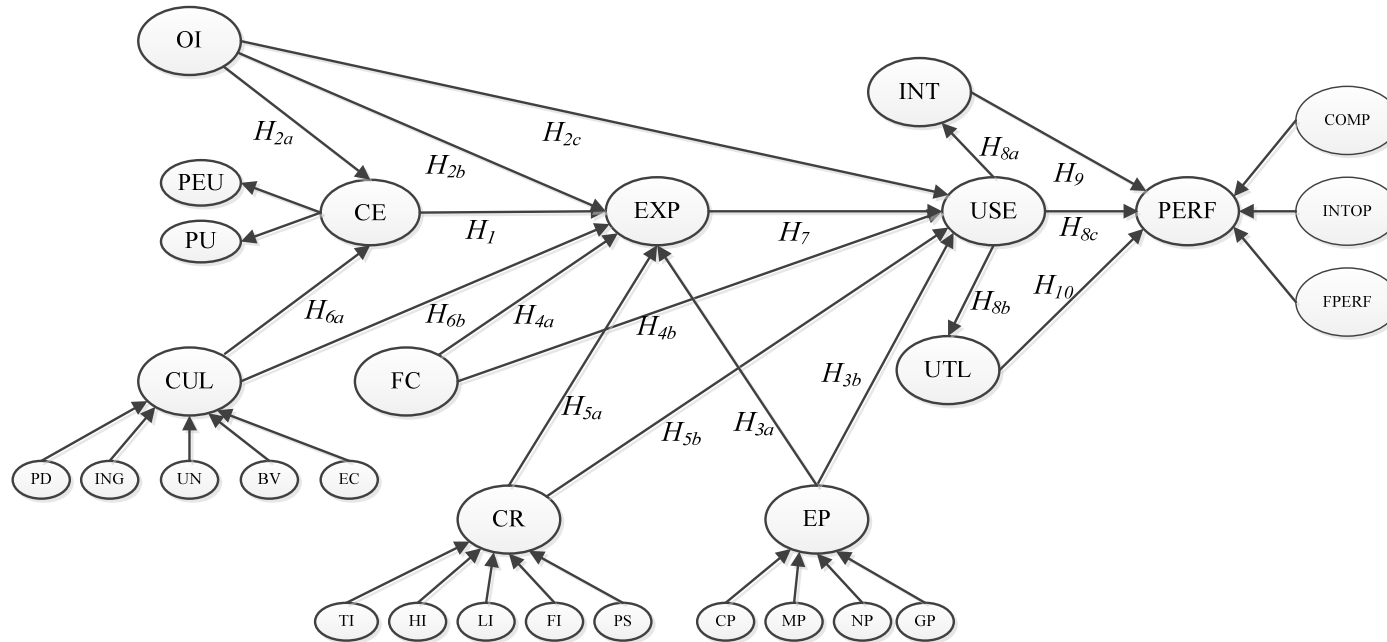
Some errors and mistakes related to different questions were detected and a few suggestions were received during the pilot test. The errors and mistakes were mainly

associated with: (i) ambiguous meaning for some words; (ii) some questions being very close in their meaning creating confusion for respondents; (iii) difficulties experienced in indicating their appropriate evaluation on the Likert scale; and (iv) the question's approach not being simple and easy.

Despite the errors, the data collected through the pilot survey were recorded and the study model was estimated. The analysis also indicated some loopholes in the questionnaire. For example, the factor analysis of the data collected through the pilot survey showed that the factor loadings of some constructs were '1'. The suggested reason for this was that when respondents were unable to differentiate the level of their evaluation in answering the questions, they mostly chose the extreme value. Thus, the factor loading of different items of some constructs tended to reach a value of '1'. Based on feedback from respondents during the pilot survey and errors detected through analysing the pilot survey data, the entire questionnaire was revised to ensure that it was a valid and reliable survey questionnaire. It is worth noting that the incorporation of all respondents' suggestions and the analysis results led to slight modification of the final version of the questionnaire by replacing some words and making changes in the expression of some questions which mostly involved simplification. The final version of the questionnaire was then used to collect data from a national survey.

5.5 SUMMARY

This chapter has presented the construction of the hypotheses in accordance with the final research model developed in Chapter 4. To analyse the comprehensive research model (see Figure 4.1), 18 hypotheses were developed to describe the relationships between the study variables (see Figure 5.1). Furthermore, three hypotheses were developed to analyse the mediating roles of ICT integration and degree of utilisation to explain the influence of ICT usage on organisational performance. The development of the measurement scales and items was also presented. Next, the survey questionnaire was developed based on the existing literature and field study results. The back-translation method was employed to translate the instrument for the survey. Pre-testing and a pilot study were used to validate the questionnaire. The final questionnaire played the vital role in the data collection by a national survey which is discussed in Chapter 6.



CE = Cognitive evaluation, OI = Owner innovativeness, EXP = Expectation, EP = Environmental pressure, CUL = Culture, CR = Country readiness, FC = Facilitating condition, USE = Actual usage, INT = Integration, UTL = Utilisation, PERF = SME performance.

(First-order constructs, PU = Perceived usefulness, PEU = Perceived ease of use, PD = Power distance, ING = In-group collectivism, UN = Uncertainty avoidance, BV = Bengali value, EC = Ethical culture, TI = Technology infrastructure, HI = Human infrastructure, LI = Legal infrastructure, FI = Financial infrastructure, PS = Government policy and supports, CP = Coercive pressure, MP = Mimetic pressure, NP = Normative pressure, GP = Global pressure, COMP = Competitiveness, INTOP = Internal operation productivity, FPERF = Financial performance)

Figure 5.1: The comprehensive research model and hypotheses

CHAPTER 6

DATA ANALYSIS¹⁵

6.1 INTRODUCTION

This chapter presents the quantitative data analysis procedures and reports on the results. In particular, this chapter presents the procedure for and results from estimating the structural model using the partial least squares (*PLS*)-based structural equation modelling (*SEM*) by applying *PLS-Graph* Version 3, as well as reporting on the validation of the psychometric properties of the measurement model. Factor loadings, *t*-statistics and the composite reliability of the reflective constructs are presented as proof of convergent validity, while average communalities, the correlation matrix and cross-loading matrix are also provided as proof of discriminant validity among the reflective constructs. The relative importance of the formative items towards the formation of the related latent construct is also

¹⁵ This chapter contributed to the following journal and conference papers:

- i. Azam, M. S., & Quaddus, M. (2013). Examining the influence of national culture on adoption and use of information and communication technology: A study from Bangladesh's SME perspective. *The International Technology Management Review*, 3(2), 116–126.
- ii. Azam, M. S., & Quaddus, M. (2012). Effects of internal and external factors on internet-based digital technology usage by SMEs in a developing country. *Communications of the IIMA*, 12(4), 41–69.
- iii. Azam, M. S., & Quaddus, M. (2013, 14–17 October). The effects of national infrastructure and government policy on information and communication technology usage by SMEs in a developing country. *24th Annual Conference of the International Information Management Association (IIMA 2013)*, 2013, New York, USA (forthcoming).
- iv. Azam, M. S., & Quaddus, M. (2013, 4–7 August). The mediating effects of ict integration and utilisation on ICT usage and SME performance. *6th Africa-Asia-Australasia Conference of the International Telecommunications Society 2013*, Perth, Australia.
- v. Azam, M. S., Madden, G., & Quaddus, M. (2013, 4–7 August). A multivariate probit estimation to examine the impact of ICT on SMEs' marketing performance. *6th Africa-Asia-Australasia Conference of the International Telecommunications Society 2013*, Perth, Australia..
- vi. Azam, M. S., & Quaddus, M. (2013, 20–23 May). Does ICT use affect SMEs' performance? A developing country perspective. *International Journal of Science and Arts (IJAS) Conference 2013*, Toronto, Canada.
- vii. Azam, M. S., & Quaddus, M. (2012, 5–7 December). Information and communication technology usage by SMEs in a developing country: An environmental perspective. *26th Annual Australian and New Zealand Academy of Management Conference (ANZAM) 2012*, Perth, Australia.
- viii. Azam, M. S., & Quaddus, M. (2012, 15–17 October). Do environmental pressures and culture affect Internet-based digital technology usage by SMEs in a developing country? *23rd Annual Conference of the International Information Management Association (IIMA) 2012*, Chicago, USA.
- ix. Azam, M. S. (2012, 22–23 March). Acceptance and usage of ICT by the SMEs in Bangladesh: A cultural perspective. *Curtin Graduate School of Business (CGSB) Research Forum 2012*, Perth, Australia.
- x. Azam, M. S., & Quaddus, M. (2011, 13–16 November). How culture affects ICT diffusion among SMEs in Bangladesh. *5th Africa-Asia-Australasia Conference of the International Telecommunications Society 2011*, Perth, Australia.

appraised. The assessment of the structural model commenced once the measurement model had been evaluated and adjusted. Estimates of path coefficients, *t*-statistics and R^2 values are presented to determine the degrees and magnitudes of the effects of exogenous variables and explanatory power of the model. This chapter concludes by describing the results of the hypotheses testing.

6.2 OVERVIEW OF SURVEY AND DATA EXAMINATION

The study analysed 282 survey responses collected from different SMEs in Bangladesh. The response rate was calculated as 22% for the samples from the ready-made garment (*RMG*) industry and 55% for the leather and leather product industry. Partial least squares (*PLS*)-based structural equation modelling (*SEM*) was used as the key analytical tool for the estimates. The representativeness or generalisability of the research outcomes was largely dependent on the sample size. A reasonable number of observations could generate reliable results. The size of the sample was considered adequate for executing structural equation modelling for the estimates as it satisfied different sample size specifications as suggested by Hair et al. (1998), Gefen et al. (2000), Barclay et al. (1995) and Chin (1998a).¹⁶

The theoretical model of the study consisted of 25 first-order constructs and five higher-order constructs among which six constructs were endogenous. The sample size should be at least 60 ($6 \times 10 = 60$) according to Gefen et al. (2000): in the model, the number of indicators within the most complex formative construct was six. Another recommendation was that it should be at least 50 ($5 \times 10 = 50$) according to Barclay et al. (1995) and Chin (1998a) as the largest number of antecedent constructs leading to an endogenous construct as predictors in a regression was five. The study was finally run with 282 sample units for data analyses which could be considered sufficient for a robust PLS model.

¹⁶ Hair et al. (1998) suggested 200 sample units to estimate any multivariate analysis which was widely executed when using covariance-based structural equation modelling (CBSEM). However, researchers have followed different suggestions for sample size determination for the PLS-based structural equation modelling (SEM) estimation. According to Gefen et al. (2000), the sample size should be at least 10 times the number of items within the most complex, formative construct of the model. Barclay et al. (1995) and Chin (1998a) stated that the sample size must be 10 times the indicators within the most complex formative construct.

6.2.1 SAMPLE PROFILE

As the study utilised a disproportionate stratified probability sampling technique, different types of SMEs from the manufacturing industry sector were included in the sample which brought in logical grounds for generalising the inferred outcomes.

Table 6.1: Survey Firm Characteristics

Description	F	%
<i>Sector</i>		
Ready-made garment industry	225	79.8%
Leather industry	57	20.2%
<i>Size</i>		
Small business	174	61.7%
Medium business	108	38.3%
<i>Level of ICT use</i>		
Homepage	271	96.1%
Online cataloguing	91	32.3%
E-commerce	50	17.7%
ERP	1	0.4%
<i>SMEs' preferences & grants</i>		
Received preferences as an SME	51	18.1%
Received subsidies or ICT grants	20	7.1%
<i>Nature of customer</i>		
Geographically diverse customers	234	83.0%
Customers not geographically diverse	48	17.0%
<i>Internet connectivity</i>		
Dial-up/DSL	29	10.3%
Broadband (cable and mobile)	236	83.7%
Mobile broadband	17	6.0%
<i>Operating offices or stores</i>		
Single office or store	11	3.9%%
Two offices or stores	238	88.4%
More than two offices or stores	33	11.7%
<i>ICT experience</i>		
Started ICT before 2000	68	24.1%
Started ICT since 2000	214	75.9%

The study investigated the opinions and perceptions of the owner, owner-manager, manager (decision-maker) or delegated representative of SMEs located in or adjacent to the city of Dhaka. Dhaka was selected as the sampling area after taking into consideration the fact that a high concentration of industry was evident in or near Dhaka. Internet penetration was also high in Dhaka comprising approximately 80% of Bangladesh's total Internet users. The sample consisted of 79.2% from the RMG industry and 20.2% from the leather industry (see Table 6.1).

Of the firms surveyed, 96.1% had their own homepage, 32.3% had a product cataloguing-capable homepage, 17.7% have experience in e-commerce, and 0.4% had an enterprise resource planning (ERP) system. The study included 18.1% of firms who enjoyed preferences as SMEs whereas only 7.1% had received any grants or subsidies for ICT.

Furthermore, the survey comprised 85.1% male and 14.9% female respondents (see Table 6.2). The sample also included respondents of different ages, levels of education, levels of income and ICT experience which enhanced the representativeness of the sample data.

As shown in Table 6.2, 42.6% of respondents were aged below 34 years, 37.2% were 35–44 years, and 20.2% were aged 45 years or above. In terms of education, 35.8% of respondents had Masters' degrees, 47.5% had bachelor degrees and 5.7% had higher secondary certificates: 11% had other academic qualifications.

The study also included 17% of respondents with monthly income below 20,000 BDT, 40.4% between 20,000 BDT and 30,000 BDT, 21.3% between 30,000 BDT and 50,000 BDT, 17.0% between 50,000 BDT and 100,000 BDT while 4.3% of respondents had monthly income over 100,000 BDT. Overall, 95.7% of respondents had prior ICT experience.

Table 6.2: Survey Respondent Characteristics

Description	F	%
<i>Gender</i>		
Male	240	85.1%
Female	42	14.9%
<i>Age</i>		
Age 34 or below	120	42.6%
Age 35-44 years	105	37.2%
Age 45-60 years	54	19.1%
Age Over 60 years	3	1.1%
<i>Education</i>		
Master's degree	101	35.8%
Bachelor degree	134	47.5%
Higher secondary certificate	16	5.7%
Others	31	11.0%
<i>ICT experience</i>		
Have ICT experience	270	95.7%
No ICT experience	12	2.3%
<i>Monthly income</i>		
Below 20,000 BDT	48	17.0%
20,000-30,000 BDT	114	40.4%
30,000-50,000 BDT	60	21.3%
50,000-100,000 BDT	48	17.0%
Over 100,000 BDT	12	4.3%

6.2.2 DATA EXAMINATION

Prior to analysis, the data were first screened for outlier checking and missing values. Alreck and Settle (1995) recommended an extensive data clean-up process which involves the review of the data line by line to check for any errors due to missing or irrational data. In conjunction with reviewing the data line by line, this study adopted frequency tables and the Mahalanobis distance test for outlier checking. During screening, some missing values were found. As the number of missing cells was small in size considering the number of variables as well as the number of records, a different approach for missing value adjustment, involving a re-visit to the respondents, was employed in the belief that precaution was better than cure. However, there still remained some missing values even after re-visiting the

respondents. Finally, an ML (maximum likelihood) algorithm was used for the imputation of the remaining missing values. The careful review and screening of the raw data resulted in 282 complete and usable data records for the final data analysis.

The theoretical model was composed of 25 first-order constructs which comprised 12 reflective and 13 formative constructs. The model also included five second-order constructs which comprised two reflective higher-order constructs and three formative higher-order complex conceptualisations. The theoretical model involved six endogenous latent variables to illustrate the structural relationships among the 25 first-order and five second-order latent constructs.

The model comprised 34 reflective items and 40 formative items which were composed of 25 first-order and six second-order conceptualisations. This was used to examine the effects of predictors for the endogenous latent variables of the study namely, *cognitive evaluation*, *expectation of ICT usage*, *actual ICT usage*, *ICT integration*, *ICT utilisation* and *organisational performance*. The number of constructs employed in the theoretical model indicated that the sample size of the study ($n = 282$) was adequate to proceed with *PLS*-based structural equation modelling (*SEM*). The analysis also conformed to the minimum threshold requirement of allocating at least two indicators per construct for structural equation modelling (*SEM*) (Rahim et al., 2001; Kline, 2010).

6.2.3 JUSTIFICATION OF REFLECTIVE AND FORMATIVE MEASURES

The differentiation and appropriate use of formative and reflective constructs in estimates has been a recent advancement of structural equation modelling (*SEM*). IS researchers initially modelled mostly reflective constructs due to many reasons. These included the availability of software that was supportive for estimates of formative constructs (Chin, 1998a; Gefen et al., 2000); conceptual criteria for determining whether constructs should be specified as reflective or formative (Diamantopoulos & Winklhofer, 2001; Edwards & Bagozzi, 2000); lack of a consistent standard for assessing psychometric properties of measures (Bagozzi, 1998; Bollen, 1989); and lack of requisite knowledge for the subsequent estimates (Jarvis, Mackenzie, & Podsakoff, 2003). The introduction of *PLS*-based structural equation modelling (*SEM*) has provided the analytical tools suitable for modelling reflective and formative constructs. The development of software for component-

based *SEM* has provided enormous opportunities for researchers who are involved in modelling reflective and formative constructs. However, it is difficult to anticipate the nature of an indicator, that is, whether it is reflective or formative.

Researchers have primarily judged the nature of a latent variable by applying the definitions of reflective and formative indicators as described below.

By nature, reflective items are highly correlated as they (reflective indicators) represent reflections, or manifestations, of a construct. Hence, variation in a construct leads to variation in its indicators (Bollen, 1989). For example, an individual change in the latent *perceived usefulness* construct results in corresponding changes in each manifest indicator of perceived usefulness. Thus, perceived usefulness has been identified as a reflective construct.

Formative indicators, on the other hand, are entirely opposite to the character of a reflective indicator. The formative items show direct causal relationships from the item to the latent variable, that is, the items cause the latent variable (Diamantopoulos & Winklhofer, 2001). In other words, the formative constructs are formed by their respective measurement items. Thus, the items are not correlated and measure different underlying dimensions of the latent variable (Chin, 1998b). For example, *country readiness* is measured by *technology infrastructure*, *human infrastructure*, *legal infrastructure*, *financial infrastructure*, and *government policy and supports*. The measurement indicators are not correlated and the variation in the latent construct does not lead to variation in its indicators. More clearly, an individual's favourable assessment about *country readiness* does not necessarily mean that all of its indicators are favourable for SMEs' ICT adoption. Thus, the country readiness construct has been identified as a formative construct.

Modelling reflective or formative constructs requires theoretical justification (Jarvis et al., 2003; Diamantopoulos & Siguaw, 2006; Coltman et al., 2008). However, it may be difficult to explore the theoretical interpretation of a construct, reflective versus formative. Jarvis et al. (2003) developed a set of conceptual criteria which are used as a guideline for justifying the nature of variables, reflective or formative, modelled to measure a phenomenon. More clearly, a variable is modelled as *formative* when the following decision rules hold; otherwise, it is *reflective*:

- (i) the direction of causality is from indicators to constructs
- (ii) the indicators need not be interchangeable
- (iii) covariation among indicators is not necessary, and
- (iv) the nomological net of indicators can differ (Jarvis et al., 2003; Rai, Patnayakuni, & Seth, 2006; Petter, Straub, & Rai, 2007).

The screening process, which applied the above conceptualisations and decision rules (see Appendix E for the decision rules in detail), resulted in the identification of 34 reflective items and 40 formative items for 12 reflective and 13 formative first-order constructs. Five second-order constructs comprising two reflective higher-order constructs and three formative higher-order complex conceptualisations were also justified.

6.2.4 EXAMINATION OF POSSIBLE BIASES

The distributions of the sample into various types of firms resulted in a balance between the different categories of SMEs which were of different type, size, scope of business and competitive position. A quarter of the respondents in the sample were from small enterprises and three quarters were from medium-sized enterprises. The survey instruments were supplied to different SMEs in Bangladesh anonymously selected using a stratified random sampling technique. Through the use of several follow-up calls and reminders by telephone and by sending surveyors as the researcher's representatives, the survey responses were received in two phases. In the first phase, a total of 150 responses were received. The researcher again initiated the push technique to receive more responses. At this stage, two trained surveyors were employed to contact respondents who had not yet sent the completed survey instruments. Repeated follow-up calls and SMS, and surveyors' personal contacts resulted in the receipt of 132 more responses. The study thus analysed the data set which comprised responses collected at two different points in time.

To ascertain the quality of the data, the study examined whether any systemic biases could exist due to there being two groups of respondents.

Table 6.3: Test of Possible Biases

Variable	Mean Rank		Mann-Whitney U Test			KS Test	
	Wave-1	Wave-2	Mann-Whitney	Z-stat	p value	Z score	p value
<i>Firm Characteristics</i>							
Sector	142.14	140.77	9804.000	-0.202	0.840	0.081	1.000
Size	140.14	143.05	9696.000	-0.355	0.723	0.173	1.000
Global business	143.88	138.80	9543.000	-0.803	0.422	0.302	1.000
SME preference	140.44	142.70	9741.000	-0.349	0.727	0.135	1.000
<i>Level of ICT use</i>							
Homepage	142.30	140.59	9780.000	-0.524	0.601	0.102	1.000
Online cataloguing	143.00	139.80	9675.000	-0.407	0.684	0.190	1.000
E-commerce	140.00	143.20	9675.000	-0.498	0.619	0.190	1.000
<i>Intention to use IT</i>							
Online cataloguing	142.58	140.27	9738.000	-0.248	0.804	0.218	1.000
E-commerce	145.10	137.41	9360.000	-0.867	0.368	0.627	0.826
<i>Subjective perception</i>							
Perceived usefulness	137.29	146.29	9268.000	-0.973	0.331	0.691	0.727
Perceived ease of use	142.86	139.96	9696.500	-0.321	0.748	0.355	1.000
<i>Personal</i>							
Gender	141.18	141.86	9852.000	-0.114	0.909	0.041	1.000
Age	142.89	139.92	9691.000	-0.329	0.742	0.321	1.000
Education	136.40	149.34	8865.500	-1.647	0.100	0.716	0.684
Income	142.98	139.82	9678.000	-0.339	0.734	0.686	0.735

As the survey responses were received during two different time periods, a question could be asked about whether respondents who answered quickly may be in a more advantageous position in terms of their company's positioning or their status in using advanced ICT: knowing the situation better might thus motivate them to answer the questionnaire. On the other hand, late respondents may be affiliated with the group of firms that were running with a lower level of ICT use; thus, they could be less motivated to respond. However, it was not unlikely that the advanced group, in enjoying various facilities and the uniqueness of the technology, might overrate the benefits, utility and usage of ICT and other aspects of the study. To test this possible bias, the total sample was divided into two groups: Wave-1 (advanced group: firms responded quickly) and Wave-2 (general group: firms responded in the second time period).

The Mann-Whitney U test was used to compare the ranked means of some discrete variables between the two groups. A Kolmogorov-Smirnov (K-S) test was further used to examine if the sample distribution of Wave-1 group was equal to that of the Wave-2 group (Boes, Graybill, & Mood et al., 1974, reported in Zhu & Kraemer, 2005). As shown in Table 6.3, the p value of each variable was insignificant ($p > 0.10$). That is, all variables such as firm characteristics (sector, size, global business and SME preference); level of ICT use (homepage, online cataloguing and e-commerce); intention to use ICT (online cataloguing and e-commerce); subjective perception (perceived usefulness and perceived ease of use); and individual characteristics (gender, age, education and income) seemed to be equal between the groups. Thus, the study concluded that the category of respondents (Wave-1 or Wave-2) did not cause any survey bias.

6.3 MODEL ASSESSMENT

6.3.1 ASSESSMENT OF THE MEASUREMENT MODEL

The model consisted of 25 first-order constructs and five second-order constructs. Both first-order and second-order constructs contained reflective as well as formative items or indicators. Thus, the assessment of the measurement model involved several tasks that assessed the reliability and validity of the first-order reflective and formative constructs, and the higher-order reflective and formative constructs. The strength of the psychometric properties was assessed by examining the convergent validity and discriminant validity of the reflective items and manifest indicators (for second-order reflective construct validation) while the formative constructs were validated by composite measurement as formative items do not measure the same underlying dimension. The indicators' weights, which measure the relative importance of the formative items in the formation of the constructs, were used to make composite latent variables. The same principle was applied in the validation of the higher-order formative constructs.

6.3.2 CONVERGENT VALIDITY

The assessment of convergent validity was a fundamental part of assessing the measurement model. The psychometric properties of the measurement model were assessed by evaluating the reliability, convergent validity and discriminant validity

(Fornell & Larcker, 1981). The reliability of the constructs was assessed by considering composite reliability and Cronbach's alpha. The magnitude and significance of standard path loadings were considered to examine the construct validity.

6.3.2.1 Item reliability

Item reliability assessed the loadings for each individual item. Table 6.4 presents the detailed item loadings. The loadings indicate the correlation of the items with their respective constructs. Therefore, maintaining low loading items would decrease the correlation between the items in the construct (Nunnally, 1994). Item reliability also measured the level of random error for each construct; the lower the item loading, the higher the level of random error. Therefore, this procedure could identify and eliminate the items in a particular construct that could increase the construct's level of random error (Fornell & Larcker, 1981).

High item loadings indicated the reliability of the measures of the latent variable; moreover, the prior literature has supported some agreed levels of item loadings as thresholds for fairly reliable measures. Igarria et al. (1995) deemed 0.4 as an acceptable minimum loading. Hair et al. (1998) suggested that loadings above 0.3 were significant, above 0.4 were more significant and above 0.5 were very significant. Chin (1998a) believed item loadings should be above 0.5. Carmines and Zeller (1979) maintained 0.7 as the reliability limit whilst Barclay et al. (1995) specified 0.707 as the minimum limit. However, Nunnally (1994) argued that, in the case of strong theoretical support, further reviews of the low loading items were warranted. This would be especially pertinent if the low loading items added to the explanatory power of the model.

Taking into account all the recommendations in the literature and to maximise the measurement model's ability to fulfil the requirements of convergent validity, the minimum value of 0.5 was determined. Hence, after the first PLS run, four items with loadings below 0.5 were discarded, these being INTEGRA4, INTEGRA5, PD2 and PD3. Although some of the constructs had a small number of manifest items, each of the constructs contained at least two indicators even after discarding the items with low loadings; thus, the final model conformed to the criterion suggested

by Kline (2010) and Rahim, Antonioni and Psenicka (2001) that there should be a minimum of two items in a construct.

Table 6.4: Psychometric Properties for First-order Reflective Constructs

Construct	Items	Loading	t-statistics	CR	AVE
Perceived usefulness	PU1	0.917	79.85	0.956	0.844
	PU2	0.938	11.91		
	PU3	0.940	29.24		
	PU4	0.878	55.52		
Perceived ease of use	PEU1	0.948	50.00	0.967	0.879
	PEU2	0.960	82.26		
	PEU3	0.963	9.22		
	PEU4	0.877	48.65		
Facilitating condition	FACICON1	0.769	30.92	0.875	0.701
	FACICON2	0.853	33.31		
	FACICON3	0.895	76.24		
Owner innovativeness	OWNER1	0.765	3.50	0.800	0.669
	OWNER2	0.674	1.99		
Power distance	PD1	0.963	89.29	0.964	0.930
	PD4	0.965	90.74		
In-group collectivism	INGROUP1	0.746	10.78	0.900	0.752
	INGROUP2	0.920	9.93		
	INGROUP3	0.924	6.53		
Uncertainty avoidance	UNAVOID1	0.980	63.54	0.974	0.951
	UNAVOID2	0.971	40.51		
Ethical culture	ECUL1	0.975	200.04	0.967	0.936
	ECUL2	0.960	130.29		
Integration	INTEGRA1	0.764	22.86	0.791	0.561
	INTEGRA2	0.639	13.68		
	INTEGRA3	0.832	35.89		
Internal operation productivity	INTOP1	0.898	75.44	0.898	0.746
	INTOP2	0.870	60.52		
	INTOP3	0.821	41.41		
Competitiveness	COMP1	0.732	11.63	0.731	0.478
	COMP12	0.757	13.44		
	COMP3	0.572	6.08		
Financial performance	FPERF1	0.771	30.24	0.847	0.650
	FPERF2	0.901	67.70		
	FPERF3	0.737	18.59		

The final run of the refined measurement model ensured high reliability of the measures as all reflective items were found to have satisfactory loadings. All of the items were found to have loadings above 0.707 while only one indicator had a

loading of 0.572 which was acceptable as it satisfied the threshold suggested by Hair et al. (1998) and Igbaria et al. (1995).

6.3.2.2 Internal consistency

Internal consistency is measured through calculating the composite reliability (CR) (Fornell & Larcker, 1981). Composite reliability is considered to be superior to the traditional measures of consistency (such as Cronbach's alpha) because it is not influenced by the number of indicators (Hanlon, 2001).

Constructs with a coefficient value of 0.70 or more in the estimates of composite reliability were accepted as reliable for further analysis (as suggested by Igbaria et al., 1997; Barclay et al., 1995; Hair et al., 2011). As shown in Table 6.4, all constructs met this criterion. The reflective construct *competitiveness* had the lowest internal consistency of 0.734 while *uncertainty avoidance* had the highest of 0.974. Most of the study constructs had an internal consistency of approximately 0.8 which was considered to be very satisfactory.

6.3.2.3 Average Variance Extracted (AVE)

Fornell and Larcker (1981) specified that average variance extracted (AVE) should be at least 0.5 for convergent validity to be satisfied. Thus the AVE scores, although not a usual measure of convergent validity, were rationally computed for robustness of the statistical analysis.

As shown in Table 6.4, all of the reflective constructs satisfactorily met this criterion for convergent validity while a little deviation was seen in the AVE score for first-order reflective construct *competitiveness* which was also used as a manifest latent indicator for the higher order variable *performance*. The variable *competitiveness* appeared with an AVE score of 0.478 which was not problematic as the score was very close to the cut-off value as suggested by Fornell and Larcker (1981). Thus, the AVE results indicated satisfactory convergent validity for all of the reflective constructs.

6.3.3 DISCRIMINANT VALIDITY

The measurement model also involved the evaluation of the extent to which different constructs diverged from one another which is termed 'discriminant validity'. Discriminant validity, a proof of construct validity, is defined as the degree to which

any given construct is different from any other (Barclay et al., 1995). The square root of the AVE and the cross-loading matrix are widely used measures for discriminant validity (Igarria et al., 1995; Barclay et al., 1995). According to Igarria et al. (1995), the model is assessed as having acceptable discriminant validity if the square root of the AVE of a construct is larger than its correlation with other constructs (Hair et al., 2011). On the other hand, the constructs may be considered as discriminant if the loading of items within a construct (shown in the columns in a cross-loading matrix) are greater than the loading of any other item within the same column (Barclay et al., 1995). Both the approaches for assessing discriminant validity are important to adequately prove discriminant validity at construct level as well as at item level.

6.3.3.1 Discriminant validity at construct level

The square root of the *AVE* and inter-construct correlations were compared to assess discriminant validity at construct level. According to Fornell and Larcker (1981), constructs are considered to have adequate discriminant validity if the square root of the *AVE* is greater than the inter-construct correlations.

Table 6.5 presents the square root of the *AVE* and the inter-construct correlations. The inter-construct correlations are presented in the off-diagonals while the values for the square root of the *AVE* are placed in the main diagonal in the matrix in bold font. In order to prove discriminant validity among the reflective constructs, the off-diagonal elements (correlations of latent variables) must be less than or equal to the bolded, diagonal elements (\sqrt{AVE}) in the corresponding rows and columns (Igarria et al., 1997; Barclay et al., 1995; Gefen et al., 2000; Hair et al., 2011). The measurement model met the criterion for discriminant validity as the bolded diagonal values were seen to be greater than the off-diagonal correlation values in their corresponding rows and columns. Thus, the results proved adequate discriminant validity among the study constructs allowing the structural model estimation to proceed with no further item deletion from the model.

Table 6.5: Correlation Matrix for First-order Reflective Constructs

	FC	OI	INT	PU	PEU	INTOP	COMP	FPERF	PD	UA	ING	ECUL
FC	0.835											
OI	0.210	0.818										
INT	0.442	0.068	0.749									
PU	0.653	0.072	0.429	0.919								
PEU	0.649	0.222	0.414	0.533	0.938							
INTOP	0.557	0.051	0.521	0.638	0.337	0.864						
COMP	0.324	-0.033	0.531	0.197	0.131	0.302	0.695					
FPERF	0.389	0.033	0.586	0.500	0.321	0.730	0.314	0.806				
PD	-0.218	-0.144	-0.205	-0.130	-0.231	-0.155	-0.062	-0.145	0.964			
UA	0.023	0.110	-0.100	0.022	0.109	-0.022	-0.102	0.029	-0.277	0.976		
ING	-0.191	-0.180	-0.100	-0.175	-0.203	-0.136	-0.023	-0.211	0.448	-0.368	0.867	
ECUL	-0.299	-0.082	-0.261	-0.267	-0.243	-0.393	-0.114	-0.347	0.390	-0.376	0.357	0.967

FC = Facilitating condition, OI = Owner innovativeness, INT = Integration, PU = Perceived usefulness, PEU = Perceived ease of use, INTOP = Internal operation productivity, COMP = Competitiveness, FPERF = Financial performance, PD = Power distance, UA = Uncertainty avoidance, ING = In-group collectivism, ECUL = Ethical culture

6.3.3.2 Discriminant validity at item level

The study also assessed the discriminant validity at item level comparing the loadings and cross-loadings of the measures. The loading of items within a construct (shown in columns) should be greater than the loading of any other item in order to prove discriminant validity among the constructs (Barclay et al., 1995). Table 6.6 shows the loadings and cross-loadings of items and constructs in the cross-loading matrix. The cross-loading matrix displayed high correlations between constructs and relevant measurement items. All reflective constructs of the model showed high correlation, with their respective measurement items being also significantly higher than the items in the same column measuring other constructs, the only exception being the correlation between *perceived ease of use* and *facilitating condition*. Items 2 and 3, measuring the *facilitating condition*, demonstrated a very high correlation with *perceived ease of use* ($r = 0.88$ and 0.86 respectively). This occurred because *facilitating condition* is measured through questions that are, in a sense, further proof of organisational technology competency making a system easy to use and fostering the adoption rate of digital technology. This measures whether the organisation has capable human resources who also have the skills to do the work in an automated environment, whether the organisation has adequate resources necessary to work in a digital environment and whether the existing systems are compatible with using digital technology. Thus, high correlation between some measurement items of *facilitating condition* and *perceived ease of use* was considered to be justified. This high correlation was not considered problematic as the correlations of *perceived ease of use* with its measurement items were observed as higher than those with high correlation ($r = 0.94, 0.95, 0.96,$ and 0.90 respectively). Finally, it was concluded that the model now demonstrated both convergent and discriminant validity.

Table 6.6: Cross-loading Matrix

	PU	PEU	OI	FC	PD	ING	UA	ECUL	INT	INTOP	COMP	FPERF
PU1	0.9179	0.5182	0.0754	0.5828	-0.0767	-0.1167	0.0488	-0.2601	0.4686	0.6085	0.2474	0.5299
PU2	0.9372	0.4907	0.0539	0.6261	-0.0513	-0.1001	-0.0375	-0.2532	0.4338	0.6070	0.1920	0.4479
PU3	0.9392	0.4526	0.0981	0.5477	-0.0314	-0.0883	0.0017	-0.2137	0.3817	0.6203	0.1715	0.5262
PU4	0.8787	0.5017	0.0841	0.5549	-0.0622	-0.0997	0.0719	-0.2593	0.2777	0.5049	0.1213	0.3754
PEU1	0.4836	0.9400	0.1736	0.6457	-0.1848	-0.1710	0.1236	-0.2215	0.3537	0.3034	0.1219	0.2775
PEU2	0.5031	0.9518	0.1490	0.6269	-0.1920	-0.1942	0.0902	-0.2505	0.3905	0.3327	0.1496	0.3256
PEU3	0.5156	0.9554	0.1648	0.6275	-0.1637	-0.1889	0.0928	-0.2407	0.3593	0.3220	0.1495	0.2985
PEU4	0.4945	0.8984	0.2441	0.5226	-0.1414	-0.1420	0.1025	-0.1993	0.3343	0.3047	0.0928	0.3564
OWNER1	0.0406	0.2135	0.7370	0.2016	-0.1507	-0.1249	0.0647	-0.0625	0.0542	0.0215	-0.0407	-0.0173
OWNER2	0.0905	0.1416	0.9072	0.1496	-0.1069	-0.2190	0.1460	-0.0820	0.0651	0.0958	-0.0137	0.1223
FACICON1	0.7854	0.5153	0.1161	0.7462	-0.1557	-0.1627	-0.0007	-0.2819	0.4634	0.6478	0.3126	0.5109
FACICON2	0.4639	0.8794	0.1596	0.6543	-0.2131	-0.1769	0.0884	-0.2470	0.3362	0.3267	0.1156	0.2702
FACICON3	0.4545	0.8648	0.1838	0.6671	-0.2130	-0.1893	0.0895	-0.2697	0.3284	0.3423	0.1094	0.2834
PD1	-0.1187	-0.2211	-0.1325	-0.2121	0.8434	0.4126	-0.2643	0.3674	-0.1952	-0.1397	-0.0480	-0.1425
PD4	-0.1132	-0.2385	-0.1379	-0.2448	0.8419	0.4440	-0.2654	0.3943	-0.1675	-0.1517	-0.0013	-0.1152
INGROUP1	-0.0943	-0.1472	-0.1619	-0.1392	0.2669	0.9135	-0.3111	0.2711	-0.0255	-0.1098	0.0104	-0.1288
INGROUP2	-0.1207	-0.1900	-0.2295	-0.1260	0.3352	0.8649	-0.3804	0.3056	-0.0749	-0.0572	-0.0162	-0.1915

	PU	PEU	OI	FC	PD	ING	UA	ECUL	INT	INTOP	COMP	FPERF
INGROUP3	-0.2109	-0.1847	-0.1537	-0.2011	0.3278	0.6823	-0.2901	0.3441	-0.1337	-0.1670	-0.0441	-0.2256
UNAVOID1	0.0439	0.1030	0.1269	0.0132	-0.2491	-0.3753	0.9771	-0.3560	-0.1153	-0.0214	-0.1171	0.0310
UNAVOID2	-0.0009	0.1117	0.1396	0.0352	-0.2470	-0.3740	0.9740	-0.3781	-0.0985	-0.0210	-0.0802	0.0480
ECUL1	-0.2880	-0.2463	-0.0582	-0.2953	0.2857	0.3013	-0.3636	0.9768	-0.2643	-0.3987	-0.1104	-0.3798
ECUL2	-0.2222	-0.2178	-0.1229	-0.2722	0.3117	0.3067	-0.3647	0.9575	-0.2369	-0.3581	-0.1191	-0.2951
INT1	0.3522	0.1620	-0.0275	0.2788	-0.0429	-0.0088	-0.1209	-0.1946	0.7851	0.4116	0.4646	0.4013
INT2	0.2805	0.5754	0.0879	0.4172	-0.0704	-0.0573	0.0470	-0.1663	0.5810	0.2714	0.2785	0.3336
INT3	0.3287	0.2592	0.1117	0.3026	-0.1562	-0.0500	-0.1214	-0.2223	0.8483	0.4652	0.4363	0.5557
INTOP1	0.5714	0.3221	0.0431	0.4592	-0.0664	-0.0821	0.0168	-0.3717	0.4683	0.8980	0.2193	0.7319
INTOP2	0.4566	0.1279	0.0588	0.3082	-0.0232	-0.0121	-0.0889	-0.3068	0.4974	0.8697	0.3045	0.6348
INTOP3	0.6343	0.4374	0.1106	0.6468	-0.1579	-0.1394	0.0176	-0.3417	0.3916	0.8209	0.2768	0.5378
COMP1	0.2482	0.1930	0.0510	0.3270	-0.0376	-0.0118	-0.0387	-0.0918	0.3215	0.2909	0.7318	0.2457
COMP2	0.0794	0.0780	-0.0843	0.1674	0.0201	-0.0095	-0.1027	-0.1266	0.5042	0.2222	0.7563	0.2816
COMP3	0.0414	-0.0922	-0.0398	0.1396	0.0415	0.0537	-0.0827	0.0347	0.2483	0.0426	0.5725	0.0491
FPERF1	0.5701	0.4592	0.0768	0.4449	-0.1568	-0.1869	0.1863	-0.3491	0.4263	0.6872	0.2103	0.7711
FPERF2	0.3992	0.2733	0.1120	0.2973	-0.1142	-0.2026	0.0621	-0.3469	0.5212	0.6306	0.2437	0.9005
FPERF3	0.2516	0.0614	-0.0028	0.1663	0.0704	-0.0004	-0.1821	-0.1405	0.4737	0.4528	0.3239	0.7372

PU = Perceived usefulness, PEU = Perceived ease of use, FC = Facilitating condition, OI = Owner innovativeness, PD = Power distance, ING= In-group collectivism, UA = Uncertainty avoidance, ECUL = Ethical culture, INT = Integration, INTOP = Internal operation productivity, COMP = Competitiveness, FPERF = Financial performance

6.3.4 INDICATOR WEIGHTS FOR FORMATIVE CONSTRUCTS

The theoretical model comprised both reflective and formative constructs. Among the 25 first-order and five second-order constructs of the model, 13 first-order constructs and four higher-order constructs were formative in nature. By definition, reflective items measure the same underlying dimensions and should be correlated, while formative indicators ‘cause’ the latent construct, also called the emergent construct, which is explained as a function of the formative measures. The structural equation modelling (SEM) involved a two-step procedure which assessed the psychometric properties of the latent constructs by examining reliability using Cronbach’s alpha or Fornell and Larcker’s (1981) measure of composite reliability; convergent validity by examining the loadings and *t*-statistics; and discriminant validity by examining the AVE and inter-construct correlations or loading and cross-loading matrix, before estimating the structural model. Although all of the tests for construct reliability and validity were considered as fundamental requirements for reflective constructs, these were not necessary requirements for formative constructs (Jarvis et al., 2003; Rai et al., 2006) as the items were not correlated and did not measure the same underlying dimension.

In estimating the measurement model, researchers have generally proceeded by evaluating the construct validity and reliability for reflective constructs; however, these two forms of validity should not be conducted in the same manner for formative measures, given the differences between reflective and formative measures. Construct validity is typically assessed by two aspects of validity: convergent validity which detects whether the measures for a construct are more correlated with one another than with measures of another construct, and discriminant validity which determines if the measures are isolated as distinct constructs (Petter et al., 2007). The methods of determining construct validity that focus on common variance, although applicable to reflective constructs, logically do not apply well to formative constructs as the correlations between indicators within a construct do not need to be higher than the correlations between indicators of different constructs (MacCallum & Browne, 1993) and there is no requirement that the measures of the construct be highly correlated (Rossiter, 2002). Unlike common

factor analysis, where one examines the loadings, in principal component analysis for formative constructs, the weights must be examined.

Therefore, indicator weights, which provided information on the relative importance of the formative items towards the formation of the corresponding latent construct, were calculated. The weights for each of the 40 formative indicators are presented in Tables 6.7 and 6.8. The tables show that the weights for 26 formative items had significant *t*-values while this was not the case for 14 items.

As there were a number of formative indicators with insignificant weights, it was important to decide whether some indicators should be discarded in order to have formative constructs with indicators that would highly contribute to the emergent constructs. Diamantopoulos and Winklhofer (2001) suggested that if any of the item weightings for formative measures were non-significant, it may be appropriate to remove the non-significant indicators (one at a time) until all paths were significant and a good fit was obtained (this may be applicable in covariance-based structural equation modelling [*CBSEM*]). Zhu et al. (2006a) followed the guidelines of retaining measurement items with significant weights and above the cut-off value of 0.3 (Chin, 1998b). Content validity is an issue that could have an adverse effect when adopting removal measures in formative constructs. Dropping the formative indicators that had non-significant weights could pose the question whether the construct was still measuring the entire domain and whether the content validity was preserved (Bollen & Lennox, 1991).

The works of Fornell, Larsson and Roos (1990), Santosa et al. (2005), and Diamantopoulos and Winklhofer (2001) may be worth mentioning in support of retaining all the indicators of a formative construct regardless of their significance and the magnitude of their weight.

This study has developed 13 first-order formative constructs and four higher-order constructs in analysing all possible aspects of conceptualising the domain of the constructs. However, in its agreement with the proposition “omitting an indicator is omitting a part of the construct”, this study showed that it suspected that the meaning or definition of the constructs would be changed if any indicator was deleted. Thus,

all the indicators of the formative constructs were logically retained for further analyses.

Table 6.7: Validity for First-order Formative Constructs (Culture and Environment)

Construct	Items	Weight	t statistics	Tolerance	VIF
Bengali values	BVAL1	-0.751	4.78**	0.961	1.04
	BVAL2	0.571	2.51**	0.980	1.02
	BVAL3	0.048	0.19	0.960	1.04
Coercive pressure	COERPRE1	-0.018	0.20	0.979	1.02
	COERPRE2	0.682	10.31**	0.844	1.19
	COERPRE3	0.512	7.19**	0.828	1.21
Mimetic pressure	COMPRES1	0.424	1.97*	0.995	1.01
	COMPRES2	0.877	7.68**	0.995	1.01
Normative pressure	NORMPRE1	0.559	7.09**	0.910	1.10
	NORMPRE2	0.583	7.09**	0.864	1.16
	NORMPRE3	0.228	2.16**	0.964	1.04
	NORMPRE4	0.110	0.99	0.979	1.02
Global pressure	GLOPRE1	0.063	0.40	0.971	1.03
	GLOPRE2	0.988	27.50**	0.971	1.03

** $p < 0.01$, * $p < 0.05$, VIF = variance inflation factor

In addition to the indicator weights, the test of multicollinearity was conducted on the formative items. Unlike reflective indicators, where multicollinearity between construct items is desirable (illustrated by a high Cronbach's alpha or composite reliability scores), excessive multicollinearity in formative constructs can destabilise the model.

Table 6.8: Validity for First-order Formative Constructs (Country Readiness and ICT Use)

Construct	Items	Weight	t statistics	Tolerance	VIF
Technological infrastructure	TECH1	0.203	0.68	0.870	1.15
	TECH2	-0.386	1.21	0.721	1.39
	TECH3	0.828	3.94**	0.740	1.35
	TECH4	0.511	2.66**	0.969	1.03
Human infrastructure	HINFRA1	0.612	1.46	0.354	2.82
	HINFRA2	0.144	0.34	0.387	2.59
	HINFRA3	0.367	1.09	0.608	1.65
Legal infrastructure	LINFRA1	0.197	0.54	0.951	1.05
	LINFRA2	0.938	4.18**	0.951	1.05
Financial infrastructure	FINFRA1	0.897	2.81**	0.838	1.19
	FINFRA2	0.210	0.54	0.838	1.19
Government policy and supports	GOV1	0.808	3.26**	0.387	2.59
	GOV2	0.862	3.39**	0.384	2.61
	GOV3	-0.531	1.52	0.372	2.69
	GOV4	-0.688	2.15*	0.355	2.82
Expectation	EXP2	0.216	4.26**	0.951	1.05
	EXP3	0.237	3.78**	0.425	2.35
	EXP4	0.828	15.52**	0.452	2.21
	EXP5	-0.062	1.08	0.69	1.45
	Usage	USAGE2	0.176	3.70**	0.981
	USAGE3	0.491	6.48**	0.542	1.85
	USAGE4	0.553	8.09**	0.543	1.84
	USAGE5	0.052	2.25*	0.983	1.02
Utilisation	UTL1	0.235	2.61*	0.919	1.09
	UTL2	0.863	11.12**	0.689	1.45
	UTL3	0.081	0.79	0.720	1.39

** $p < 0.01$, * $p < 0.05$, VIF = variance inflation factor

The existence of very high correlations among measures may suggest that multiple indicators are tapping into the same aspect of the construct. Thus, low collinearity among items is vital in ensuring the stability of the estimates (Mathieson, Peacock, & Chin, 2001). Hence, this establishes that each indicator has its own distinct influence. In general, multicollinearity is examined by the variance inflation factor (VIF). Although a VIF value greater than 10 is acceptable, different threshold values

for VIF are proposed as collinearity poses more problems in formative constructs. Kleinbaum, Kupper, Muller, and Nizam (1998) recommended that the threshold of *VIF* be 10 while Mathieson et al. (2001) and Hair et al. (2011) suggested 5 as the maximum threshold for detecting multicollinearity among indicators. However, Diamantopoulos and Siguaw (2006) stated that a VIF statistic greater than 3.3 was problematic for formative measures. The SPSS 19 statistical package was utilised to run the regression analysis with the PLS construct scores as the dependent variables and the items as independent variables (Andreev, Maoz, Heart, & Pliskin, 2009).

As shown in Tables 6.7 and 6.8, the results depicted that all the *VIF* scores were below 3.3 which was well below the recommended maximum threshold recommended by Kleinbaum et al. (1998), Mathieson et al. (2001) and Hair et al. (2011). Therefore, all the formative items were logically retained.

6.4 VALIDATION OF THE HIGHER-ORDER MODEL

The estimation of hierarchically structured latent variables is a very useful method under structural modelling which allows for more theoretical parsimony and reduces model complexity (Edwards, 2001; Law et al., 1998; MacKenzie, Podsakoff, & Jarvis, 2005). In the past, hierarchical modelling was mainly analysed within the framework of covariance-based structural equation modelling (*CBSEM*) and most of the cases focused on the second-order construct (Edwards, 2001; Edwards & Bagozzi, 2000; Jarvis et al., 2003; Law & Wong, 1999; MacKenzie et al., 2005; Petter et al., 2007). These researchers defined hierarchical constructs or multidimensional constructs as the constructs involving more than one construct. Although still limited in number, recent initiatives have explored a more advanced avenue in the analysis of hierarchically structured latent variables, both on the extent of hierarchy as well as in their underlying relationships.

Recent research has shown a third-order and fourth-order hierarchical latent variable model design with varied underlying relationships among the constructs, that is, formative or reflective, within a *PLS*-based path modelling framework (Wetzels et al., 2009, Akter, D'Ambra, & Ray, 2010, 2011). The higher-order construct may be defined as the latent variable which is created through the indicators and latent variables in a multiple hierarchy. For example, if a second-order latent variable

consists of two underlying first-order latent variables, each with four manifest variables, the second-order manifest variables can be specified using all (eight) manifest variables of the underlying first-order latent variables (Chin & Gopal, 1995). Consequently, the manifest variables are used twice: for the first-order latent variable (“primary’ loadings) and for the second-order latent variable (“secondary” loadings).

With this established, the outer model (measurement model) and the inner model (structural model) are thus specified accounting for the hierarchical component of the model and representing the loadings of the second-order latent variable on the first latent variables. Wetzels et al. (2009) extended this approach to address the higher-order hierarchical models.

Like first-order latent constructs, the second-order or higher-order constructs may also be composed of both reflective and formative indicators. The formation of two different types of higher-order constructs, the reflective higher-order construct and the formative higher-order construct, may be explained by the following equations where Equations 6.1 and 6.2 explain first-order and second-order reflective constructs, while Equations 6.3 and 6.4 state the formation of first-order and second-order formative constructs respectively:

$$y_i = \Lambda_y \cdot \eta_j + \varepsilon_i \quad \text{Equation 6.1}$$

where, y_i = manifest variables (e.g. items of perceived usefulness), Λ_y = loadings of first-order latent variable, η_j = first-order latent variable (e.g. perceived usefulness), ε_i = measurement error

$$\eta_j = \Gamma \cdot \xi_k + \zeta_j \quad \text{Equation 6.2}$$

where, η_j = first-order factor (e.g. perceived usefulness), Γ = loadings of second-order latent variable, ξ_k = second-order latent variable (e.g. cognitive evaluation), ζ_j = error of first-order factors

$$\eta = \gamma_1 x_1 + \gamma_2 x_2 + \dots + \gamma_n x_n + \varepsilon \quad \text{Equation 6.3}$$

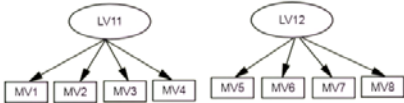
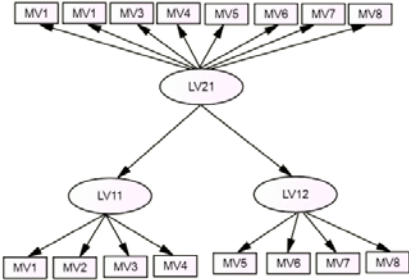
where, η = first-order latent variable, x_i = observed variables, γ_i = expected effect of x_i on η , ε = a disturbance term, with $COV(x_i, \varepsilon) = 0$ and $E(\varepsilon) = 0$

$$\Gamma = \varphi_1 \eta_1 + \varphi_2 \eta_2 + \dots + \varphi_n \eta_n + \zeta \quad \text{Equation 6.4}$$

where, Γ = second-order latent variable, η_i = observed variables, φ_i = expected effect of η_i on Γ , ε = a disturbance term with $COV(\eta_i, \zeta) = 0$ and $E(\zeta) = 0$


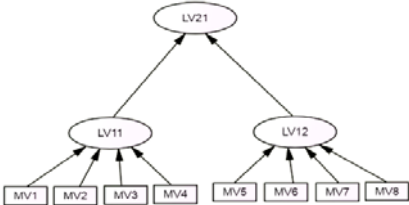
This study has applied the above-mentioned functions to develop the hierarchical conceptualisations of the study constructs through a multi-stage process. The hierarchical conceptualisation can result in theoretical parsimony and ease of analysis. The analytical procedures for hierarchical reflective models and formative models are depicted in Tables 6.9 and 6.10.

Table 6.9: Description of Second-order Reflective Constructs

Description	Illustration
<p>1 Construct the first-order latent variables such as LV11 and LV12 and relate them to their respective block of manifest variables (such as, LV11: MV1-MV4; LV12: MV5-MV8) using Mode A¹⁷ (reflective) in their outer model. The loading represents the first-order loadings (see Equation 6.1).</p>	
<p>2 The second-order latent variable can now be constructed by relating to the block of the underlying first-order latent variables and their constructs, such as second-order construct LV21 by MV1-MV8, using Mode A (reflective) in their outer model (the indicators placed above the second-order construct represent the secondary loadings). The first-order latent variables (LV11 and LV12) are now related to the second-order variable LV21 as reflective dimensions. This inner model represents the second-order loadings (see Equation 6.2).</p>	

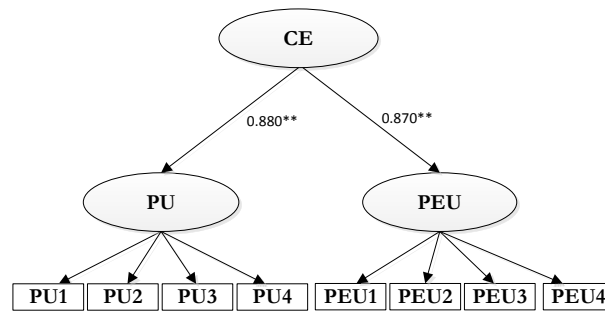
¹⁷ Researchers using PLS-SEM often refer to reflective measurement models (i.e. scales) as Mode A, and formative measurement models (i.e. indices) are labelled Mode B (e.g. Rigdon, Ringle, & Sarstedt, 2010).

Table 6.10: Description of Second-order Formative Constructs

Description	Illustration
<p>1 Construct the first-order latent variables (LV11 and LV12) and relate the manifest variables (LV11: MV1-MV4; LV12: MV5-MV8) to the formative constructs using Mode B (formative) in their outer model. The weight represents the first-order weights. Indicator weights are estimated to validate the formative constructs as well as calculate the composites (see Equation 6.3).</p>	
<p>2 The second-order latent variable can now be constructed by relating the block of the underlying first-order latent variables (LV11 and LV12) to the second-order formative construct (LV21) using Mode B (formative) in their outer model. The first-order latent variables (LV11 and LV12) are now related to the second-order variable LV21 as formative dimensions and the weight of these paths represent the second-order weights (see Equation 6.4).</p>	

6.4.1 VALIDATION OF SECOND-ORDER REFLECTIVE CONSTRUCT: COGNITIVE EVALUATION (REFLECTIVE-REFLECTIVE)

Cognitive evaluation was modelled as a second-order construct, capturing two beliefs towards technological innovation—*perceived usefulness* and *perceived ease of use*, as validated through the field study. Resulting from the field study’s strong support for capturing complex measures, this second-order approach viewed the two dimensions in a collective and mutually reinforcing manner. Accordingly, *cognitive evaluation* was operationalised to be an integrative measure of beliefs towards technological innovation (see Figure 6.1).



** $p < 0.01$, CE = Cognitive evaluation, PU = Perceived usefulness, PEU = Perceived ease of use

Figure 6.1: Cognitive evaluation

The degree of explained variance of the second-order hierarchical cognitive construct was reflected in its first-order components, *perceived usefulness* (77.5%) and *perceived ease of use* (75.8%). As shown in Table 6.11, the path coefficients from second-order cognitive evaluation of the first-order constructs, *perceived usefulness* (0.880) and *perceived ease of use* (0.870), were greater than the suggested cut-off of 0.7 (Chin, 1998b; Zhu et al., 2006a) and were significant at $p < 0.01$. The composite reliability (CR = 0.939) and average variance extracted (AVE = 0.66) of the second-order construct were also well above the cut-off values of 0.7 and 0.5 respectively (see Table 6.11) (Gefen et al., 2000; Bagozzi & Yi, 1988). Thus, the conceptualisation of *cognitive evaluation* as a higher-order, multidimensional construct seemed justified.

Table 6.11: Second-order Cognitive Evaluation Construct and Its Association with First-order Components

Construct	Component	Items	Loading	<i>t</i> -value	R^2	CR	AVE
Cognitive evaluation (second-order reflective)	Perceived usefulness	4	0.880**	72.57	0.775	0.939	0.66
	Perceived ease of use	4	0.870**	47.73	0.758		

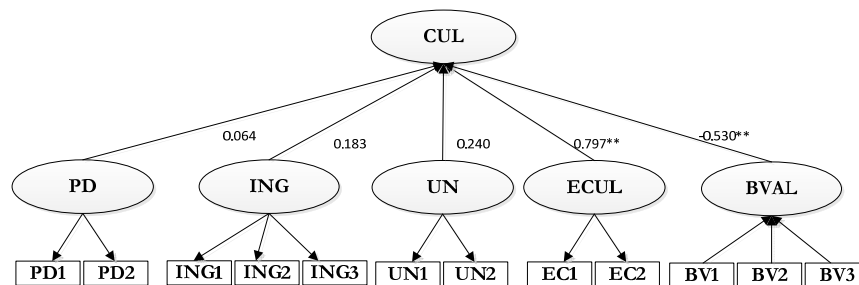
** $p < 0.001$

6.4.2 VALIDATION OF SECOND-ORDER FORMATIVE CONSTRUCTS

The study involved four constructs as higher-order formative constructs, namely, *culture*, *environmental pressure*, *country readiness* and *organisational performance*. As with the first-order formative construct validation, the indicator weights and the test of multicollinearity were conducted to assess the validity of second-order formative constructs.

6.4.2.1 Culture (mixed)

Culture was modelled as a second-order composite variable of five first-order constructs—*power distance*, *in-group collectivism*, *uncertainty avoidance*, *Bengali values* and *ethical culture*. All first-order constructs were reflective except *Bengali values* which was a composite of three indicators (see Figure 6.2). As shown in Table 6.12, the paths from *ethical culture* and *Bengali values* were significant while the other three paths were not found to be significant. Table 6.8 also showed that multicollinearity was non-existent among the five first-order constructs due to their very small VIF values (Diamantopoulos & Siguaw, 2006). As stated in section 6.3.4, all formative indicators regardless of their magnitude and level of significance were retained to ensure the measurement of the entire domain and content validity (Bollen & Lennox, 1991) and thus the hierarchical conceptualisation of *culture* was justified for the structural model estimation.



** $p < 0.01$, CUL = Culture, PD = Power distance, ING = In-group collectivism, UN = Uncertainty avoidance, ECUL = Ethical culture, BVAL = Bengali values

Figure 6.2: Culture

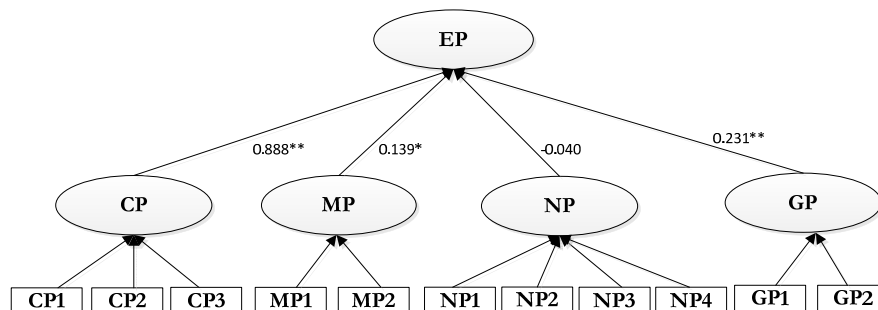
Table 6.12: Second-order Culture Construct and its Association with First-order Components

Construct	Component	Items	Weight	t-value	Tolerance	VIF
Culture (second-order formative)	Power distance	2	0.064	0.37	.840	1.191
	In-group collectivism	3	0.183	0.99	.779	1.284
	Uncertainty avoidance	2	0.240	1.45	.725	1.379
	Ethical culture	2	0.797**	6.18	.788	1.270
	Bengali values	3	-0.530**	3.68	.932	1.073

** $p < 0.01$; VIF = variance inflation factor

6.4.2.2 Environmental pressure (formative–formative)

Environmental pressure was modelled as a second-order composite variable of four first-order constructs—*coercive pressure*, *normative pressure*, *mimetic pressure* and *global pressure*. All of the first-order constructs used as manifest indicators for the second-order formative construct, *environmental pressure*, were also formative (see Figure 6.3). As shown in Table 6.13, the paths from *coercive pressure*, *mimetic pressure* and *global pressure* were significant while *normative pressure* did not produce any significant path weight. Multicollinearity was non-existent among the four first-order constructs as the VIF value was far below the conservative threshold level of 3.3 given by Diamantopoulos and Siguaw (2006). Thus, the hierarchical conceptualisation of *environmental pressure* was justified for structural model estimation.



** $p < 0.01$, EP = Environmental pressure, CP = Coercive pressure, MP = Mimetic pressure, NP = Normative pressure, GP = Global pressure

Figure 6.3: Environmental pressure

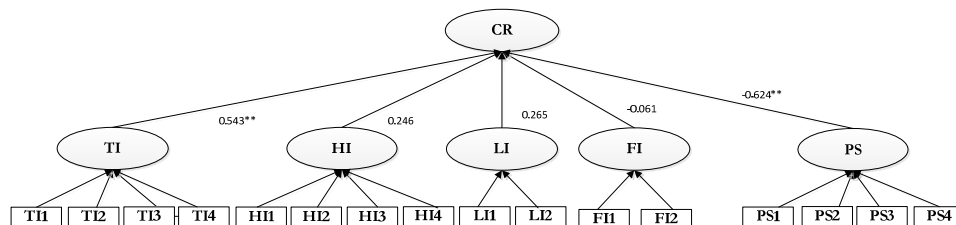
Table 6.13: Second-order Environmental Pressure Construct and Its Association with First-order Components

Construct	Component	Items	Weight	t-value	Tolerance	VIF
Environmental pressure (second-order formative)	Coercive pressure	3	0.888**	13.19	.451	2.216
	Normative pressure	4	-0.040	0.48	.475	2.107
	Mimetic pressure	2	0.139*	1.98	.935	1.069
	Global pressure	2	0.231**	3.16	.864	1.157

** $p < 0.01$, * $p < 0.05$; VIF = variance inflation factor

6.4.2.3 Country readiness (formative–formative)

Country readiness was modelled as a second-order composite variable of five first-order constructs—*technology infrastructure*, *human infrastructure*, *legal infrastructure*, *government policy and supports* and *financial infrastructure* (see Figure 6.4). All first-order constructs of the higher-order model were reflective. Reliability and validity of the first-order reflective constructs were justified in section 6.3.2.1. As shown in Table 6.14, the paths from *technology infrastructure* ($\gamma = 0.543$, $t = 3.14$, $p < 0.01$) and *government policy and supports* ($\gamma = -0.624$, $t = 3.72$, $p < 0.01$) were significant while *human infrastructure* ($\gamma = 0.246$, $t = 1.10$, $p < 0.01$), *legal infrastructure* ($\gamma = 0.265$, $t = 1.62$, $p > 0.05$) and *financial infrastructure* ($\gamma = -0.061$, $t = 0.22$, $p < 0.01$) did not produce any significant effects. Multicollinearity was not existent among the five first-order constructs as the VIF values were between 1.006 to 1.768 which was far below the conservative threshold level. Thus, the hierarchical conceptualisation of *environmental pressure* was justified for structural model estimation.



** $p < 0.01$, CR = Country readiness, TI = Technology infrastructure, HI = Human infrastructure, LI = Legal infrastructure, FI = Financial infrastructure, PS = Government policy and supports

Figure 6.4: Country readiness

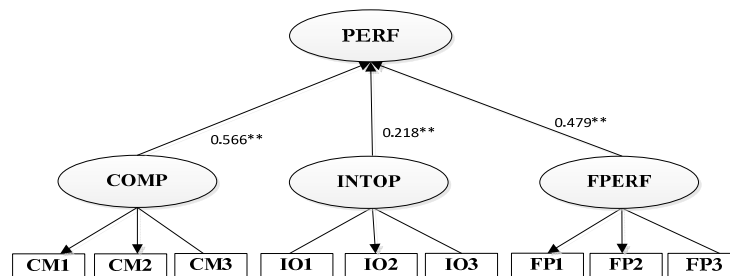
Table 6.14: Second-order Country Readiness Construct and Its Association with First-order Components

Construct	Components	Items	Weight	t-value	Tolerance	VIF
Country readiness (second-order formative)	Technology infrastructure	5	0.543**	3.14	.721	1.387
	Human infrastructure	4	0.246	1.10	.569	1.757
	Legal infrastructure	2	0.265	1.62	.884	1.132
	Government policy and supports	4	-0.624**	3.72	.994	1.006
	Financial infrastructure	2	-0.061	0.22	.566	1.768

** $p < 0.01$; VIF = variation inflation factor

6.4.2.4 Organisational performance (reflective–formative)

The final dependent variable of the study, *organisational performance*, was also modelled as a second-order composite variable of three first-order reflective constructs, *competitiveness*, *internal operation productivity* and *financial performance* (see Figure 6.5). As all first-order constructs were reflective, reliability, convergent validity and discriminant validity were duly justified before estimating the composite variable (see Tables 6.5, 6.6 and 6.7). As shown in Table 6.15, the paths from *internal operation productivity* ($\gamma=0.218$, $t=2.35$, $p < 0.05$), *competitiveness* ($\gamma=0.566$, $t=7.33$, $p < 0.01$) and *financial performance* ($\gamma=0.479$, $t=4.33$, $p < 0.01$) were significant. The largest VIF value of the constructs was 2.251 which confirmed that multicollinearity was non-existent. Thus, the hierarchical conceptualisation of *organisational performance* was valid for structural model estimation.



** $p < 0.01$, PERF = Performance, COMP = Competitiveness, INTOP = Internal operation productivity, FPERF = Financial performance

Figure 6.5: Organisational performance

Table 6.15: Validity for Second-order Performance Construct

Construct	Components	Items	Weight	t-value	Tolerance	VIF
Performance	Competitiveness	3	0.566**	7.33	.888	1.126
(second-order formative)	Internal operation productivity	3	0.218**	2.35	.447	2.236
	Financial performance	3	0.479**	4.33	.444	2.251

** $p < 0.01$; VIF = variation inflation factor

6.5 STRUCTURAL MODEL

To assess nomological validity, a structural model was developed which comprised five exogenous and six endogenous latent variables. The variances associated with the endogenous variables determined the explanatory power of the proposed model. The path coefficients and t -values were calculated to address the effects of the constructs and their underlying relationships according to the proposed theoretical framework. The hypothesised relationships between the constructs could be calculated by two methods, namely, ‘bootstrap’ or ‘jackknife’ (Gefen et al., 2000). ‘Bootstrap’ is popularly used within the *PLS* framework as it produces both a t -value and an R^2 value.

The technique which bootstrapping employs for calculating the t -statistic is similar to the traditional t -test that is also used to interpret the significance of the paths between study constructs (Barclay et al., 1995). Interpreted in a similar way in multiple regression analysis, the R^2 value is also used to indicate the explanatory power of exogenous variables within a model. In other words, this value estimates the variance associated with endogenous constructs; thus, the proposed overall model could be evaluated. It is important to note that *PLS* had some advantages as it was ideal for assessing the path loadings and structural relationships between the study constructs which could handle both formative and reflective constructs (Chin & Newsted, 1999; Hanlon, 2001): it also did not require the normal distribution of the data.

6.5.1 NOMOLOGICAL VALIDITY

The nomological validity of the endogenous variables of the model was examined by their R^2 values (Santosa et al., 2005). Falk and Miller (1992) proposed that the minimum R^2 should be 0.10. As shown in Table 6.16, the results of the structural equation modelling (SEM) estimation employing a bootstrapping procedure indicated that all the R^2 values were above the minimum cut-off value proposed by Falk and Miller (1992) which, in turn, ensured the nomological validity of the model. The overall model explained 48.5% of the variance (R^2) of *organisational performance*.

Table 6.16: Nomological Validity of the Endogenous Variables

Endogenous constructs	R^2
Cognitive evaluation	0.138
Expectation	0.585
Usage	0.765
Integration	0.416
Utilisation	0.239
Performance	0.485

The structural equation model estimation further explained that 13.8% of variance in *cognitive evaluation* was accounted for by *owner innovativeness* and *culture*. The estimation also indicated that 58.5% of variance in *expectation* was accounted for by *cognitive evaluation*, *owner innovativeness*, *culture*, *environmental pressure* and *country readiness*. *Expectation*, *owner innovativeness*, *environmental pressure* and *country readiness* also affected *actual usage* with an R^2 value of 0.765. The result indicated that 76.5% of *ICT usage* behaviour was accounted for by the exogenous variables, *expectation*, *owner innovativeness*, *environmental pressure* and *country readiness*. The model finally indicated 41.6% of variance in *integration* and 23.9% of variance in *utilisation* accounted for *actual usage*.

6.5.2 TESTS OF HYPOTHESES

As shown in Tables 6.16 and 6.17 (see also Figure 6.6), the results depicted significant effects of *cognitive evaluation* on the *expectation* of ICT usage by SMEs ($\gamma=0.155, t=2.74, R^2=0.585$). Thus, Hypothesis H_1 was supported.

Hypotheses H_{2a}, H_{2b} and H_{2c} were developed to assess the influence of *owner innovativeness* on *cognitive evaluation*, *expectation* and *ICT use* respectively. The model estimation depicted a significant effect of *owner innovativeness* ($\gamma=0.163, t=2.21$) on *cognitive evaluation*.

Owner innovativeness was also hypothesised to have positive correlations with *expectation* and *ICT use*. The effects of *owner innovativeness* on *expectation* ($\gamma=-0.067, t=0.97, R^2=0.585$) and its effects on *ICT use* ($\gamma=-0.038, t=0.85, R^2=0.765$) were not found to be significant. Thus, Hypothesis H_{2a} was accepted while Hypotheses H_{2b} and H_{2c} were rejected.

The hypothesised relationship between *environmental pressure* and *expectation* as well as *environmental pressure* and *actual ICT use* were postulated in Hypotheses H_{3a} and H_{3b} . *Environmental pressure* was found to have significant effects on *expectation* ($\gamma=0.405, t=8.51, R^2=0.585$) and *actual use* ($\gamma=0.191, t=3.25, R^2=0.765$). Thus, Hypotheses H_{3a} and H_{3b} were accepted.

The effects of *facilitating condition* on *expectation* and *actual use* were postulated in Hypotheses H_{4a} and H_{4b} respectively. The structural equation modelling (SEM) results presented a significant association between *facilitating condition* and *expectation* ($t=5.13, R^2=0.585$) as well as between *facilitating condition* and *actual use* ($\gamma=0.070, t=1.94, R^2=0.765$). Thus, Hypotheses H_{4a} and H_{4b} were accepted.

As postulated in Hypothesis H_{5a} , the study results supported the association between *country readiness* and *expectation* ($\gamma=-0.134, t=2.83, R^2=0.585$) while the results rejected the anticipated association between *country readiness* and *usage*

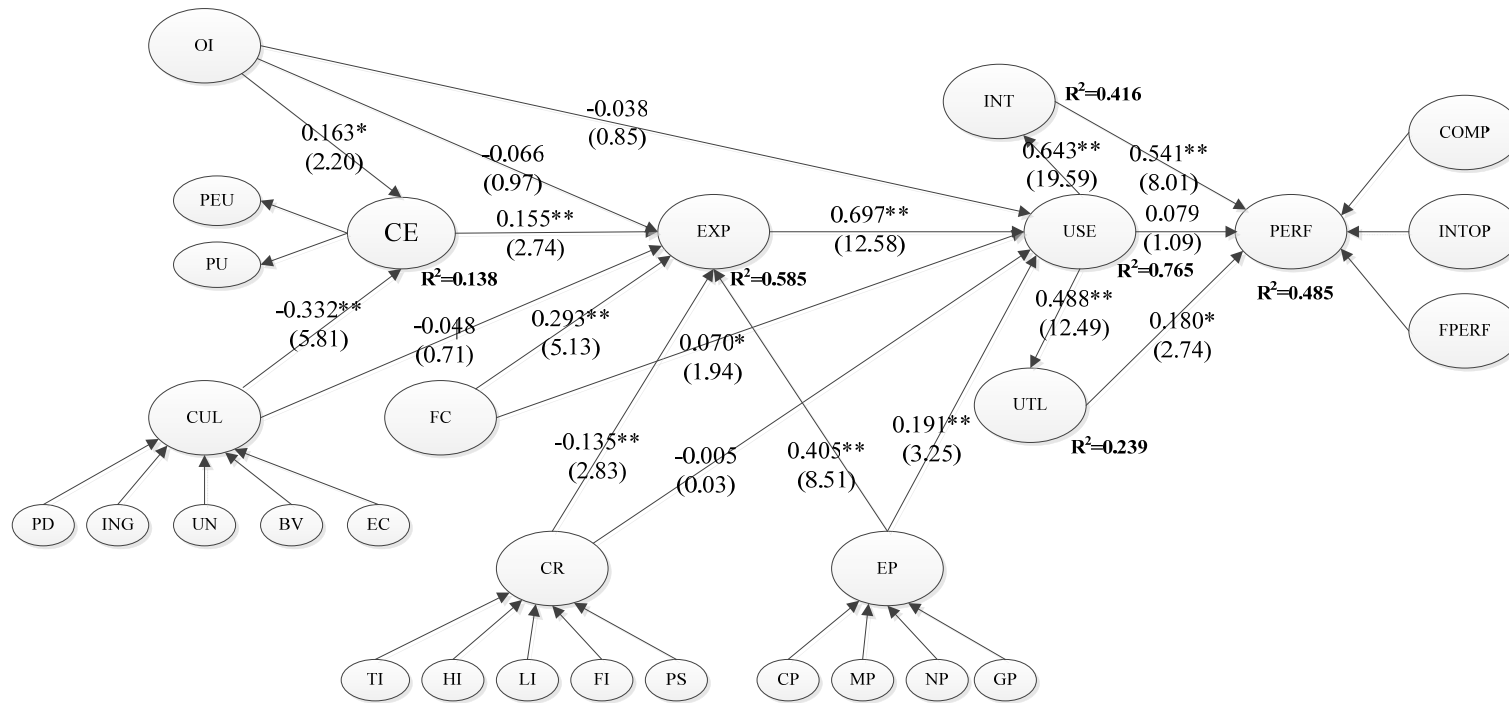
($\gamma = -0.005$, $t = 0.03$, $R^2 = 0.765$). Thus, Hypothesis H_{5a} was supported while Hypothesis H_{5b} was rejected.

Table 6.17: Results of the Structural Model

	Loading	t-value
<i>CE</i> → <i>EXP</i>	0.155**	2.74
<i>OI</i> → <i>CE</i>	0.163*	2.20
<i>OI</i> → <i>EXP</i>	-0.067	0.97
<i>OI</i> → <i>USE</i>	-0.038	0.85
<i>EP</i> → <i>EXP</i>	0.405**	8.51
<i>EP</i> → <i>USE</i>	0.191**	3.25
<i>FC</i> → <i>EXP</i>	0.294**	5.13
<i>FC</i> → <i>USE</i>	0.070*	1.94
<i>CR</i> → <i>EXP</i>	-0.135**	2.83
<i>CR</i> → <i>USE</i>	-0.005	0.03
<i>CUL</i> → <i>EXP</i>	-0.048	0.71
<i>CUL</i> → <i>CE</i>	-0.333**	5.81
<i>EXP</i> → <i>USE</i>	0.697**	12.58
<i>USE</i> → <i>INT</i>	0.643**	19.59
<i>USE</i> → <i>UTL</i>	0.488**	12.49
<i>INT</i> → <i>PERF</i>	0.541**	8.01
<i>UTL</i> → <i>PERF</i>	0.180*	2.74
<i>USE</i> → <i>PERF</i>	0.079	1.09

** $p < 0.01$, * $p < 0.05$

CE = Cognitive evaluation, *OI* = Owner innovativeness, *EXP* = Expectation, *EP* = Environmental pressure, *FC* = Facilitating condition, *CR* = Country readiness, *CUL* = Culture, *USE* = Actual usage, *INT* = Integration, *UTL* = Utilisation, *PERF* = SME performance



** $p < 0.01$, * $p < 0.05$, CE = Cognitive evaluation, OI = Owner innovativeness, EXP = Expectation, EP = Environmental pressure, CUL = Culture, CR = Country readiness, FC = Facilitating condition, USE = Actual usage, INT = Integration, UTL = Utilisation, PERF = SME performance.

Figure 6.6: The comprehensive model estimates

The relationships between *culture* and two endogenous variables, *cognitive evaluation* and *expectation*, were postulated separately in Hypotheses H_{6a} and H_{6b} . The analysis depicted a significant association between *culture* and *cognitive evaluation* ($\gamma = -0.333$, $t = 5.81$, $R^2 = 0.138$) while it showed the opposite result to what was postulated in Hypothesis H_{6b} ($\gamma = -0.048$, $t = 0.71$, $R^2 = 0.585$). Thus, Hypothesis H_{6a} was accepted and Hypothesis H_{6b} was rejected.

The effects of *expectation* on *actual use* are postulated in Hypothesis H_7 . The results depicted a strong and significant effect of *expectation* on *actual use* ($\gamma = 0.697$, $t = 12.58$, $R^2 = 0.765$). Thus, Hypothesis H_7 was accepted.

Hypotheses H_{8a} , H_{8b} and H_{8c} respectively postulated the effects of *ICT usage* on *ICT integration*, *ICT utilisation* and *SMEs' performance*. The model estimates showed a significant association between actual *ICT usage* and *ICT integration* ($\gamma = 0.623$, $t = 12.58$, $R^2 = 0.416$), they also showed significant effects on *ICT utilisation* ($\gamma = 0.488$, $t = 2.74$, $R^2 = 0.239$). The results indicated that actual *ICT usage* was not significantly associated with *SMEs' performance* ($\gamma = 0.079$, $t = 1.09$, $R^2 = 0.485$). Thus, Hypotheses H_{8a} and H_{8b} were accepted while Hypothesis H_{8c} was rejected.

As postulated in Hypothesis H_9 , the study results showed that *ICT integration* had significant effects on *SMEs' performance* ($\gamma = 0.541$, $t = 8.01$, $R^2 = 0.485$). Thus, the relationship between *ICT integration* and *SMEs' performance* as postulated in Hypothesis H_9 was accepted.

Hypothesis H_{10} anticipated significant effects of *ICT utilisation* on *SMEs' performance*. The study results also indicated a significant association between *ICT utilisation* and *SMEs' performance* ($\gamma = 0.180$, $t = 2.74$, $R^2 = 0.485$). Thus, Hypothesis H_{10} was accepted. The results of the hypotheses tests are summarised in Table 6.18 and also illustrated in Figure 6.6.

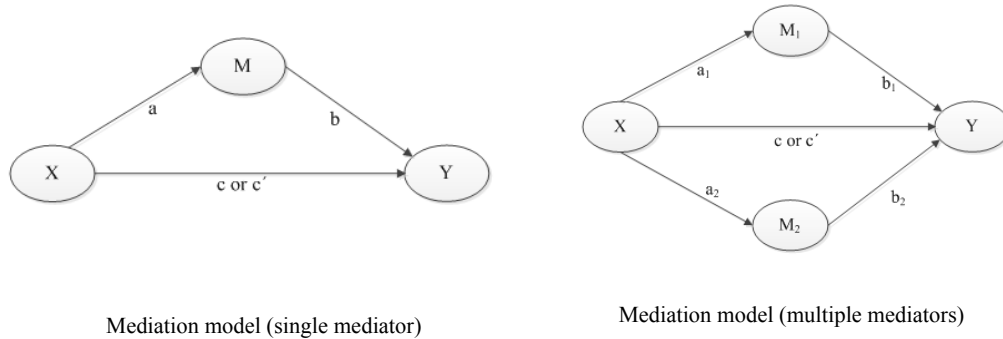
Table 6.18: Results of Hypotheses Tests

Hypotheses		Comments
H_1	Cognitive Evaluation has direct and positive influence on Expectation	Accepted
H_{2a}	Owner Innovativeness has direct and significant effects on Cognitive Evaluation	Accepted
H_{2b}	Owner Innovativeness has direct and significant effects on Expectation	Rejected
H_{2c}	Owner Innovativeness has direct and significant effects on Use of ICT	Rejected
H_{3a}	Environmental Pressure has a significant influence on Expectation	Accepted
H_{3b}	Environmental Pressure has a significant influence on Actual Use	Accepted
H_{4a}	Facilitating Condition has a significant influence on Expectation	Accepted
H_{4b}	Facilitating Condition has a significant influence on Actual Use	Accepted
H_{5a}	Country Readiness has a significant influence on Expectation	Accepted
H_{5b}	Country Readiness has a significant influence on Use of ICT	Rejected
H_{6a}	Culture has a significant influence on Cognitive Evaluation	Accepted
H_{6b}	Culture has a significant influence on Expectation	Rejected
H_7	Expectation has a significant influence on Actual Usage	Accepted
H_{8a}	ICT Usage has significant influence on Integration	Accepted
H_{8b}	ICT Usage has a significant influence on Utilisation	Accepted
H_{8c}	ICT Usage has a significant influence on Performance	Rejected
H_9	ICT Integration has a significant influence on Performance	Accepted
H_{10}	ICT Utilisation has a significant influence on Performance	Accepted

6.5.3 TEST FOR MEDIATING ROLE OF INTEGRATION AND UTILISATION

A system embraces the causes and effects among a number of variables that produce the final outcome through a process. Like predictors or independent variables, the process itself has some effects on the systems which, in turn, is reflected in the outcome. Researchers try to understand the effects of the process on the possible outcome by mediation analysis. Mediation exists when a predictor affects a

dependent variable indirectly through at least one intervening variable, or mediator. Figure 6.7 illustrates mediation models with single and multiple intervening variables.



Mediation model (single mediator)

Mediation model (multiple mediators)

X = Independent variable, Y = Dependent variable, M = Mediating variable

Figure 6.7: Mediating model

The concept of mediation analysis is not new, it can be traced back to the early genetics work of Wright (1921) followed by the stimulus response models of Woodworth (1928) in psychology. Although the study of mediation has a long history (Hyman, 1955; MacCorquodale & Meehl, 1948), it has become popular with the creation of basic measurement approaches for assuming the effect of mediation (Baron & Kenny, 1986; Judd & Kenny, 1981; Lindley & Walker, 1993). It has, furthermore, become easier with the application of structural equation modelling (SEM) (Bollen, 1989).

In the basic measurement approach, Baron and Kenny (1986) and Jude and Kenny (1981) discussed four characteristics of mediation that are also used as the following steps for probing whenever there exists any mediating relationship in a recursive model:

Step 1: The initial variable has significant correlation with the outcome. If Y is considered as a criterion variable and X as the initial variable or predictor, the variations in levels of the initial variable, such as X, should significantly account for the variations in the criterion variable, such as Y.

$$Y = b_0 + cX + \varepsilon \tag{Equation 6.5}$$

where, b_0 = Constant, X = Initial variable, c = Regression effect of X on Y ,

ε = a disturbance term

Step 2: The variations in levels of the initial variable should significantly account for variations in the presumed mediator. This step essentially involves treating the mediating variable as if it was an outcome variable.

$$M = b_0 + aX + \varepsilon \quad \text{Equation 6.6}$$

where, b_0 = constant, M = Mediating variable, a = Regression effect of X on M ,
 ε = a disturbance term

Step 3: The variations in the mediating variable should significantly account for variations in the criterion variable.¹⁸

$$Y = b_0 + bM + \varepsilon \quad \text{Equation 6.7}$$

where, b_0 = Constant, M = Mediating variable, b = Regression effect of M on Y ,
 ε = a disturbance term

Step 4: In complete mediation, the relationship between the initial variable and criterion variable is no longer significant (in control of the mediating variable).

$$Y = b_0 + c'X + bM + \varepsilon \quad \text{Equation 6.8}$$

where, b_0 = Constant, X = Initial variable, M = Mediating variable, c' = Regression effect of X on Y (in control for M), b = Regression effect of M on Y , ε = a disturbance term

The purpose of Steps 1–3 is to establish that zero-order relationships among the variables exist. If all the relationships explained in Steps 1-3 (Equations 6.5 to 6.7) are seen to be significant, researchers anticipate that the third variable M may act as a process variable which may explain the effects of the initial variable x on the criterion variable Y . The variable M is then called a mediating variable or process variable. Assuming there are significant relationships from Step 1 through to Step 3, one proceeds to Step 4. In Step 4, some form of mediation is supported if the effect of M (path b) remains significant after controlling for X . If X is no longer significant

¹⁸ Although 'zero' level regression is logically required to test the influence of the mediation variable on the criterion variable as in Equation 6.7, Baron and Kenny (1986) suggested that the same equation be used to ascertain the relationship stated in Step 3 and Step 4 by multiple regression as modelled in Equation 6.8. Thus, the influence of mediating variables on the outcome variable (in control of the initial variable) is also assessed through Equation 6.8.

when M is controlled, the finding supports full mediation. If x is still significant (i.e. X and M both significantly predict Y), the finding supports partial mediation.

If the mediation process involves only one mediating variable, it is termed simple mediation. More than one variable may perform a mediating role in a causal model. Thus, mediation processes involving more than one intervening variable, termed ‘multiple mediation’, may also be analysed through the above-mentioned procedure.

6.5.3.1 Mediating role of ICT integration

Table 6.19 and Figure 6.8 illustrate that Model 1 shows a direct relationship between the initial variable *ICT use* and the criterion variable *SMEs’ performance* ($c = 0.511$, $t = 9.94$); Model 2 shows a relationship between the initial variable *ICT use* and the mediating variable *ICT integration* ($a_1 = 0.640$, $t = 13.94$), while Model 3 shows that the mediating variable *ICT integration* has significant effects on the criterion variable *SMEs’ performance* ($b_1 = 0.696$, $t = 16.21$). Since all of the above-mentioned relationships are significant, it may be assumed that *ICT integration* may perform a mediating role in explaining the relationship between *ICT use* and *SMEs’ performance*. To further prove whether any mediating relationship exists and, if it exists, what type of mediation it is, the researcher should estimate the regression stated in Step 4. As shown in Table 6.19, Model 4 illustrates a significant effect of *ICT integration* on *SMEs’ performance* ($b_1 = 0.625$, $t = 11.24$): the effects of *ICT use* on *SMEs’ performance* is also significant ($c' = 0.111$, $t = 1.99$). It is important to note that, although the effects of *ICT use* on *SMEs’ performance* is significant (in control of *ICT integration*), the magnitude of the effect is reduced in comparison to the direct relationship between *ICT use* and *SMEs’ performance* ($c = 0.511$, $t = 9.94$). Thus, in applying the basic concept of mediation analysis (Baron & Kenny, 1986; Jude & Kenny, 1981), it is observed that *ICT integration* plays a partial moderating role in explaining the relationship between *ICT use* and *ICT integration* (see Figure 6.8).

The significance of indirect effects is examined by the z statistic (Sobel, 1982). The z value is formally defined as follows (Equation 6.9):

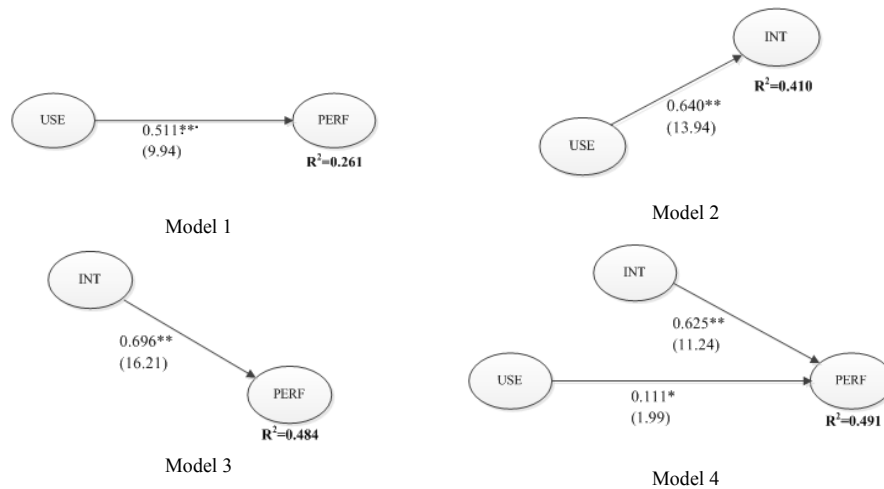
$$z = \frac{a \times b}{\sqrt{b^2 \times s_a^2 + a^2 \times s_b^2 + s_a^2 \times s_b^2}} \quad \text{Equation 6.9}$$

$$z = \frac{0.640 \times 0.696}{\sqrt{(0.696)^2 \times (0.0459)^2 + (0.640)^2 \times (0.0429)^2 + (0.0459)^2 \times (0.0429)^2}} = 10.56$$

The results support the mediating effects of *ICT integration* which implies that it has an indirect influence on *SMEs' performance*. The variance accounted for (VAF) value is used to estimate the ratio of the indirect effects (Equation 6.10).

$$VAF = \frac{a \times b}{a \times b + c} = 87.17 \quad \text{Equation 6.10}$$

The VAF value indicates that 87.17% of the total effect of *ICT use* on *SMEs' performance* is explained by indirect effects through *ICT integration*.



** $p < 0.01$, *USE* = *ICT use*, *INT* = *Integration*, *PERF* = *Performance*

Figure 6.8: Mediating effects of integration

Table 6.19: Mediating Role of Integration in Explaining Performance

	Model 1	Model 2	Model 3	Model 4	Comments
c or c'	0.511** (9.94)			0.111* (1.99)	Partial mediation
a_1		0.640** (13.94)			
b_2			0.696** (16.21)	0.625** (11.24)	
R^2	0.261	0.410	0.484	0.491	

** $p < 0.01$, * $p < 0.05$.

6.5.3.2 Mediating role of ICT utilisation

The study contained another conceptualisation of ICT usage which was ICT utilisation, in examining SMEs' performance. *ICT use* is the measure of the assessment of using different levels of ICT applications while *ICT utilisation* is the measure of the assessment of the degree of ICT utilisation among different functional areas of the organisation. The study assumed that using only ICT usage may not adequately explain organisational performance in the absence of ICT utilisation throughout the organisation. As shown in Table 6.20, Model 1, Model 2, Model 3 and Model 4 illustrate the results that may be concluded about any mediating relationship among the three latent variables (see Figure 6.9).

Model 1 shows the direct relationship between the initial variable *ICT usage* and the criterion variable *SMEs' performance* ($c=0.511$, $t=9.94$); Model 2 shows the relationship between the initial variable and the mediating variable *ICT utilization* ($a_2 = 0.283$, $t = 9.22$); and Model 3 shows that the mediating variable *ICT utilisation* had significant effects on the criterion variable *SMEs' performance* ($b_2 = 0.530$, $t = 10.45$). Since all of the above-mentioned relationships are significant, it may be assumed that *ICT utilisation* may perform a mediating role in explaining the relationship between *ICT usage* and *SMEs' performance*. To further prove whether any mediating relationship exists and, if it exists, what type of mediation it is, the researcher should estimate the regression stated in Step 4 (as stated in section 6.5.3). As shown in Table 6.20, Model 4 illustrates a significant effect of *ICT utilisation* on *SMEs' performance* ($b_2 = 0.369$, $t = 6.78$): the effects of *ICT use* on *SMEs' performance* is also significant ($c' = 0.333$, $t = 6.11$). It is important to note that although the effects of *ICT use* on *SMEs' performance* is significant (in control of *ICT utilisation*), the magnitude of the effect is largely reduced in comparison to the direct relationship between *ICT usage* and *SMEs' performance* ($c = 0.511$, $t = 9.94$). Thus the results indicate a partial mediation of *ICT utilisation* in explaining the relationship between *ICT use* and *SMEs' performance* (Baron & Kenny, 1986; Jude & Kenny, 1981).

The significance of the indirect effects of *ICT use* on *SMEs' performance* through *ICT utilisation* (mediating variable) was examined by the z statistic (Sobel, 1982).

The results supported the mediating effects of *ICT utilisation* ($z = 5.39$, $VAF = .238$) which implies that it has an indirect influence on *SMEs' performance*.

The VAF value indicated that 23.8% of the total effect of *ICT use* on *SMEs' performance* was explained by indirect effects through *ICT utilisation*.

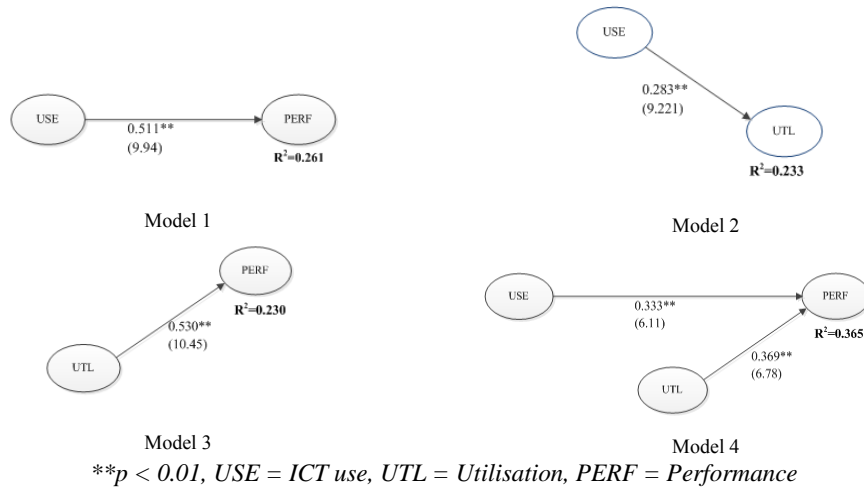


Figure 6.9: Mediating effects of utilisation

Table 6.20: Mediating Role of ICT Utilisation in Explaining Performance

	Model 1	Model 2	Model 3	Model 4	Comments
c or c'	0.511** (9.94)			0.333** (6.11)	Partial mediation
a_2		0.283** (9.221)			
b_2			0.530** (10.45)	0.369** (6.78)	
R^2	0.261	0.233	0.230	0.365	

** $p < 0.01$.

Through understanding the above-mentioned characteristics and applying the steps from Baron and Kenny (1986), it has been assumed that ICT use influences the performance growth of SMEs through a process which comprises ICT integration and ICT utilisation as intervening variables. Baron and Kenny's (1986) steps also helped to detect whether there was any mediating relationship and also answered the question of whether the target variable was feasible for mediation analysis. The process produced reliable estimates of indirect effects and their power through multiple regression analysis. However, researchers face difficulties when more than one intervening variable is involved in a process in a causal model.

6.5.3.3 Mediating roles of ICT integration and ICT utilisation

Different types of mediation occur in a causal set-up such as simple mediation and multiple mediation. Simple mediation involves the analysis of the effects of independent variables on a criterion variable by a single intervening variable. Multiple mediation involves the relatively complex analysis of the effects of independent variables on a criterion variable by multiple mediators or intervening variables.

Although the analysis of mediation has received the bulk of researchers' attention in behavioural studies, most of the previous initiatives have focused on simple mediation analysis, only a few authors have focused on the simultaneous testing of multiple indirect effects which is a worthwhile method for addressing the complex mediated relationship (e.g. Bollen, 1987, 1989; Brown, 1997; MacKinnon, 2000; West & Aiken, 1997).

In multiple mediation, the specific indirect effect of X on Y via mediator i (Brown, 1997; Fox, 1985) is defined as the product of the two unstandardised paths linking X to Y via those mediators. For example, the specific indirect effect of X on Y through M_1 is quantified as a_1b_1 . If another variable M_2 is included in the model as a simultaneous mediator, the specific indirect effect of X on Y through M_2 is quantified as a_2b_2 . The complex relationship in a simultaneous multiple mediator model is estimated by utilising the formulas as stated in Equations 6.11 and 6.12.

$$\text{The total indirect effect} = \sum_{i=1}^j a_i b_i \quad \text{Equation 6.11}$$

$$\text{Total effect } c = c' + \sum_{i=1}^j a_i b_i \quad \text{Equation 6.12}$$

Total indirect effects may also be calculated by $c - c'$

The conceptual model of the study included the simultaneous multiple mediators *ICT integration* and *ICT utilisation* to address the impact of *ICT use* on *SMEs' performance*. The preceding subsections have addressed the effects of two mediators when applying Baron and Kenny's (1986) procedure by multiple regression separately with a single mediator.

The emergence of structural equation modelling (*SEM*) created remarkable progress in mediation analysis. Structural equation modelling, a second generation statistical tools, produces multiple mediators' direct and indirect effects in a causal framework. Covariance-based structural equation modelling (*CBSEM*) has been widely used as an analytical tool for assessing mediating effects in a common and integrated platform. As structural equation modelling (*SEM*) produces comprehensive results, Baron and Kenny's (1986) four-step procedure was not entirely required for the analysis.

With the emergence of sophisticated SEM software, mediation analysis has not only become popular, but new and easier ways have been provided for obtaining estimates to examine mediating effects. The new procedure considers three different models—no mediation, complete mediation and partial mediation—for mediation analysis. The values of different parameter estimates and fit indices are the criteria for comparison to select the preferred model. In order to prove the mediating effects, this study's previously estimated model was restructured by developing three different models to investigate the mediating roles of *ICT integration* and *ICT utilisation* on *organisational performance*.

In the complete mediation model, ICT use was hypothesised to have only an indirect effect on SMEs' performance through ICT integration and ICT utilisation. The partial mediation model anticipated significant direct and indirect effects while the no mediation model involved assessment of the predictor variables' impact only on the outcome variable.

In covariance-based structural equation modelling (*CBSEM*), researchers estimate the model's extension as a no mediation model, full mediation model and partial mediation model. The study thus estimated different fit indices to examine which model would produce acceptable and high fit indices. The strength of different fit indices was the basis for the preferred model selection which also justified the pattern of mediation. *CAIC* (comprehensive Akaike information criteria), chi-squared, comparative fit index (*CFI*), normed fit index (*NFI*), incremental fit index (*IFI*), root mean square error of approximation (*RMSEA*) and adjusted goodness-of-fit index (*AGFI*) statistics were estimated to select the preferred model. Covariance-

based *SEM* can compute the fit indices and easily compare different models while component-based structural equation modelling only uses R^2 to anticipate the variations in the model. A different form of fit index, *GoF*, a global fit measure, is conducted for *PLS* path modelling. The *GoF* value is computed by the average communality and average R^2 for the endogenous constructs (Tenenhaus et al., 2005).

$$GoF = \sqrt{AVE \times \bar{R}^2} \quad \text{Equation 6.13}$$

The estimated *GoF* values may be used to assess the global validation of *PLS* models. The validation of the *PLS* model was examined by comparing the *GoF* values with different cut-off values set for the model with different explanatory power (Wetzels et al., 2009). The *GoF* values followed the basic three cut-off values as:

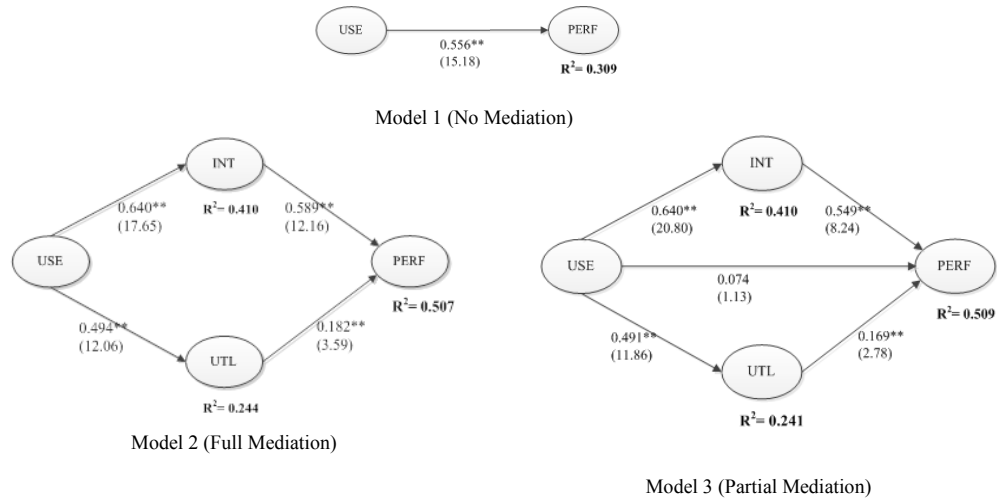
$$GoF_{small} = 0.1, GoF_{medium} = 0.25, GoF_{large} = 0.36 .$$

The high *GoF* values suggested a satisfactory fit which may help to select the preferred model for assessing the form of mediation with adequate support to globally validate the *PLS* model.

As shown in Table 6.21 (see also Figure 6.10), Model 1 (no mediation model), Model 2 (complete mediation model) and Model 3 (partial mediation model) have *GoF* values of 0.405, 0.467 and 0.466 respectively. Thus, each of the models exceeded the cut-off value of 0.36 for large sizes of R^2 which, in turn, provided adequate supports for global validation of the *PLS* models.

Model 2 showed significant direct effects of ICT use on SMEs' performance ($c = 0.556$, $t = 15.18$, $R^2 = 0.309$). The complete mediation model showed significant effects of the initial variable on both the intervening variables. The initial variable *ICT use* had a significant effect on the mediator, *ICT integration* ($a_1 = 0.640$, $t = 17.65$, $R^2 = 0.41$), and also had a significant effect on another mediator *ICT utilisation* ($a_2 = 0.494$, $t = 12.06$, $R^2 = 0.44$). The model again projected the

significant effects of the mediators, *ICT integration* ($b_1 = 0.589$, $t = 12.16$) and *ICT utilisation* ($b_2 = 0.182$, $t = 3.59$) on the criterion variable *SMEs' performance*.



** $p < 0.01$, USE = *ICT use*, INT = *Integration*, UTL = *Utilisation*, PERF = *Performance*

Figure 6.10: Mediating effects of integration and utilisation

The partial mediation model also showed the significant effects of *ICT use* on the two mediators *ICT integration* and *ICT utilisation*. The result also indicated the significant influence of the two mediators (*ICT integration* and *ICT utilisation*) on *SMEs' performance* while the effect of *ICT use* on *SMEs' performance* was seen to be non-significant ($c' = 0.74$, $t = 1.13$, $R^2 = 0.509$). The combined model showed a reduced strength of c , which was also insignificant. Thus, the analyses posited a complete mediating process in assessing the effects of *ICT use* on *SMEs' performance* through two intervening variables, *ICT integration* and *ICT utilisation* (see Table 6.22).

Further indirect effects of *ICT use* on *SMEs' performance* through *ICT integration* ($a_1 \times b_1 = 0.377$) were higher than the effects through *ICT utilisation* ($a_2 \times b_2 = 0.09$).

The total indirect effect was given by $\sum_{i=1}^j a_i b_i = 0.467$.

Table 6.21: Mediating Roles of ICT Integration and Utilisation

	Model 1 (No mediation)	Model 2 (Full mediation)	Model 3 (Partial mediation)	Comments
c or c'	0.556** (15.18)	na	0.074 (1.13)	Complete mediation
a_1	na	0.640** (17.65)	0.640** (20.80)	
b_1	na	0.589** (12.16)	0.549** (8.24)	
a_2	na	0.494** (12.06)	0.491** (11.86)	
b_2	na	0.182** (3.59)	0.169** (2.78)	
R^2	0.309	0.41(M ₁) 0.244(M ₂) 0.507(Y)	0.41(M ₂) 0.241(M ₂) 0.509(Y)	
GoF	0.405	0.467	0.466	

** $p < 0.01$.

The hypotheses tests results for mediating effects of *Integration* and *Utilisation* on SME performance are summarised in Table 6.22.

Table 6.22: Summary of Hypotheses Tests for Mediating Effects of Integration and Utilisation

Hypotheses	Comments
H_{11a} Integration plays a significant mediation role in explaining the effects of ICT usage on SME performance.	Partial mediation
H_{11b} Utilisation plays a significant mediation role in explaining the effects of ICT usage on SME performance	Partial mediation
H_{11c} Integration and utilisation jointly play a significant mediation role in explaining the effects of ICT usage on SME performance	Complete mediation

The study results showed the significant effects of *ICT usage* on *SMEs' performance* in a complete mediational process which involved the multiple intervening variables, *ICT integration* and *ICT utilisation*. Interestingly, *ICT usage* significantly affected *SMEs' performance* in a single mediational process. That is, in the no-mediation model, the effect of *ICT usage* on *SMEs' performance* was observed to be significant. The effects of *ICT usage* were reduced in the single mediation process (either *ICT integration* or *ICT utilisation*) which vanished in the multiple mediation process in the presence of both *ICT integration* and *ICT utilisation* as mediators.

6.6 SUMMARY

This chapter has presented the results of the quantitative analysis of a nation-wide survey conducted in Bangladesh to study the diffusion of ICT and its role in generating the performance of SMEs. The study employed *PLS*-based structural equation modelling (*SEM*) with a data set of 282 SMEs in Bangladesh used for data analysis. The nature of the study (practical and exploratory), and the nature of the latent variables under study (reflective and formative) justified the use of the *PLS* technique as the main analytical tool. The procedures of data collection, data screening by investigating possible biases and data analysis were elaborated in detail.

The analysis of the data by *PLS* was performed in two stages (assessment of the measurement model and structural model estimation) which were reported separately. The measurement model was assessed by estimating the convergent validity and discriminant validity of the constructs. The convergent validity of the reflective indicators was examined by item loadings while weights of the items and absence of multicollinearity among them were the criteria for the formative indicators. Composite reliability and *AVE* were also computed to test convergent validity. The study used 0.5, 0.7 and 0.5 as threshold levels (cut-off values) for the item loadings, composite reliability and *AVE* respectively. The study examined the square root of *AVE* and inter-construct correlations for construct level discriminant validity, and the item cross-loading matrix for item level discriminant validity of the study constructs. The hypotheses of the study were tested by estimating the structural model. The magnitude and degree of the estimates were examined by path coefficient (γ) and critical ratio (*t*-statistic) while the nomological validity was examined by R^2 . The structural model explained 58.5% of variance in *expectation* while 76.5% and 48.5% of variance were explained in *ICT use* and *organisational performance* respectively. The estimates nullified five hypotheses while all other hypotheses developed in Chapter 5 were accepted. The implications of these results and outcomes are discussed in Chapter 7.

CHAPTER 7

DISCUSSION AND INTERPRETATION

7.1 INTRODUCTION

This chapter presents the discussion of the results and interpretation of the quantitative data analysis. The premise of the data analysis was developed by anticipating the structural relationships between endogenous and exogenous variables. The estimated results, through applying PLS-based structural equation modelling (SEM), showed the degree and magnitude of the relationships between the constructs under study. The discussion of the results and their interpretations was performed based on the anticipated hypotheses and statistical estimations. The hypotheses of the research and test results were shown in Chapters 5 and 6 respectively. This chapter discusses and debates the results in light of the respective hypotheses.

7.2 HYPOTHESIS RELATED TO COGNITIVE EVALUATION

7.2.1 HYPOTHESIS H_1

The theory of reasoned action (TRA) (Fishbein & Ajzen, 1975) suggests that overall affective evaluation, that is, one's beliefs (cognitive) towards performing a behaviour and respective evaluations (affective) heavily influence the individual's intention of performing the behaviour. The evaluation is made based on one's cognitive evaluation of the consequences of that behaviour (Ajzen & Fishbein, 1980; Sheppard et al., 1988).

Based on the notion of the TRA and supported by previous studies, it was anticipated that *cognitive evaluation* would have a direct and positive influence on *expectation* (Mehta & Sivadas, 1995; Reynolds, 1974; Schlosser et al., 1999). The findings of the study revealed that *cognitive evaluation* ($\gamma = 0.155$) was directly related to *expectation*. This finding was consistent with past studies (Mehta & Sivadas, 1995; Reynolds, 1974; Schlosser et al., 1999; Liao & Cheung, 2001) and also complied with the notion of the TRA and the theory of planned behaviour (TPB).

With a strong positive and significant influence on *expectation*, *cognitive evaluation* played an important role in ICT adoption by SMEs. The result indicated that highly positive evaluation, that is, firms' favourable perception about ICT created positive expectation regarding the use or implementation of the technology. From the model, it was observed that the construct *cognitive evaluation* was a compound higher-order latent variable constructed by the reflections of two perceptual beliefs, *perceived ease of use* and *perceived usefulness*. These two factors were internal and developed through the adopter's own knowledge and perceptions about ICT.

This result has some implications for existing and potential users of ICT as well as for policy makers. Policy makers may be interested to know how *cognitive evaluation* could be developed in a positive way to boost the general level of ICT usage by SMEs in Bangladesh.

7.3 HYPOTHESES RELATED TO OWNER INNOVATIVENESS

Applying the notion of the diffusion of innovation (DOI) theory (Rogers, 1983, 1995, 2003), it has been argued that the first adopters of an innovation are innovators themselves who usually try a new idea, concept or product first and take the associated risks. Their good or bad experiences are transmitted to other potential adopters through the communication channels in an innovation diffusion process. The innovator's first experience of an innovation works as a reference which attracts different potential adopters and an innovation finally gains popularity. In support of the past literature, the field study justified three different hypotheses related to owner innovativeness.

7.3.1 HYPOTHESIS H_{2a}

The estimates showed a significant positive association between *owner innovativeness* ($\gamma = 0.163$) and *cognitive evaluation*. Traditionally, the literature has suggested a positive link between adopter innovativeness and intention and/or actual use. This hypothesis was developed through the field study analysis. The finding of the structural model estimation was in line with the field study and was also consistent with the basic assumption of the DOI theory (Rogers, 2003).

The result indicated that innovative owners or CEOs favourably evaluate the usefulness and operational ease of ICT. An innovative owner or CEO usually generates new ideas or concepts for the development or sustainability of the organisation and has the ability to bear any risk associated with implementing those ideas or concepts. Thus, although in general, SME owners anticipate various constraints in accepting ICT, by their nature, innovative owners positively evaluate the outcome of the innovation and proceed to have actual experience. This result has some implications for the Bangladeshi government, policy makers and concerned organisations who are involved in promoting ICT usage among SMEs. Innovative SME owners may play a significant role, as a reference group, in fostering the adoption rate of ICT by SMEs in Bangladesh.

7.3.2 HYPOTHESIS H_{2b}

It was anticipated that *owner innovativeness* would have direct and significant effects on *expectation*. The estimation rejected the hypothesis by revealing a non-significant association between *owner innovativeness* ($\gamma = -0.067$) and *expectation*. Surprisingly, the result was not consistent with the field study nor with past studies (Thong, 1999; Thong & Yap, 1995). The result indicated that owner or CEO innovativeness had no impact on expectation. In general, the innovative owner or CEO, by their nature, initiates things differently; thus, they are not hesitant to try an innovation. The innovators bear the risks associated with the adoption of an innovation and use the innovation at the first stage (Rogers, 2003) which implies that innovative owners highly intend to use an innovation. This result may have happened because the research model included *expectation* as an immediate antecedent of *actual usage* which was explained as a state of rational intention. Unlike intention, *expectation* is an expressed state of willingness which is formed by evaluating many internal, external and environmental factors. Thus, although previous studies had found that *owner innovativeness* had a strong and significant effect on *intention* (Thong & Yap, 1995; Thong, 1999), this study, logically, did not find a significant relationship between them. The adoption of ICT was highly associated with the resources and operational skills (Venkatesh et al., 2003, 2008) of the organisation as well as the compatibility (Rogers, 2003) of the ICT with existing systems and procedures. Thus, innovative owners, although holding new ideas and

positive evaluations about the technology, consider their ability in terms of resources and operational skills as well as compatibility which may produce a realistic expectation whereas innovativeness has no significant impact.

7.3.3 HYPOTHESIS H_{2c}

The estimation revealed a non-significant association between *owner innovativeness* ($\gamma = -0.038$) and *SMEs' actual usage of ICT*. Contrary to the field study outcome and previous studies, this finding indicated that owner innovativeness had no impact on the usage of ICT (Thong & Yap, 1995). It may be argued that, unlike innovations which are non-technical in nature that may be adopted and used by the will or preference of an entrepreneur, technological innovations particularly ICT require competent human resources, technology resources and a compatible working environment. As the technology involves operation of the Internet, the use, that is, the level of ICT application and depth of use, is related to its compatibility with customers, suppliers, regulatory authorities, partners and other stakeholders. This study investigated SMEs in Bangladesh where small enterprises face many problems regarding their resources and are mostly operated in an informal manner. The Bangladeshi government, although aiming to develop a digital-based economy by 2021, runs with a manual and traditional working environment in different departments and functional areas. Thus, SMEs, having the required facilities and resources, are also less inclined to use technology.

Furthermore, the SMEs that are involved in international operations are compelled to use ICT as their foreign counterparts require their ICT competency, particularly their online participation, and in this situation it is not important whether the entrepreneurs are innovative.

7.4 HYPOTHESES RELATED TO ENVIRONMENTAL PRESSURE

7.4.1 HYPOTHESIS H_{3a}

It was anticipated that *environmental pressure* would have a significant influence on *expectation*. The structural model estimation showed a direct significant association between *environmental pressure* ($\gamma = 0.405$) and *expectation* which was consistent

with previous studies (Ajzen, 1985; Kuan & Chau, 2001; Teo et al., 2003). *Environmental pressure* was measured as a composite of *coercive pressure* (DiMaggio & Powell, 1983; Quaddus & Hofmeyer, 2007); *mimetic pressure* (Premkumar & Ramamurthy, 1995; Teo et al., 2003); *normative pressure* (Teo et al., 2003; Venkatesh et al., 2003); and *global pressure* (field study); thus, this finding indicated the overall impact of *environmental pressure* on *expectation*. It was argued that firms that received positive experience about the use of ICT from their suppliers, partners or other stakeholders were highly inclined to adopt the same technology in their organisation to reap the advantages of using ICT. The results also suggested that customers' expectations and competitors' ICT usage's trends and patterns influence SMEs' ICT usage expectation. This study reported a unique environmental influence which may arise from ongoing technological development and globalisation.

7.4.2 HYPOTHESIS H_{3b}

Following the notion of the technology, organisation and environment (TOE) framework (Tornatzky & Fleischer, 1990), it was anticipated that *environmental pressure* would have a significant influence on *SMEs' actual use of IT*. The results of the structural model revealed a positive and significant effect of *environmental pressure* ($\gamma = 0.191$) on *actual usage* behaviour which was consistent with the TOE framework and other past studies (Tornatzky & Fleischer, 1990; Zhu & Kraemer, 2005; Teo et al., 2003). As with Hypothesis H_{3a} , the overall impact of *environmental pressure* was anticipated by Hypothesis H_{3b} . The result indicated that *SMEs' actual use of ICT* was largely influenced by *environmental pressure* arising from competitors (*mimetic pressure*); partners/customers (*normative pressure*); demands from the regulatory authority or dominant customers/suppliers (*coercive pressure*); or technological development/globalisation (*global pressure*). The results suggested that firms that have had good experiences using ICT with their close stakeholders, partner organisation and suppliers and whose customers expected to see them using technology would use ICT. The trend, status and success of competitors' ICT use

also influenced SMEs' level of ICT use. Most importantly, SMEs used ICT due to pressure from their dominant customer organisations or suppliers. This was very common in the ready-made garment (RMG) industry. Most of the customers or suppliers of Bangladeshi RMG organisations are large internationally reputable companies. They are completely ICT-based. They communicate, interact and transact with all parties online. Without ICT competency and online participation, it is not possible to interact with them. Thus, the RMG organisations had no choice but to use ICT to become compatible with their customers or suppliers and also to match the competition.

Globalisation has created new opportunities for business organisations. SMEs have become more international to gain the competitive advantage from being active in international business. ICT, particularly the Internet, offers easy access to the international arena and ensures effectiveness and reliability in communication, negotiations and transactions.

7.5 HYPOTHESES RELATED TO FACILITATING CONDITION

7.5.1 HYPOTHESIS H_{4a}

The estimation showed a significant correlation between *facilitating condition* ($\gamma = 0.294$) and *expectation* which was consistent with past research studies (Venkatesh et al., 2008; Ajzen, 1985; Taylor & Todd, 1995c; Thompson et al., 1991) and the field study. The operationalisation of the construct *facilitating condition* emphasised external resources such as organisational, technological and human resources. *Facilitating condition* referred to the degree to which an individual believed that an organisational and technical infrastructure existed to support the use of the system. The result indicated that the SMEs with the necessary technical and organisational resources (e.g. hardware and Internet connectivity, ICT-competent employees, compatible procedures, etc.) had high expectation of using ICT.

7.5.2 HYPOTHESIS H_{4b}

In accordance with the UTAUT model (Venkatesh et al., 2003), it was anticipated that *facilitating condition* would have a significant influence on SMEs' *actual use of*

ICT. The estimation showed a significant association between *facilitating condition* ($\gamma = 0.70$) and *actual ICT usage* behaviour. The results indicated that firms with adequate hardware and network connectivity, competent employees and compatible working environments were likely to use ICT. The results also indicated that firms lacking some technical and organisational infrastructure were logically less inclined to use ICT. This result supported the findings of past researchers (Venkatesh et al., 2003; Gupta et al., 2008).

7.6 HYPOTHESES RELATED TO COUNTRY READINESS

In reference to Rogers (1983), Tornatzky and Fleischer (1990), Caselli and Coleman (2001) and Zhu and Kraemer (2005), it was anticipated that *country readiness* would have a significant influence on *SMEs' expectation* (Hypothesis H_{5a}) and *actual usage* (Hypothesis H_{5b}) of *ICT*.

7.6.1 HYPOTHESIS H_{5a}

The structural model estimation showed a significant association between *country readiness* ($\gamma = -0.135$) and *SMEs' expectation* to use ICT. The result indicated that overall *country readiness* was an important predictor of *expectation* which was consistent with the findings of previous studies (Molla & Licker, 2005; Marques et al., 2011). *Country readiness*, an aggregated variable, explained the overall effects of contextual factors as the construct was a higher-order composite of *technology infrastructure, human infrastructure, legal infrastructure, financial infrastructure, and government policy and supports*. The overall effect of *country readiness* was negative which meant that the overall infrastructure of the country was not favourable for the adoption of ICT particularly from the SMEs' perspective. This result may be debated as Bangladesh is now in its infancy in the implementation of ICT in different sectors. Although the government of the country is dedicated to establishing a digital-based society by 2021 by applying the ICT potential in economic development and governance, the responses from different parties have not been very satisfactory.

For example, Internet penetration of Bangladesh on June 2012 was calculated as 0.5% which was very low in comparison to many developed and developing

countries.¹⁹ The Bangladeshi government is trying hard to overcome these challenges by providing subsidies and grants, initiating favourable ICT policy and tax rebates, and also providing computer hardware at a lower price. However, ICT users are facing several constraints, such as coverage of the Internet network, Internet speed, power supply, legislative supports in different kinds of online disputes and lack of online banking facilities which restrict them from using ICT and establishing ICT-dependent working environments.

7.6.2 HYPOTHESIS H_{5b}

The structural model estimation did not find any significant association between *country readiness* ($\gamma = -0.005$) and *SMEs' actual ICT usage* behaviour. The result was inconsistent with previous studies (Dewan & Kraemer, 2000; Zhu & Kraemer, 2005; Zhu et al., 2006a). Surprisingly, the aggregated impact of the contextual factors was not found to be significantly related to *SMEs' ICT use* while it had significant negative effects on *expectation*. It is argued that this result occurred because the Bangladeshi infrastructure, namely, *technology infrastructure, human infrastructure, legal infrastructure, financial infrastructure or government policy and supports* negatively affected *SMEs' expectation of using ICT*. That is, the SMEs that were willing to adopt ICT were afraid about the outcome of the investment when evaluating the overall infrastructural supports required for ICT operation. Their negative perception of the infrastructure as Internet speed was, in general, very slow, frequent power outages occurred, banking and legal supports were incompatible, and the absence of online consumer protection law all adversely affected their expectation.

Despite inadequate and incompatible infrastructural supports, some organisations were compelled to use ICT due to their interactions with international companies (many of whom were large multinational enterprises) as a collaborator, supplier or customer.

Organisations in foreign countries were completely computer-based working in automated environments. They demanded that their foreign collaborators were

¹⁹ Internet penetration is higher in Australia (88.8%), USA (78.1%), the UK (83.6%), Egypt (35.6%), South Africa (17.4), Malaysia (60.7%), China (40.1%) and India (11.4%) in comparison to Bangladesh (Internet World Stats, 2013).

compliant with their systems. Thus, SMEs in underdeveloped countries, although facing several constraints and having had no expectation of adopting such technology, were using ICT to comply with their foreign customers and collaborators and to match the competition. In this context, although *country readiness* had strong negative effects on *expectation*, there was no relationship with *actual usage* behaviour.

7.7 HYPOTHESES RELATED TO CULTURE

Culture, as an important aspect of the external environment, affected organisational *ICT usage* behaviour. Based on the field study outcomes and past studies (Bertolotti, 1984; Burn, 1995; Erez & Early, 1993; Gefen & Straub, 1997; Hill et al., 1998; Ho et al., 1989), it was anticipated that *culture* would have a significant influence on *cognitive evaluation* (Hypothesis H_{6a}) and *expectation* (Hypothesis H_{6b}).

7.7.1 HYPOTHESIS H_{6a}

The results of the structural equation model estimation showed a significant negative association between *culture* ($\gamma = -0.333$) and *cognitive evaluation*. This result was consistent with the field study and prior studies (Lu, Rose, & Blodgett, 1999; Ralston, Giacalone, & Terpstra, 1994; Dolecheck & Dolecheck, 1987). Culture is composed of values, norms and beliefs which individuals of a collective acquire through their long-term interactions with their fellow community members, society and the environment. Individuals' preferences and behaviours are largely influenced by their own culture. The result suggested that the culture of Bangladesh was not supportive to the operation and implementation of computer-driven communication systems or working environments among SMEs.

Bangladesh is a developing country which is characterised by a culture with high power distance and high in-group collectivism. Small businesses are mostly operated in an informal manner. Individuals in this society usually interact through face-to-face communication, maintaining close social ties and mostly use the Bengali language as their medium of communication. Nepotism, political influence and interference have become a part of the country's culture. The overall culture of the

country is now polluted through exercising bribery and unethical ways of conducting business in different sectors.

Utilisation of computers in the working environment requires the establishment of structured and formal working procedures, technology resources and skilled human resources. Entrepreneurs of SMEs are usually confused when considering the usefulness of ICT as it is not compatible with the overall culture of the country. They may also not perceive the technology as being easy to use as the basic interfaces of computer-driven programs are English language-based.

This study has measured *culture* by applying higher-order hierarchical modelling where culture was conceptualised as a second-order composite of *power distance*, *in-group collectivism*, *uncertainty avoidance*, *ethical culture* and *Bengali values*. The estimation revealed a gross summated effect of *culture* on *cognitive evaluation* which was negative.

7.7.2 HYPOTHESIS H_{6b}

The statistical estimation did not reveal any significant association between *culture* ($\gamma = -0.048$) and *expectation*, which thus rejected Hypothesis H_{6b} . Prior studies have supported the view that *culture* influences *organisational ICT use* (Bertolotti, 1984; Burn, 1995; Erez & Early, 1993; Gefen & Straub, 1997; Hill et al., 1998; Ho et al., 1989; Straub, 1994; Harris & Davison, 1999). The field interviews explored the view that *culture* was associated with *expectation* and *cognitive evaluation*. Although interview participants supported the link between *culture* and *expectation*, statistical analysis of the national survey data indicated that this prediction, based as it was on a small sample, could not be applied to a larger population.

The assumption, justified through the qualitative field study, may be rejected by a quantitative survey. This is a common problem of mixed-method research as some ideas primarily considered through the field study which comprises a small sample size may be rejected through the responses from a comparatively large sample used in the quantitative survey (Quaddus, Islam, & Stanton, 2006; Jackson, 2008). However, this result may be argued against, according to England (1975), who stated that culture was a key determinant in determining individual beliefs, values and attitudes. *Cognitive evaluation* represented individuals' favourable or unfavourable

feelings towards an innovation which was completely internal and projected as attitude, thus a significant association between *culture* and *cognitive evaluation* was justified. This result is consistent with the findings of numerous past studies (Lu, Rose, & Blodgett, 1999; Ralston, Giacalone, & Terpstra, 1994; Dolecheck & Dolecheck, 1987).

Surprisingly, *culture* was not found to have a significant effect on *expectation*. One possible explanation of this result was that the comprehensive research model included *cognitive evaluation* as a predictor of *expectation* with *culture*. Cognitive evaluation was more highly influenced by culture than expectation as culture is a determinant of individuals' values, beliefs and attitudes (England, 1975). Cognitive evaluation, as the relatively expressed state of individuals' favourableness or unfavourableness toward an innovation, produced a strong and significant effect on expectation while culture did not provide any significant effect on expectation but significantly explained cognitive evaluation. As an individual's favourableness or unfavourableness towards an innovation formed their intention or expectation, cognitive evaluation was found to have a strong significant effect on expectation.

Importantly, *culture*, although it was not found in this study to have a positive effect on *expectation*, was indirectly related to *expectation* through its strong and significant influence on *cognitive evaluation*.

7.8 HYPOTHESIS RELATED TO EXPECTATION

7.8.1 HYPOTHESIS H_7

Applying the notion of the TRA (Fishbein & Ajzen, 1975), TPB (Ajzen, 1985) and TAM (Davis, 1989) with the outcome of a recent study (Venkatesh et al., 2008), *expectation* was predicted to have a significant positive influence on *actual usage* behaviour (Hypothesis H_7). Finally, the structural model estimation depicted *expectation* ($\beta = 0.697$) as a strong and significant determinant of actual behaviour when referring to *actual use* of ICT among SMEs in Bangladesh. The finding supported previous theories and empirical studies (Ajzen & Fishbein, 1980; Azam & Quaddus, 2009b; Chang, 1998; Fishbein & Ajzen, 1975; Mathieson, 1991; Taylor & Todd, 1995a, 1995b; Venkatesh & Morris, 2000; Venkatesh & Davis, 2000;

Venkatesh et al., 2003; Venkatesh et al., 2008). Consistent with the theoretical framework, this result indicated that a positive and strong expectation, that is, the willingness to adopt would foster the use of ICT at firm level.

7.9 HYPOTHESES RELATED TO ICT USE

7.9.1 HYPOTHESIS H_{8a}

Based on the field study findings, *ICT use* was anticipated to have a significant influence on *ICT integration* (Hypothesis H_{8a}). The structural model estimation revealed a strong significant positive association between *ICT use* ($\gamma = 0.643$) and *integration*. This result was consistent with the field study. This study measured *ICT use* as a summated subjective assessment of different levels of ICT applications, namely, use of the Internet and homepage (capable of product cataloguing); use of interactive homepage (capable of receiving online orders); use of interactive homepage for transactions (capable of online transactions); and use of enterprise resource planning (ERP). Consistent with the field study outcome, this result indicated that the higher levels of ICT application would speed up the process of ICT integration between different functional areas within the organisation as well as with other organisations at industry level.

7.9.2 HYPOTHESIS H_{8b}

As with Hypothesis H_{8a} , based on the field study findings, it was proposed that *ICT use* would have a direct significant influence on *degree of utilisation* (Hypothesis H_{8b}). The structural model estimation revealed a strong significant positive association between *ICT use* ($\gamma = 0.488$) and *degree of utilisation*. This result was consistent with the field study. *Degree of utilisation* was measured through a summated subjective assessment of how appropriately ICT was utilised in different functional areas in the firm, namely, production, administration and accounts, and marketing and sales. Consistent with the field study outcome, this result indicated that the higher level of ICT applications would ensure proper utilisation of ICT in various functional areas of the firm.

7.9.3 HYPOTHESIS H_{8c}

Applying the notion of the resourced-based view (RBV) of the firm (Barney, 1991) and its application to ICT at the firm level (Bharadwaj, 2000; Powell & Dent-Micallef, 1997), it was anticipated that *ICT use* would have direct positive effects on firm *performance* (Hypothesis H_{8c}). Surprisingly, the structural model estimation did not find any significant association between *ICT use* ($\gamma = 0.077$) and *performance*. This result was also not consistent with previous studies ((Bharadwaj, 2000; Powell & Dent-Micallef, 1997; Zhu & Kraemer, 2005; Zhu et al., 2006a). This result also was contrary to the outcome of the field study.

However, the result apparently was similar to the productivity paradox of IT. This was argued according to the resource-based view (RBV) (Barney, 1991) which explains that valuable, rare, imperfectly imitable and imperfectly substitutable resources could generate sustainable competitive advantage for the firm with the prerequisite of heterogeneity and imperfectly mobile resources among competing firms. The constructs, *ICT integration* and *degree of utilization*, combine ICT resources with different functionalities of a firm and utilise them properly which produces unique capabilities that are intangible and unable to be imitated. Thus, ICT use alone, without integrated and properly utilised applications, may not have any significant impact on firm performance.

7.10 HYPOTHESIS RELATED TO ICT INTEGRATION

7.10.1 HYPOTHESIS H_9

ICT integration was anticipated to have a significant influence on *organisational performance* (Hypothesis H_9). The structural model estimation revealed a strong significant association between *ICT integration* ($\gamma = 0.541$) and *firm performance*. This result was consistent with the field study outcome and past studies (Zhu & Kraemer, 2002, 2005). *Firm performance* was measured by applying higher-order hierarchical modelling where *competitive performance*, *internal operation productivity* and *financial performance* were the manifest variables. However, this result indicated that overall *firm performance* largely depended on how ICT was integrated between different functional areas. This result was logical as organisations

would not receive the benefit if they introduced computer-based operation only in one particular department while other departments operated through manual procedures. Furthermore, organisations would not receive productive output even in the case where computer-based operations were introduced in many departments if they were not integrated.

7.11 HYPOTHESIS RELATED TO DEGREE OF UTILISATION

7.11.1 HYPOTHESIS H_{10}

Based mainly on the field study findings, it was anticipated that *degree of utilisation* would have a significant effect on *firm performance* (Hypothesis H_{10}). The structural model estimation accepted the hypothesis portraying *degree of utilization* ($\gamma = 0.180$) as having a significant association with *firm performance*. This result was consistent with the findings of past studies (Forster & Conford, 1992; Ordedra et al., 1993). This result indicated that organisations benefit from ICT use if the degree of utilisation is satisfactory; that is, the technology is utilised properly. It is important to note that ICT usage indicates the frequency or rate of usage of various ICT applications while degree of utilisation explains the extent to which the proper and actual use of technology is ensured.

The logical interpretation of this finding is that most of the functions in Bangladesh, from household day-to-day operations to business and social formalities as well as government services are performed through manual processes. Thus, numerous functions of ICT, although implemented, are un-utilised or under-utilised which causes adverse effects on the productivity of ICT and finally on firm performance.

Furthermore, ICT, particularly the Internet, although not new in Bangladesh, is still at an introductory level as most people are reluctant and/or incapable of utilising it in communications, services and businesses. As the Bangladeshi government has declared that it is seeking to achieve a digital Bangladesh by 2021 and has set the country the target of establishing e-governance by 2014, the people are being motivated and pushed towards the adoption of technology. Unfortunately, this is confined to the operation of entertainment-related ancillary functions, such as audio, video, games, video streaming, chat rooms, etc.

The application of ICT, although promoted in various sectors across the country, unfortunately is not reasonably involved in accomplishing economic or business functions. As a consequence, the productivity impact of ICT at firm level has become questionable. Organisations invest and introduce ICT with a view to performing some specified organisational functions. Proper accomplishment of those tasks results in productivity of the investment. Consistent with this notion, this study has revealed that organisations that fail to accomplish the tasks properly would suffer from adverse effects on firm performance.

7.12 HYPOTHESIS RELATED TO MEDIATING EFFECTS OF ICT INTEGRATION AND DEGREE OF UTILISATION

Based on the field study outcome, it was anticipated that *ICT integration* and *degree of utilisation* would play mediation roles in explaining the effects of ICT use on firm performance. The structural model estimation depicted a mediational process explaining the effects of *ICT use on organisational performance* which involved two intervening variables, *ICT integration* and *degree of utilisation*. The mediational relationship was examined by applying the procedure of Baron and Kenny (1986).

It was revealed that the variation in ICT use alone would significantly account for a variance in SMEs' performance, the effects becoming reduced in the presence of a single mediator (*integration* or *utilisation*) which would finally disappear in a multiple mediation environment (with the presence of *ICT integration* and *degree of utilisation* together). The results indicated that the effect of *ICT use on firm performance* was completely mediated through *ICT integration* and *degree of utilisation*.

It is argued that this result occurred because, due to the lack of infrastructural supports and the lower level of ICT and Internet penetration, organisations did not apply ICT intensively to accomplish all major organisational or business functions. Moreover, although organisations used ICT, their inability to integrate major business functionalities would impact adversely on organisational performance. Likewise, organisations did not attain performance growth if ICT was not utilised properly.

7.13 SUMMARY

This chapter has provided a discussion of the structural equation modelling (SEM) estimates presented in Chapter 6. The interpretations of the findings have been carried out to support the hypotheses. This chapter has discussed the effects of the antecedent factors of ICT adoption and diffusion by SMEs. In analysing the impact of ICT on firm performance, it was found that ICT use may not generally create enhanced firm performance. Integration and proper utilisation of ICT were important indicators of firm performance. The discussion in this chapter has indicated that firms generally experience performance growth if ICT is integrated and properly utilised. The final chapter comprises the conclusion and presents future research directions.

CHAPTER 8

CONCLUSIONS AND FUTURE RESEARCH DIRECTIONS

8.1 INTRODUCTION

This chapter presents the conclusions of the current research. In order to state the contribution of the research to the body of knowledge, a summary of the entire research process and outcomes is provided in section 8.2. Section 8.3 then discusses the theoretical and practical contributions of the research. The final section states the limitations of this study and outlines directions for future research.

8.2 RESEARCH SUMMARY

This research project was initiated to study the impact of the diffusion of ICT on SMEs' performance with special attention given to the mediating effects of ICT integration and utilisation. Previous studies have reported a clear differentiation in the level of usage of ICT between rich and poor countries, as well as between developed and developing countries. The introduction of the usage of ICT, particularly Internet-dependent technology, by individuals and organisations involves changes to the systems, procedures and processes of relevant services and also affects the way through which customers, suppliers, regulatory bodies and other external parties deal with business organisations. The rapid and exponential growth of ICT usage has attracted the bulk of researchers' attention in looking at the phenomena of the adoption and diffusion of the technology. Although numerous research initiatives have focused on the adoption intention (Pavlov & Chai, 2002; Lal, 1999; Gefen & Straub, 2000; Kendall et al., 2001) and actual usage (Venkatesh et al., 2008; Johnson & Hignite, 2000; Anandarajan et al., 2002; Thatcher et al., 2006) of the technology, the question of whether ICT usage impacts on firm performance in SMEs has not been clearly answered (see Jean, 2007). Furthermore, previous studies on innovation diffusion have focused on the developed country perspective and, mostly, on the American perspective (Zhu & Kraemer, 2005). Due

to the infrastructural, environmental and cultural differences, and a wide digital divide between developed and developing countries, the theories constructed from a developed country perspective may logically suffer from their lack of generalisability and applicability in the developing country context. It has been assumed that the theoretical framework constructed in a developed country perspective would also fit the developing country environment. However, it is not unlikely that the theoretical framework would vary in different contexts. To examine the effects of the diffusion of ICT on SMEs' performance, this study firstly developed a comprehensive theoretical model and then examined the research model from a developing country perspective with survey data collected from various SMEs in Bangladesh.

The theoretical framework of the research (described in Chapter 2) was developed by combining the technology adoption-diffusion theories, namely the theory of reasoned action (TRA) (Fishbein & Ajzen, 1975); Rogers' diffusion of innovation (DOI) theory (Rogers, 1983); the theory of planned behaviour (TPB) (Ajzen, 1985); the technology acceptance model (TAM) (Davis, 1986); unified theory of acceptance and use of technology (UTAUT) (Venkatesh et al., 2003); and the technology, organisation and environment (TOE) framework (Tornatzky & Fleischer, 1990) with institutional theory (DiMaggio & Powell, 1983) and resource-based theory/view (Barney, 1991). The initial research model was refined and contextualised by the field study and a comprehensive research model was developed. The hypotheses for the research were formulated from the comprehensive model.

As previously discussed in the methodological section (described in Chapter 3), this study has employed a mixed-method research approach, combining qualitative and quantitative methods of data collection and analysis to attain the research objectives. The qualitative phase of the study extended and contextualised the initial model. It is not unlikely that due to contextual differences the subject of this study may have a manifestation which differs from and may be beyond the scope of the existing literature. Furthermore, the new model developed through synthesising different

models needed to be contextualised. A field study was conducted by interviewing 11 SMEs in Bangladesh (as described in Chapter 4). Content analysis (by NVivo 10) was performed to analyse the data. The findings, in general, supported the initial model. However, some adjustments were also applied to the initial model to build a comprehensive and integrated research model (Figure 5.1). Importantly, the field study suggested reducing the number of related latent variables in order to construct a higher-order latent variable combining related first-order variables. *Cognitive evaluation, culture, environmental pressure, country readiness* and *performance* were developed as second-order constructs through this process. Finally, the comprehensive model comprised *owner innovativeness, cognitive evaluation, facilitating condition, environmental pressure, culture* and *country readiness* as antecedents of the adoption and use of ICT by SMEs while organisational performance was predicted through the influence of *ICT use, integration* and *degree of utilisation*. Based on the comprehensive research model, 21 hypotheses were formulated under 11 groups (as described in Chapter 5).

The second phase of the research employed a quantitative approach to test these hypotheses. Since this study stands under the positivist research paradigm, the main and most voluminous work was associated with this phase (the quantitative research) of the study. The quantitative research study involved the development of the survey instrument, questionnaire pre-testing, survey design, data collection, data coding, recording and manipulation, outlier checking and model estimation (as described in Chapter 6). The questionnaire was finalised after pre-testing. Next, a pilot study was conducted on 60 respondents. Based on the feedback, some modifications were made and the final questionnaires were distributed to SMEs in Bangladesh seeking their responses. In total, 282 responses were gathered. A partial least squares (PLS)-based structural equation modelling (SEM) technique was employed to analyse the quantitative data with this performed through PLS-Graph Version 3.

The analysis revealed that the adoption and diffusion of ICT by SMEs in Bangladesh were largely influenced by *cognitive evaluation, facilitating condition,*

environmental pressure and *country readiness* with *owner innovativeness* and *culture* indirectly affected through *cognitive evaluation*. Organisations were interested in implementing ICT for better organisational performance. Surprisingly, ICT use was not found to have any significant effect on overall organisational performance. However, the structural model depicted a unique interrelationship between *ICT use, integration, degree of utilisation* and *organisational performance*. The analysis revealed that ICT use, although not directly related to organisational performance, was indirectly related through *integration* and the *degree of utilisation*. This result suggests that organisations may not attain better performance by implementing ICT in their firm if it is not integrated with different functional areas and utilised properly.

8.3 CONTRIBUTIONS OF THE RESEARCH

This study successfully employed a mixed-method research approach which has provided some unique results to address the main research questions. As opposed to most studies in the adoption area which commonly engage in a mono-method approach, this research applied a mixed method that combined qualitative and quantitative approaches in the data collection process. For the qualitative method, a field study was employed while the quantitative method used a survey as the data collection process. The overall design of the study and its implementation were challenging on several counts as the study examined the innovation diffusion phenomena from a developing country perspective while most diffusion theories have been constructed from a developed country perspective and, particularly, an American perspective (Zhu & Kraemer, 2005). The mixed-method research approach was appropriate and has made significant contributions which included building a comprehensive research model (contextualised and fine-tuned); exploring a few new constructs, variables and their measurement items; exploring the causal links between the study variables; testing of hypotheses; and drawing inferences by reliable and valid research outcomes. The main contributions of the study, both the theoretical and practical contribution, are reported in the following section.

8.3.1 THEORETICAL CONTRIBUTION

This study was initiated to examine SMEs' ICT usage behaviour and firm performance. This study extended its exploration from simply addressing the innovation adoption-diffusion phenomena to analyse the effects of ICT diffusion on organisational performance. In examining the ICT diffusion process in SMEs, its antecedents and consequences from the viewpoint of generating organisational performance growth, this study has reviewed existing innovation diffusion theories and has combined those theories with institutional theory and the resource-based view.

In summary, this study has reviewed the theory of reasoned action (TRA) (Fishbein & Ajzen, 1975); diffusion of innovation (DOI) theory (Rogers, 1983); theory of planned behaviour (TPB) (Ajzen, 1985); technology acceptance model (TAM) (Davis, 1986); unified theory of acceptance and use of technology (UTAUT) (Venkatesh et al., 2003); and the technology, organisation and environment (TOE) framework (Tornatzky & Fleischer, 1990) combined with institutional theory (DiMaggio & Powell, 1983) and resource-based theory/view (Barney, 1991). The results of this synthesis have helped to construct a comprehensive model which has focused on the process of the diffusion of ICT and its impact on organisational performance. The existing theories have mostly addressed the ICT diffusion phenomena from a developed country perspective while their applicability in addressing similar phenomena from a developing country perspective is questionable. The initial theoretical model developed through reviewing the existing literature underwent a screening process using a qualitative field study to fine-tune and contextualise the research model.

The field study interviews suggested some adjustments that were needed to the model which had been primarily developed from theory. These adjustments involved changes in the interrelationships between some constructs, omission of some variables and also inclusion of some new variables and measurement items. This screening process yielded an integrated research model which enabled the study of

the ICT diffusion process and the post-adoption phenomena (i.e. the effects of ICT usage on firm performance) in the context of SMEs in Bangladesh.

The comprehensive theoretical model includes various factors from different levels which involve individual, organisational, cultural, environmental and country-specific factors. The model also uses three different levels of ICT use: *ICT use*, *integration* and *degree of utilisation* to address the depth, breadth and appropriateness of ICT use, respectively. The theoretical model predicts that the effects of ICT use on organisational performance are mediated through integration and utilisation. This prediction was validated through analysis of the survey data. By including ICT integration and utilisation and their mediational roles, the theoretical model is comprehensive and unique in addressing ICT diffusion and organisational performance. This presents a major theoretical contribution.

The model measures organisational performance (SME performance) as a higher-order construct comprising three different performance-related manifest variables: *competitiveness*, *internal operation productivity* and *financial performance*. The model also explains *cognitive evaluation* as a higher-order construct which comprises two internal manifest variables: *perceived usefulness* and *perceived ease of use*.

The model includes three different aspects of external *environmental pressure*, namely, pressure arising from cultural aspects, pressure arising from the industrial environment and pressure arising from the macro-country environment. Each of the environment-related factors is addressed by applying a higher-order modelling procedure. *Culture* is formed by the effects of *power distance*, *in-group collectivism*, *uncertainty avoidance*, *ethical culture* and *Bengali values*; *environmental pressure* is composed of *coercive pressure*, *mimetic pressure*, *normative pressure* and *global pressure*; while *country readiness* comprises *technology infrastructure*, *human infrastructure*, *legal infrastructure*, *financial infrastructure* and *government policy and supports*. Although most of the variables being studied were borrowed from previous literature, a number of the variables explored in the field study were very

much context-specific and were the first of their kind to examine technology innovation diffusion phenomena from a developing country perspective. For example, *Bengali values, ethical culture* and *degree of utilisation* of ICT, as well as the measurement procedure of *cognitive evaluation* and country-specific variables, were new thus adding to the significance of this study.

The theoretical framework is innovative and provides a holistic approach for looking at the antecedents of ICT diffusion and its consequences for organisational performance. More clearly, the theoretical framework offers an opportunity to examine the whole process of innovation diffusion and its effect on organisational performance from a single platform. The robustness of analysis, furthermore, suggests the suitability of the comprehensive model for analysing the diffusion of ICT by SMEs and its effects on organisational performance. This framework is potentially suitable for testing similar phenomena in the large organisation environment from both a developing and developed country perspective.

8.3.2 PRACTICAL CONTRIBUTION

This study has provided a clear picture of how internal and external factors affect ICT usage by SMEs (in a developing country) and the consequential effects of this usage on organisational performance mediated through integration and utilisation. By categorising SMEs by their different levels of ICT use, it was revealed that SMEs that have positive cognitive evaluation towards ICT and adequate technological resources, and that receive positive pressure from their institutional environment are more likely to use ICT while the overall culture and country infrastructure were not supportive of the use of ICT.

Previous studies investigating adoption or usage of ICT have assumed that the use of ICT would generate performance growth. Interestingly, this study has found that ICT use did not immediately increase performance growth in SMEs. Organisations needed to acquire integration and proper utilisation of the technology in order to achieve performance growth. This was consistent with the notion of the resource-based view of ICT which emphasises that combining ICT into different

organisational functionalities (i.e. integration with front-end functionalities or back-end integration) can create IT capabilities that are rare, unable to be imitated, valuable and sustainable, thereby contributing to value generation. Managers, interested stakeholders and policy makers may follow these findings and focus on ICT integration and the degree of utilisation with the view of attaining superior firm performance.

This study may also suggest some changes and modifications in Bangladesh's existing policies and strategies for promoting ICT adoption and ICT use by SMEs in order to achieve economic development.

Bangladesh is a developing country in which SMEs play a significant role in its development processes. The Bangladeshi government is dedicated to the utilisation of the potential of ICT in its economic development and to the establishment of a digitally-based society by 2021. In light of the country's *Vision 2021*, the government has already revised the ICT policy and has made provision for various supports to promote ICT use in different sectors of the country. For example, the government has withdrawn all taxes from computer hardware, provides interest-free loans for ICT (software) businesses, and launches pro-ICT policies, grants, subsidies and motivational programs.

Government offices are gradually developing and becoming equipped with ICT devices to introduce e-governance systems. The last few years have witnessed significant physical and infrastructural development in terms of the installation of a large number of computer devices in different government offices, business enterprises and households. Frustratingly, most of these technological facilities are either un-utilised or under-utilised. For example, the majority of ICT users only access audio-visual entertainment programs, such as using their MP3 players, listening to audio or video music, playing online games, etc. In recent years, computer users have increasingly participated in online social networks, audio and video chat rooms and other forms of communication. The patterns of ICT usage by

individuals, households and organisations are similar. Thus, although a good number of SMEs use ICT, the productivity of the technology is questionable.

Entrepreneurs are apprehensive about a reduction in productivity as a result of the installation of computers in the workplace. They fearfully anticipate the risk that employees will participate in entertainment programs, games or personal communication during business hours using the technologies which have been installed to increase firm performance.

Furthermore, organisations, in general, use ICT to conduct some of their tasks while a number of functions are still carried out by the traditional means which, in many cases, are not compatible with the computerised online environment. The lack of implementation of completely computerised operations (i.e. the installation of computers to accomplish the tasks of all functional areas) prevents the attainment of the full benefits of ICT usage. This study's findings may provide a lesson for entrepreneurs who are confused about the possible outcome of computer device installation at their workplace as the findings suggest that partial implementation of ICT in the workplace may not result in organisational productivity. The costs of computerisation, that is, operational, maintenance and installation costs, are substantial. Only very high performance growth can make it worthwhile to invest in computerisation. In reality, partial use of the computerised operation, although producing some enhanced performance, is not enough to cover the significant costs associated with ICT-based operations. However, organisation-wide usage of the technology, although seeming to involve very high costs, may regain the reduction in productivity lost through these costs.

Organisation-wide complete ICT-based operations are not possible until and unless other closely associated organisations and important stakeholders use the same system. For example, organisations cannot gain benefits from ICT-based operations if their suppliers or customers are not ICT-based. In these circumstances, organisations, although they have highly sophisticated ICT devices, will need to use manual operations to interact or communicate with their stakeholders as ICT will not

provide any help. The introduction of ICT-dependent communication and exchanges between organisations and external parties, for example, customers, suppliers, government regulatory authorities, partners and trade bodies, may help to develop this difficult situation.

Although some organisations perform some financial functions through ICT, most are confined to managing employees' salaries and account-keeping tasks. Organisations generally employ one or a few computer operators to perform computer-related tasks which means that a large number of functions remain external to their computers. It is not unlikely that some offices have computer hardware which is not used for operations but simply for social prestige as a showpiece. Moreover, the reality is that organisations, although using ICT, generally fail to ensure its proper utilisation and integrated use. Thus, the productivity of ICT usage has become questionable. In this situation, the Bangladeshi government may take the initiative to develop an integrated plan to promote the proper and integrated use of ICT which may include motivational programs, training and supports. This new initiative may help to develop the productivity of ICT usage and economic growth of the country.

The study thus calls for the initiation of a new ICT research direction exploring the status of ICT integration and ICT utilisation by SMEs and finding a way for ICT to contribute positively to organisational performance.

This study has also explored the patterns of ICT use by SMEs and has forecast the degree and magnitude of the effects of various individual, organisational and environmental factors on the adoption and usage of different levels of ICT applications. Cognitive evaluation emerged as a strong predictor of the expectation of SMEs' ICT use. The study revealed that organisations with adequate knowledge and a favourable perception of the usefulness and operational ease of the technology were more likely to use a higher level of ICT. Organisations that held a higher level of what was termed facilitating condition were also more likely to implement technological innovations than those who were lacking in this attribute. The

facilitating condition comprised adequate resources, such as technological resources, human resources or systems compatible with computerised operations which facilitated the use of ICT in an organisation.

Entrepreneurs or the government may utilise this notion to develop policies or strategies to foster the growth of ICT use by SMEs. Providing useful information about the applicability of ICT to performing various organisational functions, to operational know-how and to technological facilities will potentially attract SMEs to using ICT for organisational competitiveness. The government and policy makers should undertake mass promotional programs to disseminate information about the various uses of computers and their contribution in developing better organisational performance. Organising specialised training programs for SMEs' capacity building may succeed in attaining SMEs' motivation to use ICT. Ensuring easy access to the technology by providing loans, grants and subsidies is also important.

The comprehensive model also forecast significant environmental pressure on SMEs' use of ICT. It suggested that organisations were highly influenced by various institutional stakeholders such as peer groups, competitors, dominant suppliers, customers or regulatory authorities, and by the changing environment arising from the globalisation process. Surprisingly, SMEs used ICT mainly to comply with the demands of their significant suppliers or dominant customers' requirements. Most of the SMEs, particularly in the ready-made garment (RMG) sector, have implemented ICT-based operations as their suppliers and dominant customers allow only online communications and exchanges. Thus, they have installed computers and ICT devices in their organisation in accordance with their customers' requirements in order to maintain their business deals while all other internal functions and domestic communications are performed through traditional means of operations. In reality, the technology is only used to accomplish a part of their organisational functionalities. Although the technology ensures the success of the most important task of the business being the carrying out of its orders and deals, this is still not

considered productive in terms of the costs and investment associated with the technology installation and operation.

This study urges business enterprises' management and the government to look at the environmental and cultural factors with the view of achieving ICT usage success which may foster the country's economic development.

Initiating strategic adjustments to improve organisational practices by eliminating the traditional power distance inside the organisation as well as introducing formal working procedures by implementing necessary rules and regulations may result in productive use of technology. Furthermore, the application of a Bengali user interface may help to ensure the productivity of ICT use by SMEs in Bangladesh.

Finally, the government, various stakeholders and regulatory authorities should rationally adapt their policy and strategies focusing on the integrated and appropriate use of technology rather than only promoting the use of technology. However, the question may be asked regarding how a rational strategy to move towards appropriate and integrated utilisation of ICT could be implemented before its promotion for mass usage. My argument is that the government and many financial and non-government agencies have already made significant efforts and provided enormous support promoting the usage of ICT at the government and non-government organisational level including in SMEs. Unfortunately, most of these organisations are using the computer as a typewriter or, in some cases, as an alternative to postal mail or telephone. The situation of most small businesses is similar. The quantitative analysis indicated that organisations with high ratings with regard to the ease or usefulness of the technology were more likely to use ICT. However, the field study and subsequent survey have suggested that numerous SMEs, although currently ICT users, were not able to accomplish the expected tasks by using the technology. The practical implication of this study is that the integration and proper utilisation of ICT should be implemented for superior organisational performance.

Interestingly, the study has explained SMEs' ICT usage phenomena by employing both organisational and consumer behaviour theories. However, the growth and economic potential of SMEs demand the development of a theoretical branch which will address the adoption and usage behaviour of SMEs.

8.4 LIMITATIONS OF THE STUDY

Despite this study's substantial contribution by studying SMEs' ICT usage (from a developing country perspective) and its analysis of the effects of a range of variables on the adoption and diffusion of ICT and its consequences for organisational performance, it has some limitations. By its nature, this study has analysed the aggregated effects of macro-environmental variables on ICT use and has explored how this affects aggregated firm performance. The results have implications for industry as well as for Bangladesh. However, as the study does not clearly answer how the first-order or manifest variables (the variables which construct a higher-order hybrid variable) affect ICT use and organisational performance, this may be considered a limitation of the study.

Secondly, this study has focused on the manufacturing industry sector in Bangladesh. As the ready-made garment (RMG) industry is the major contributor to the country's economy (contributing 75% of export earnings), the ICT diffusion phenomena have been analysed mainly from this industry's perspective. The study has also included responses from the leather industry which is an emerging industry in the manufacturing industry sector in terms of its export contribution. The number of responses from the leather industry was proportionate to the RMG industry responses, determined through the respective industry's contributions in export earnings. The proportion of export earnings by the RMG industry and leather industry in Bangladesh is roughly 80:20. The application of a proportionate stratified random sampling (in fact, given the disproportion between the respective industries, a disproportionate stratified random sampling) technique for data collection was therefore methodologically sound. Moreover, in its design, the services industry was beyond the study's scope which may be considered to be a limitation in drawing

general implications for SMEs. For example, the IT industry, software and telecommunications industries, media and education industries, financial institutions, and tourism industry have high potential and make a significant contribution to the national economy.

Finally, this study utilised cross-sectional data which was collected at a single point in time. Thus, assessing the impact of the antecedent factors on the diffusion of ICT and its role in explaining SMEs' performance at different points in time was not possible.

This study has estimated the ICT adoption and diffusion phenomena by introducing a new conceptualisation of ICT use which was constructed by a composite measure of various levels of ICT applications. Although dealing with the aggregated use of ICT by SMEs is an innovative measure and has great importance in developing policy strategies at entrepreneur, industry and government level, this may be considered as a limitation as there is significant variation in the diffusion of different levels of ICT applications, such as enterprise resource planning (ERP), e-commerce, e-business, etc.

8.5 FUTURE RESEARCH DIRECTIONS

The limitations of this study may provide direction for new research investigating the adoption-diffusion of ICT by SMEs in Bangladesh. Analysis of the direct effects of the various dimensions of a higher-order composite, with these used as manifest variables or first-order variables, may provide clearer understanding of the phenomena. The effects of various dimensions of culture and the institutional environment as well as country-specific factors may help in developing policy and strategies to foster SMEs' ICT usage. Future research could compare the aggregated results with the specific outcomes of different dimensions of performance such as competitiveness, internal operation productivity and financial performance.

The changes in patterns of ICT usage and the effects of various antecedent factors could be examined by the analysis of longitudinal data collected from the same or similar panels of organisations at different points in time. The inclusion of diversified industries in the sample would enhance the validity of the predictions.

Future studies could include the services industry as well as the manufacturing industry to produce representative results.

Finally, a comparison between the diffusion phenomena of specific ICT systems such as customer relationship management (CRM), e-commerce or ERP could provide a detailed picture of the adoption-diffusion patterns of specific systems. A future research initiative could validate this theoretical foundation by comparing the aggregated results with the adoption behaviour of various specific ICT systems. This could help in developing appropriate policies and strategies to foster the usage growth of various levels of ICT applications by SMEs in Bangladesh with the view of ensuring ICT's positive impact on organisational performance.

The final research model comprises numerous latent variables for studying SMEs' ICT usage behaviour and its impact on organisational performance. Due to the scope of the thesis, the influence of control variables, such as size and experience (age of the organisation) have not been examined. Future research could add various control variables to the existing model to examine variations in the effects of the study constructs in the presence of different control variables.

This study has explored some new constructs that arose from the field study, namely Bengali values, ethical culture, global pressure and degree of ICT utilisation. By using higher-order conceptualisation, the study has also introduced different measurement procedures for some latent variables such as cognitive evaluation, culture, environmental pressure, country readiness and organisational performance. Various indices explored through the field study have been employed to estimate the composite of the higher-order latent variables, with the exception of cognitive evaluation for which a well-recognised measurement scale is applicable for measuring perceived usefulness and perceived ease of use. Development of a set of reliable measurement scales for these newly developed constructs could significantly contribute to future research initiatives thus providing a logical grounding for future research.

8.6 CONCLUSION

The modelling approach employed in this study was based on the premise that ICT usage by SMEs ensures improved organisational performance. However, this study, in particular, has addressed these questions: (1) does ICT usage affect enhanced organisational performance; and (2) how does ICT usage by SMEs contribute to enhanced organisational performance? The short answers to these questions are that ICT usage by SMEs in Bangladesh does not immediately ensure firm performance. Integration and proper utilisation of the technology play the key role in ensuring enhanced performance. The study also forecast the strong and significant effects of *cognitive evaluation*, *facilitating condition*, *country readiness* and *environmental pressure* on SMEs' expectation of using ICT which is an antecedent of ICT use. In addition, the study forecast a strong and positive impact of *expectation* on *actual usage* behaviour. The impacts of *culture* and *owner innovativeness* were found to be very strong on *cognitive evaluation*.

This study has several implications for SME owners, the coordinating authorities or trade bodies, and the Bangladeshi government who are interested in enhancing the pace of computerisation and the implementation of various ICT applications in SMEs with the view that new technology implementation will enhance organisational performance. One methodologically-oriented finding was that the structural model estimations clearly indicated that integration and utilisation of ICT are more important than simply deciding on the use of ICT. Integration and utilisation, although sounding very normal in general terms, are not easy to ensure in the ICT-based working environment within SMEs. Integration and proper utilisation of ICT are heavily dependent on the firm's resources, technical capability and operational skill, and compatible intra- and inter-organisational systems, availability of hardware and connectivity. The government, regulatory authorities and concerned organisations need to show their support by providing competent infrastructure, resources and policy guidelines to ensure proper utilisation and integrated use of ICT in SMEs.

Expectation has been revealed as an important construct which has a very strong and significant impact on ICT usage. The findings also indicated that those SME owners who had favourably evaluated the technology and who had the resources and skills were more receptive, that is, they had a higher expectation to use ICT. *Culture* provided a negative impact on expectation. Interestingly, *country readiness* provided a positive impact on expectation while providing a negative impact on ICT usage. The finding implied that when SMEs are in the process of deciding to use ICT, they assume that various supports and concerns related to the expected use and outcome exist; therefore, they favourably evaluate the country's overall development, infrastructure and supports. However, during the implementation phase, that is, actual use, they experience different services and supports. It is the reality that Bangladesh, as is the case in many developing countries, has a lack of technological, legal and financial infrastructure. Thus, the SMEs that use ICT-based applications suffer from various constraints which include lack of Internet speed; connectivity; availability of experts and resources; a compatible legal and financial environment, institutional supports, etc. Interestingly, although use of ICT depends on the choice made by the SME owner or manager, in reality, ICT use is seriously affected by the government and regulatory authorities. The government could build capable technology, legal and financial infrastructure and formulate policies and supports to motivate various concerned authorities and SME owners to ensure an integrated and properly utilised ICT operational environment.

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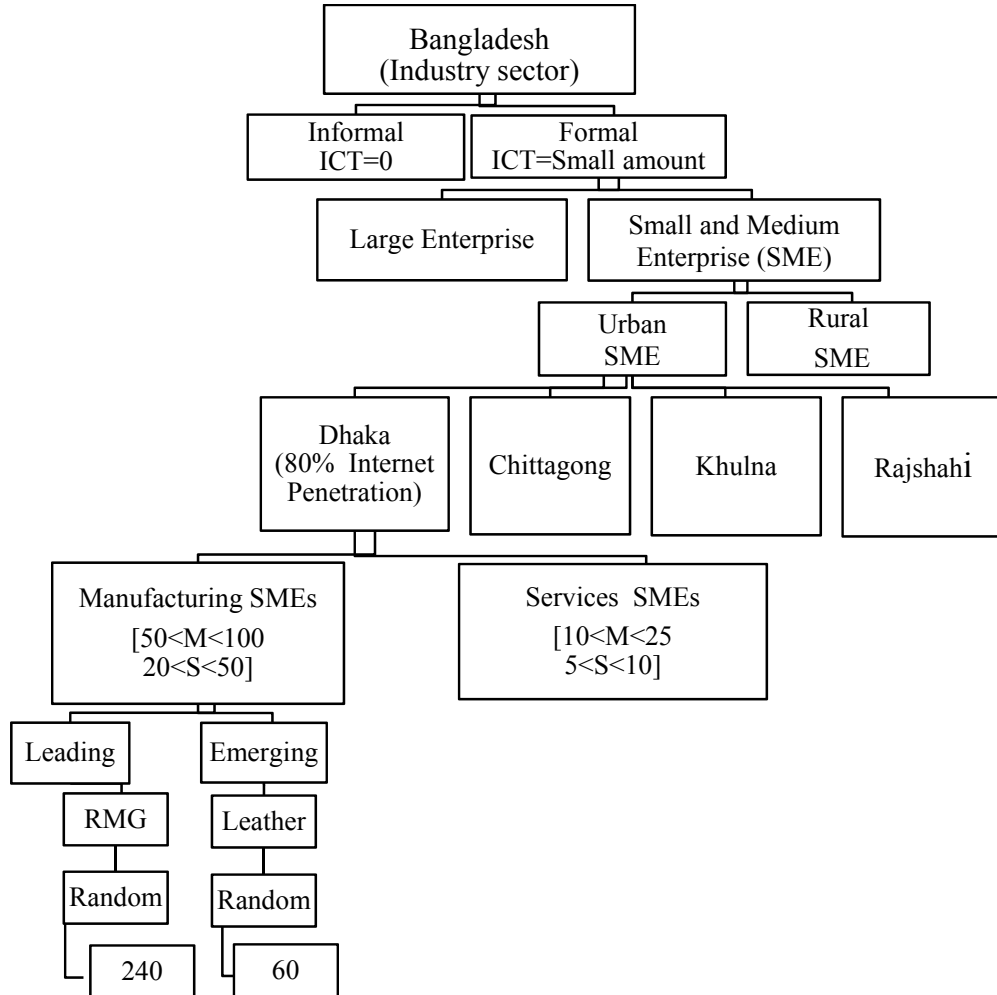
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APPENDIX A

Sample Design (Stratified random sampling)



APPENDIX B



Graduate School of Business

Interview Guide

Participant Information Sheet

My name is Md. Shah Azam. I am currently conducting a research entitled “Diffusion of ICT and SMEs Performance: The Mediating Effects of Integration and Utilisation” under Doctor of Philosophy Programme, Graduate School of Business (GSB), Curtin University of Technology, Australia.

Purpose of Research

I am investigating how diffusion of ICT links with organizational performance. The study focuses Small and Medium Sized Enterprises (SMEs) in Bangladesh. Exploring the effects of different factors the study looks for the strategies that may help develop the SMEs in Bangladesh.

Your Role

I am interested in finding out the factors that influence your company’s ICT use, related decision and performance.

I would like to talk about your status of ICT use, your internal desire, attitude towards ICT improvements, exchanges with the internal peoples and external parties. The issues related to ICT resources, capabilities, national infrastructure, as well as national culture will further be discussed as to explore how they may link with organisational ICT decision. I would also like to discuss about any indicators you use to determine ICT performance as well as overall organisational performance. I will use a set of semi-structured questions to organise a formal and fluent discussion with you which brings in required information for the study.

The interview process will take approximately 60 minutes.

Consent to Participate

Your involvement in the research is entirely voluntary. You have the right to withdraw at any stage without it affecting your rights or my responsibilities. When you have signed the consent form I will assume that you are agreed to participate and allow me to use your data in this research.

Confidentiality

The information you provide will be kept separate from your personal details, and only I will have access to this. The interview transcript will not have your name or any other identifying information on it and in adherence to university policy, the interview tapes and transcribed information will be kept in a locked cabinet for five years, before it is destroyed.

Further Information

This study has been approved by the Curtin University Human Research Ethics Committee. If needed, verification of approval can be obtained by either writing to the Curtin University Human Research Ethics Committee, c/- Office of Research & Development, Curtin University of Technology, GPO Box U1987, Perth 6845, or telephone +618-92662784. If you would like further information about the study, please feel free to contact me on +610432224840 or by e-mail: ashantonu@yahoo.co.uk. Alternatively, you can contact my supervisor Professor Mohammed Quaddus on +618-92662862 or by e-mail: mohammed.quaddus@gsb.curtin.edu.au.

Thank you very much for your involvement in this research, your participation is highly appreciated.

Interview Guide

Diffusion of ICT and SMEs Performance: The Mediating Effects of Integration and Utilisation

PhD Programme,
Curtin University of Technology, Australia

This interview guide will help explore theoretical constructs and their inter-relationship; and fine-tune proposed model for the study entitled “Diffusion of ICT and SMEs Performance: The Mediating Effects of Integration and Utilisation” under PhD programme, Graduate School of Business, Curtin University of Technology, Australia.

GENERAL

Q.1.1 Do you use any type of Information and Communications Technology (ICT) applications in your organisation at present?

Q.1.2 What ICT system do you use in your organisation? Please describe the level of use of the system (High, Medium or low etc.).

OWNER AND CEO CHARACTERISTICS

Q.2.1 How would you describe the characteristics of the owner/CEO of the enterprise that may influence organizational ICT use?

Q.2.2 Please describe the owners’/CEOs roles in ICT adoption and other ICT related decision.

BELIEFS AND EVALUATIONS

Q.3.1 How would you describe your beliefs and evaluations about ICT which may influence you to use or not use ICT in your organization?

Q.3.2 Describe how your belief or evaluation about ICT would relate with the firms overall ICT use or ICT related decision? Please give example.

ENVIRONMENTAL PRESSURE

Q.4.1 Please describe the ICT status of your different stake holders (such as supplier, distributor, competitor, customer, govt. agencies etc). Please state if you have received any encouragement or constraints from them to use or not use or enhance the current mode of ICT use in your organization? Please give examples.

Q.4.2 Please describe how above-mentioned issues would link with the firms ICT related decisions?

BEHAVIOURAL INTENTION

Q.5.1 If you have all the resources (and no constraint at all) to implement ICT, how would you express your intention in next few months?

Q.5.2 How does your above-mentioned intention (internal-desire) relate with ICT use at firm level? Please give example.

BEHAVIOURAL EXPECTATION

Q. 6.1 Considering external environment, infrastructure, law and culture can your intention be put into practice?

Q.6.2 Please describe how expectation would relate with firms ICT use or associated decisions.

MACRO AND MICRO FACILITATING CONDITION

Q.7.1 What are the resources and skills essential to implement ICT in a organization like you? Please state the strengths and weaknesses of your organization to implement ICT. Please detail as much as possible.

Q.7.2. How would you describe the resources and facilities at national level that may encourage you to implement or not implement ICT in your organization. Please detail it as much as possible.

Q.7.3 How would you describe the way the abovementioned facilities or condition link with your firms ICT use or related decisions.

NATIONAL CULTURE

Q.9.1 How would you describe the cultural issues and its impact on organisational technology usage behavior?

Q.9.5 How would you describe other national cultural issues (as you see it) in addition to the above dimensions.

Q.9.6 Please describe how the national cultural issues are linked with ICT use or ICT related decisions.

ICT USE, INTEGRATION AND DEGREE OF UTILIZATION

Q.10.1 What types of organisational ICT supports do you have in place currently (ICT resources, its application etc.)?

Q.10.2 How long have you been using ICT system in your organisation.

Q.10.2 How long have you been using ICT system in your organisation.

Q.10.3 How do you describe the way ICT use and its level of use relate with firms overall performance?

ORGANISATIONAL PERFORMANCE

Q.11. Would you kindly let me know how could you evaluate the over all performance of your organisation? Give examples.

DEMOGRAPHIC PROFILE OF THE INTERVIEWEE

Q.12.1 Please mention your demographic information:

a. Name:.....

b. Position:

c. Age:

- i) below 25 Years ii) 25-34 Years iii) 35-44 Years
- iv) 45-60 Years v) 60< Years

d. Gender:

- i) Male ii) Female

e. Education:

- i) PhD ii) Post graduate iii) Graduation iv) HSC
- v) SSC vi) Primary school vii) Literate viii) Others

f. Monthly Income:

- i) <10,000 Tk. ii) 10,000-20.000 TK. iii) 20,000-30,000 Tk.
- iv) 30,000-50,000 Tk. v) 50,000 – 80,000 Tk. vi) above 80,000 Tk.

g. ICT experience:

h. How long you been in this organization:

i. Your field of Specialization:

j. How long you are working in this position:

Q.12.2 Please brief about your organization (Business type, nature etc.).

a. Type of industry:

b. Nature of business (Manufacturing industry, Whole sale, retail etc.)

Q.12.3 Please let me know the numbers of worker employed in the organization.

Full time:

Part-time/casual:

Q.12.4 Please state about your market position in terms of the completion:

very bad 1 2 3 4 5 6 7 very good

Q.12.5 Please state about your revenue in last year:

substantially decreased 1 2 3 4 5 6 7 substantially increased

Q.12.6 Please state about your sales in last year:

substantially decreased 1 2 3 4 5 6 7 substantially increased

Q.12.7 Please state about your profit in last year:

substantially decreased 1 2 3 4 5 6 7 substantially increased

Q.12.8 Please state about your expenditure in last year:

substantially decreased 1 2 3 4 5 6 7 substantially increased

Q.13.1 Have you received any kind of privilege or benefits for your organization as SMEs?

i) Yes

ii) No

Q.13.2 have you received any grants or subsidies for ICT development in your organization?

i) Yes

ii) No

Q.14 Does your organization have 9001 or 14001 certification? Please describe about acquiring the certification (9001:14001 Certificate) and its usefulness (Please mention whether you have been refused or have any desire to get 9001:14001 certification in the case of no certification).

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Questionnaire code

APPENDIX C

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Surveyor code

Survey Questionnaire

Participation information sheet

Dear survey participant,

This survey is part of an academic research project. In response to the Government's recent move towards establishing digital Bangladesh, this study is being undertaken to discover the level of small and medium sized enterprises' preparations and willingness to adopt ICT in their organisation and the resultant outcomes in terms of organisational performance. The outcome of the survey will provide the basis for a thesis towards my PhD degree in the Graduate School of Business, Curtin University, Western Australia.

Your role in this survey is to answer the questions to the best of your knowledge. There is no right or wrong answer. We are only interested in your opinions on the issues.

Your responses will be kept strictly confidential and in no cases will your personal or organisational identity be disclosed. The outcome of the study will be used solely for academic purposes. However, your participation in this study is completely voluntary. You can participate or you can withdraw yourself anytime from the research.

It is important to be noted here that the study has been approved by the Curtin University Human Research Ethics Committee. If needed, verification of approval can be obtained by either writing to the Curtin University Human Research Ethics Committee, Office of Research and Development; Curtin University, GPO Box U1987, Perth, WA 6000, Australia, or contacting to +61-8-92662784.

My contact details are provided below if you would like further information about the study. Alternatively, you can contact my supervisor, Professor Mohammed Quaddus at +61-8-92662862, or +61-8-92667147, or mohammed.quaddus@cbs.curtin.edu.au.

It is my pleasure to receive the completed questionnaire directly or via post, email or fax at the address below. .

Thank you for your co-operation and valuable response. Your participation is highly appreciated.

Kind regards,
Md Shah Azam
PhD Candidate
Graduate School of Business,
Curtin University
78 Murray Street, Perth 6000, Western Australia
Phone: +61-8-92881171 or +61-0432224840
Fax: +61-8-92663368
E-mail: mdshah.azam@postgrad.curtin.edu.au

Questionnaire

Name of the respondent:

Name of the organisation:.....

Nature of Business (wholesaler, retailer etc.).....

Industry category:.....

Address:

.....

Phone: e-mail:

[Kindly put tick (✓) marks in the appropriate check boxes]

Please specify the category of your business:

Small business Medium Business Other (please specify).....

Are you currently using any kind of ICT?

No Yes

Please indicate the level of ICT you are currently using in your organisation:

- Basic Computer operation
- Internet with own static home page
- Interactive homepage which supports product cataloguing and order processing (Online order receiving and processing)
- Interactive home page which supports online transaction and account management (E-business)
- Complete digital communication and exchanges within and outside the organisation (ERP or digitisation)

Please indicate which types of software you are currently using:

- | | |
|--|--|
| <input type="checkbox"/> Basic computing software packages | <input type="checkbox"/> Human resource management |
| <input type="checkbox"/> Finance /accounting software | <input type="checkbox"/> Supply chain management |
| <input type="checkbox"/> Inventory management | <input type="checkbox"/> E-commerce |
| <input type="checkbox"/> Customer relations management | <input type="checkbox"/> Resource planning |
-

[Please circle the number that best matches your views on the statements]

Section A: Please indicate your perceptions about the use of ICT in your organisation. (Where 1=Strongly disagree, 2=Disagree, 3=Neither agree nor disagree, 4=Agree, and 5=Strongly agree)

Perceived usefulness						
a.	I find ICT useful in our organisation	1	2	3	4	5
b.	Using the technology enables us to accomplish tasks more quickly	1	2	3	4	5
c.	Using the technology increases our productivity	1	2	3	4	5
d.	I feel that using the technology will increase our chances of growing or developing the organisation	1	2	3	4	5
Perceived ease of use						
a.	I think our interaction with the technology is clear and understandable	1	2	3	4	5
b.	It is easy for us to become skilful at using the technology	1	2	3	4	5
c.	We find the technology easy to use	1	2	3	4	5
d.	Learning to operate the technology is easy for us	1	2	3	4	5

Section B: Please state your opinion about the characteristics of the owner or CEO of this organisation (Where 1=Strongly disagree, 2=Disagree, 3=Neither agree nor disagree, 4= Agree, and 5=Strongly agree)

Owner characteristics						
a.	He often bears risk in doing things differently	1	2	3	4	5
b.	He has original ideas	1	2	3	4	5

Section C: Please indicate your estimates of various pressures you face from the external environment that influence your interest or rate of, ICT adoption in your organisation (Where 1=strongly disagree, 2=Disagree, 3=Neither agree nor disagree, 4= Agree, and 5=Strongly agree)

Coercive pressure						
a.	Our parent company directs us to use ICT	1	2	3	4	5
b.	Our major customers demand we use ICT	1	2	3	4	5
c.	Our major suppliers demand we use ICT	1	2	3	4	5
Competitive pressure						
a.	All of our competitors have already adopted ICT	1	2	3	4	5
b.	Our main competitors that have adopted ICT have benefitted a great deal	1	2	3	4	5
Normative pressure						
		(where 1=None has adopted, and 5=All have adopted)				
a.	What is the current extent of ICT adoption by your firm's customers?	1	2	3	4	5
b.	What is the current extent of ICT adoption by your suppliers?	1	2	3	4	5

c.	What is the current extent of ICT adoption by your important business partners?	1	2	3	4	5
d.	What is the extent of ICT adoption by your regulatory bodies?	1	2	3	4	5

Global pressure

a.	We are encouraged to adopt ICT in accessing the opportunities arising from globalisation	1	2	3	4	5
c.	It has become necessary to embrace ICT for sustainability	1	2	3	4	5

Section D: Please indicate your estimates of the facilitating condition of your organisation (1=Strongly disagree, 2=Disagree, 3=Neither agree nor disagree, 4= Agree, 5=Strongly agree)

Facilitating condition

a.	ICT is compatible with other existing systems we use	1	2	3	4	5
b.	Our employees have the skill and competency necessary to handle the technology	1	2	3	4	5
c.	We have the resources necessary to use the technology	1	2	3	4	5

Section E: Please indicate your estimation on the status of the following infrastructural supports and their ability to motivate you or your organisation in adopting ICT. (Where 1=Highly dissatisfactory, 2=Dissatisfactory, 3=Neither dissatisfactory nor satisfactory, 4=Satisfactory and 5=Highly satisfactory)

Technology Infrastructure

a.	Availability and coverage of Internet service in the country	1	2	3	4	5
b.	Speed and sophistication of the Internet	1	2	3	4	5
c.	Availability of necessary hardware and accessories	1	2	3	4	5
d.	Availability and continuity of power supply	1	2	3	4	5

Human Infrastructure

a.	Peoples knowledge and skill on IT and Internet based business	1	2	3	4	5
b.	IT and Internet based business operational knowledge and skill at institutional level	1	2	3	4	5
c.	Institutional support for computer education	1	2	3	4	5

Legal Infrastructure

a.	Legal support for digital communication and E-business	1	2	3	4	5
b.	Law relating to online consumer protection	1	2	3	4	5

Financial Infrastructure

c.	Online banking facility	1	2	3	4	5
d.	Credit and debit card usage trend in the country	1	2	3	4	5

Government Policy and Supports

a.	Government tax and customs policy	1	2	3	4	5
b.	Government's motivational programme	1	2	3	4	5
c.	Government grants	1	2	3	4	5
d.	Governments subsidies	1	2	3	4	5

Section F: Please indicate your estimate on the following statements about the cultural issues.
(Where 1=Strongly disagree, 2=Disagree, 3=Neither agree nor disagree, 4= Agree, 5=Strongly agree)

Power distance						
a.	In this society employees are expected to obey and follow their leader without question	1	2	3	4	5
b.	Power is concentrated at the top management	1	2	3	4	5
c.	Employees should obey their leaders without questions	1	2	3	4	5
d.	Employees don't question any of the decisions taken by their leaders	1	2	3	4	5
Uncertainty avoidance						
a.	In this society organisations have orderliness and consistency to face any future uncertain events.	1	2	3	4	5
b.	Rules and regulations are important because they inform what the organisation expects	1	2	3	4	5
In group collectivism						
a.	In this society, group members take pride in the individual accomplishments of their group managers	1	2	3	4	5
b.	Group managers take pride in the individual accomplishments of their group members	1	2	3	4	5
c.	Managers encourage group loyalty even if individual goals suffer	1	2	3	4	5
Bengali value						
a.	In this society, face to face communication is vital among the employees in day to day operation	1	2	3	4	5
b.	Employees are comfortable and like to interact through Bengali language	1	2	3	4	5
c.	Employees have an intimate and tight social bond with other fellow members.	1	2	3	4	5
Ethical culture						
a.	Bribes and corruption are seen as common phenomena in the main institutions of the society	1	2	3	4	5
b.	Politicisation and Nepotism are seen as common phenomena in the main institutions of the society	1	2	3	4	5

Section G: Please indicate your expectation or plans for ICT use your organisation.
(Where 1= Current user, 2= Going to use by 1 year, 3 = Within 1-2 years, 4= Within 2-3 years, 5= We are not going to use ICT in near future)

Behavioural Expectation						
a	Basic computer operation	1	2	3	4	5
b	Internet with own static home page	1	2	3	4	5

c	Interactive homepage which supports product cataloguing and order processing (Online order receiving and processing)	1	2	3	4	5
d	Interactive home page which supports online transaction and account management (E-business)	1	2	3	4	5
e	Complete digital communication and exchanges within and outside the organisation (ERP or digitisation)	1	2	3	4	5

Section H: Please indicate how often you use the following ICT technology (where 1=Not use at all, and 5= Use quite often):

ICT Use						
a.	Basic computer operation	1	2	3	4	5
b.	Internet with own static home page	1	2	3	4	5
c.	Interactive homepage which supports product cataloguing and order processing (Online order receiving and processing)	1	2	3	4	5
d.	Interactive home page which supports online transaction and account management (E-business)	1	2	3	4	5
e.	Complete digital communication and exchanges within and outside the organisation (ERP or digitisation)	1	2	3	4	5

Section I: Please indicate your evaluation about ICT utilisation in your organisation (Where 1 = ICT not at all utilised; 2 = utilised to conduct 20% of functions; 3 = utilised to conduct 20–50% of functions; 4 = utilised to conduct 50–80% of functions; and 5 = utilised to conduct more than 80% of functions)

Degree of utilisation						
a.	ICT is properly utilised in production and service related functions	1	2	3	4	5
b.	ICT is properly utilised in admin and accounts related functions	1	2	3	4	5
c.	ICT is properly utilised sales and marketing related functions	1	2	3	4	5

Section J: Please indicate your estimates of the level of ICT integration in your organisation (Where 1=Strongly disagree, 2=Disagree, 3=Neither agree nor disagree, 4=Agree, and 5=Strongly agree)

Level of Integration						
a.	ICT is used in the entire working areas in the organisation	1	2	3	4	5
b.	All departments and functional areas of this organisation are integrated through a single ICT system	1	2	3	4	5
c.	Our website is well developed for front end functionality which supports information, product catalogue, customer customisation and account management	1	2	3	4	5
d.	Our web applications are electronically integrated with back office systems and data bases	1	2	3	4	5
e.	Company's data bases are electronically integrated with suppliers and partners	1	2	3	4	5

Section K: Please indicate your estimate about the performance of your organisation on the following counts since starting the technology (ICT) use (Where 1=Strongly disagree, 2=Disagree, 3=Neither agree nor disagree, 4= Agree, and 5=Strongly agree):

Competitiveness					
a.	Our sales area has been widened				
b.	Interaction with customers have been increased	1	2	3	4 5
c.	Competitive position has been improved	1	2	3	4 5
Internal operation productivity					
a.	Internal operation of the organisation became transparent	1	2	3	4 5
b.	Internal operation of the organisation became structured	1	2	3	4 5
c.	Productivity of the employees has been improved	1	2	3	4 5
Financial performance					
a.	Overall performance is increased	1	2	3	4 5
b.	Profitability of the company has increased	1	2	3	4 5
c.	Sales of the company have increased	1	2	3	4 5

Demographic questions

1. Please indicate your role in the organisation:

- Owner Owner-manager Manager Employee
 Other (please specify)

2. Your age group?

- Under 25 Years, 25-34 Years, 35-44 Years, 45-60 Years,
 Over 60 Years

3. Your gender? Male Female

4. Please indicate the level of your educational attainment:

- Postgraduate, Graduate, HSC, SSC,
 Primary school, Literate, Others (please
specify).....

5. Your monthly income:

- Less than 10,000 Tk. 10,000-20,000 Tk. 20,000-30,000 Tk. 30,000-50,000 Tk.,
 50,000 – 80,000 Tk., above 80,000 Tk.

6. Do you have any prior experience in using ICT?

- No Yes

7. Number of employees engaged in your firm?

Full time: -----.

Part time/casual-----

8. Number of computer literate employees engaged in your firm?

Computer specialist: -----
(System analyst/programmer etc.)

Computer operator: -----

General employees having computing skills:-----

9. Percentage of employees who are involved with ICT use in your organisation?

10. Please indicate the types of internet connectivity in your organisation:

- Dial up/DSL Broadband cable Mobile broadband Other (please
specify).....

11. How long have you been connected to the internet?

----- Years.

12. Kindly state the monthly average expenditure on internet and online communications in your organisation:

Expenditure for Internet:.....

Expenditure for homepage:-----

Others (please specify):.....

13. Do you employ any specialised employees for ICT operation and homepage management in your organisation?

- No Yes [if no go to question 15]

14. Please state the average monthly expenditure that you are incurring for salaries and other benefits to the specialised employees (Please give your best estimate)?

Salary-----

Other benefit-----

15. Please provide the total ICT investment/expenditure in your organisation (Please give your best estimates)?

ICT investment/expenditure in last year:..... Tk

- ICT investment/expenditure in last three years:..... Tk.
16. How many offices/sales centres/stores does your organisation have?

17. Is your entire business setup located in the same region?
 No Yes
18. Are your customers geographically dispersed?
 No Yes
19. Is your company involved in international business operations?
 No Yes
20. When did you start ICT operations in your organisation?
Year:
21. When was your company established?
Year:
22. Have you received any kind of privilege or benefits for your organization as an SME?
 No Yes
23. Have you received any grants or subsidies for ICT development in your organization from any source?
 No Yes
24. Does your organization have 9001 or 14001 certification?
 No Yes
25. Would you kindly state your annual turnover in the Year 2010-2011?
 Up to 200,000 Tk., 200,001 -500,000 Tk, 500,001-1000, 000 Tk.,
 1000, 001-2000, 000 Tk., 2000, 001-5000, 000 Tk, 5000, 001-100, 00,000 Tk.,
 100, 00,000 Tk.
26. Are you operating online banking?
 No Yes
27. Are you communicating with your regulatory authorities online?
 No Yes
28. Are you communicating with your major customers online?
 No Yes
29. Are you communicating with your major suppliers online?
 No Yes
-

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Questionnaire code

APPENDIX D

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Surveyor code

গবেষণা প্রশ্নপত্র

সুপ্রিয় উত্তরদাতা,

এই জরীপ-কাজটি একটি একাডেমিক গবেষণা প্রকল্পের অংশ। সর্বস্বত্রে আই.সি.টি'র ব্যাপক প্রসারের লক্ষে বাংলাদেশ সরকারের সাম্প্রতিক উদ্যোগের প্রেক্ষিতে দেশের ক্ষুদ্র ও মাঝারি শিল্পসমূহে আই.সি.টি ব্যবহারের প্রস্তুতি ও আকাংখ্যা এবং এর ফলাফল স্বরূপ সংস্থার সার্বিক পারফরমেন্স মূল্যায়নের জন্য এই গবেষণাটি প্রণীত হয়েছে। এই গবেষণার ফলাফল কার্টন ইউনিভার্সিটি, অস্ট্রেলিয়া'র গ্রাজুয়েট স্কুল অব বিজনেস হ'তে পি-এইচ.ডি ডিগ্রীর জন্য রচিত থিসিসের ভিত্তি রচনা করবে।

এই জরীপকাজে আপনার ভূমিকা একজন উত্তরদাতা হিসাবেসর্বোচ্চ আন্তরিকতা ও ধারনানুযায়ী প্রশ্নসমূহের উত্তর প্রদান করা। এখানে ভুল বা সঠিক উত্তর বলে কিছু নেই। সংশ্লিষ্ট ইস্যুতে আমরা শুধুমাত্র আপনার মতামত জানতে আগ্রহী।

আপনার উত্তর সমূহের কঠোর গোপনীয়তা রক্ষা করা হবে এবং কোনো অবস্থাতেই আপনার কিংবা আপনার সংগঠনের পরিচয় প্রকাশ করা হবে না। এই জরীপের ফলাফল সম্পূর্ণ একাডেমিক উদ্দেশ্যে ব্যবহৃত হবে। যাহোক, এই জরীপকাজে আপনার অংশগ্রহণ সম্পূর্ণই আপনার ইচ্ছাধীন। আপনি ইচ্ছে করলে এই গবেষণায় অংশ নিতে পারেন আবার যেকোনো সময় নিজেকে আলোচ্য গবেষণা থেকে সরিয়ে নিতে পারেন।

আপনার সুচিন্তিত মতামতসহ পূরণকৃত প্রশ্নপত্র সরাসরি, ডাকযোগে, ই-মেইল অথবা ফ্যাক্সের মাধ্যমে নিম্নঠিকানায় প্রেরণ করলে বাধিত হবে।

আপনার সহযোগিতা ও মূল্যবান মতামতের জন্য ধন্যবাদ।

বিনীত,

মোঃ শাহ আজম

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গবেষণা প্রশ্নপত্র

উত্তরদাতার নাম:

সংস্থার নাম:

ব্যবসার ধরন: (উৎপাদনকারি, সেবাদানকারি, পাইকার, খুচরা করবারী ইত্যাদি)

ব্যবসায় সেক্টর (গার্মেন্টস, লেদার, ট্যুরিজম, আই.সি.টি ইত্যাদি)

ঠিকানা:

ফোন: ই-মেইল:

অনুগ্রহকরে সঠিক ঘরে টিক (✓) চিহ্ন দিন।

- অনুগ্রহকরে সরকারি নথি বা রেজিস্ট্রেশন অনুমায়ী আপনার ব্যবসার আকার উল্লেখ করুন:
 ক্ষুদ্র ব্যবসা মাঝারি ব্যবসা
 অন্যান্য (অনুগ্রহকরে বিস্তারিত উল্লেখ করুন)
- বর্তমানে আপনারা কোনো ধরনের আই.সি.টি ব্যবহার করছেন কি?
 না হ্যাঁ

বর্তমানে আপনার সংস্থায় নিম্নের কোন্ ধরনের আই.সি.টি ব্যবহার করছেন অনুগ্রহকরে তা নির্দেশ করুন:

- বেসিক কম্পিউটার অপারেশন
- ইন্টারনেট ও ই-মেইল
- হোম-পেজ (সাধারণ হোম-পেজ)
- ইন্টারেক্টিভ হোম পেজ যা পণ্য ক্যাটালগিং ও অনলাইন অর্ডার প্রসেসিং-এ সক্ষম
- ইন্টারেক্টিভ হোম-পেজ যা অনলাইন লেনদেন ও একাউন্ট ম্যানেজমেন্টে সক্ষম (ই-বিজনেস)
- সংগঠনের বাইরে ও ভিতরে সম্পূর্ণ ইলেকট্রনিক যোগাযোগ ও বিনিময় ব্যবস্থার প্রবর্তন (ই.আর.পি/ডিজিটাইজেশন).

বর্তমানে আপনার সংস্থায় নিম্নের কোন্ ধরনের সফটওয়্যার ব্যবহার করছেন অনুগ্রহ করে তা নির্দেশ করুন:

- বেসিক কম্পিউটিং সফটওয়্যার
- হিউম্যান রিসোর্স ম্যানেজমেন্ট
- ফাইন্যান্স/একাউন্টিং সফটওয়্যার
- সাপ্লাই চেইন ম্যানেজমেন্ট
- ইনভেন্টরি ম্যানেজমেন্ট
- ই-কমার্স
- কাস্টমার রিলেশনস
- ম্যানেজমেন্ট রিসোর্স প্ল্যানিং

**অনুগ্রহ করে নিম্নোক্ত অভিব্যক্তিগুলো অনুধাবনকরে আপনার দৃষ্টিতে সঠিক সংখ্যাটি
বৃত্তাকারে চিহ্নিত করুন**

(বিঃদ্রঃ এই গবেষণাতে আই.সি.টি বলতে কম্পিউটার, কম্পিউটার নেটওয়ার্ক বা ইন্টারনেট ভিত্তিক
টেকনোলজীকে বোঝানো হয়েছে)

Section A: আই.সি.টি সংক্রান্ত আপনার ধারণা (প্রত্যক্ষণ) নির্দেশকরুন

(যেখানে ১= সম্পূর্ণ ভিন্নমত পোষণ করি, ২= জোরালোভাবে ভিন্নমত পোষণ করি, ৩=ভিন্নমত পোষণ করি,
৪=ভিন্নমত বা একমত কোনোটিই নয়, ৫=একমতপোষণ করি, ৬=জোরালোভাবে একমত পোষণ করি,
৭=সম্পূর্ণএকমত পোষণ করি)

Perceived usefulness						
ক.	আই.সি.টি'র ব্যবহার আমাদের প্রতিষ্ঠানের সার্বিক কার্যক্রমের জন্য জন্য খুবইকার্যকর	১	২	৩	৪	৫
খ.	আই.সি.টির ব্যবহার আমাদের প্রতিষ্ঠানের সমূদয় কার্যক্রম দ্রুততার সাথে সম্পাদন করতে সক্ষম করেছে	১	২	৩	৪	৫
গ.	আই.সি.টির ব্যবহার আমাদের প্রতিষ্ঠানের সার্বিক উৎপাদনীলতা বৃদ্ধি করেছে	১	২	৩	৪	৫
ঘ.	আই.সি.টি'র ব্যবহার আমাদের সংগঠনের উন্নয়নের বিভিন্নমুখী সুযোগ সৃষ্টি করেছে	১	২	৩	৪	৫
Perceived ease of use						
ক.	প্রতিষ্ঠানে আই.সি.টি'র বিভিন্ন ব্যবহার শেখা আমাদের জন্য খুবইসহজ	১	২	৩	৪	৫
খ.	সংগঠনে আই.সি.টি'র প্রয়োগে যা যা করণীয় সে বিষয়ে আমাদের পূর্ণাঙ্গ ও স্বচ্ছ ধারণা আছে	১	২	৩	৪	৫
গ.	আমরা খুব সহজেই সংগঠনের বিভিন্ন কার্যক্রমে আই.সি.টি'র ব্যবহারে দক্ষ হয়ে উঠেছি	১	২	৩	৪	৫
ঘ.	প্রতিষ্ঠানে আই.সি.টি'র ব্যবহার খুবই সহজ বলে আমরা মনে করি	১	২	৩	৪	৫

**Section B: আপনার সংগঠনে আই.সি.টি'র ব্যবহার বা প্রয়োগেবাহ্যিক বিভিন্ন উপাদানের প্রভাব সম্পর্কে
আপনার মূল্যায়ন নির্দেশ করুন**

(যেখানে ১= সম্পূর্ণভাবে ভিন্নমত পোষণ করি, ২= ভিন্নমত পোষণ করি, ৩=ভিন্নমত বা একমত কোনোটিই নয়,
৪=একমতপোষণ করি, ৫=সম্পূর্ণ একমতপোষণ করি)

Coercive pressure						
ক.	প্যারেন্ট কোম্পানির নির্দেশে আমরা আই.সি.টি'র ব্যবহার করছি	১	২	৩	৪	৫
খ.	প্রধান ক্রতাদের চাহিদা ও প্রয়োজনীয়তার প্রেক্ষিতে আমাদের আই.সি.টি'র ব্যবহার ছাড়া গত্যান্তর নেই	১	২	৩	৪	৫
গ.	প্রধান সরবরাহকারীদের চাহিদা ও প্রয়োজনীয়তারপ্রেক্ষিতে আমাদেরআই.সি.টি'র ব্যবহার ছাড়া গত্যান্তর নেই	১	২	৩	৪	৫
Competitive pressure						
ক.	আমাদের সকল প্রতিযোগী প্রতিষ্ঠান ইতিধ্যেই আই.সি.টি'র ব্যবহার শুরু করেছে	১	২	৩	৪	৫
খ.	যেসমস্ত প্রতিযোগী প্রতিষ্ঠান আমাদের আগেআই.সি.টি'র ব্যবহার শুরু করেছে তারা নানাদিক থেকে আমাদের চেয়ে বেশীসুযোগ-সুবিধা ভোগ করেছে	১	২	৩	৪	৫

Normative pressure						
ক.	আমাদের ক্রেতারা আমাদের প্রতিষ্ঠানের সার্বিক কর্মকাণ্ডে আই.সি.টি'র প্রয়োগ করা উচিত বলে মনে করে	১	২	৩	৪	৫
খ.	সরবরাহকারিরা আমাদের প্রতিষ্ঠানের সার্বিক কর্মকাণ্ডে আই.সি.টি'র ব্যবহার প্রত্যাশা করে	১	২	৩	৪	৫
গ.	আমাদের ব্যবসায়িক পার্টনাররা আমাদের আই.সি.টি নির্ভরসার্বিক কর্মকাণ্ড প্রত্যাশা করে	১	২	৩	৪	৫
ঘ.	সংশ্লিষ্ট সরকারি নিয়ন্ত্রণকারি বা রেগুলেটরি সংস্থাসমূহ প্রত্যাশা করে আমাদের প্রতিষ্ঠানের সার্বিক আই.সি.টি নির্ভর কর্মকাণ্ড	১	২	৩	৪	৫

Global pressure						
ক.	গ্লোবলাইজেশনের ফলে উদ্ভূত সুযোগসমূহ কাজে লাগাতে আমরা আই.সি.টি'র ব্যবহার শুরু করেছি	১	২	৩	৪	৫
খ.	বর্তমান সময়ে আই.সি.টি'র ব্যবহার ছাড়া কোনো প্রতিষ্ঠানের পক্ষেই টিকে থাকা সম্ভব নয় বলে মনে করি, বিধায় এর ব্যবহার শুরু করেছি	১	২	৩	৪	৫

Section C: আই.সি.টি'র ব্যবহারে প্রভাব বিস্তারকারি সংগঠনের নিম্নলিখিত উপাদানগুলো সম্পর্কে আপনার মূল্যায়ন নির্দেশ করুন
(যেখানে ১= সম্পূর্ণভাবে ভিন্নমত পোষণ করি, ২= ভিন্নমত পোষণ করি, ৩=ভিন্নমত বা একমত কোনোটিই নয়, ৪=একমতপোষণ করি, ৫=সম্পূর্ণ একমত পোষণ করি)

Facilitating condition						
ক.	আমাদের সংগঠনের বিদ্যমান বিভিন্ন সিস্টেম ও কার্য প্রক্রিয়ার সাথে আই.সি.টি সামঞ্জস্যপূর্ণ (compatible)	১	২	৩	৪	৫
খ.	আই.সি.টি ব্যবহারে আমাদের কর্মীরা দক্ষ এবং উপযুক্ত	১	২	৩	৪	৫
গ.	এই টেকনোলজী ব্যবহারের জন্য প্রয়োজনীয় সকল সম্পদ (resource) আমাদের সংগঠনে বিদ্যমান	১	২	৩	৪	৫

Section D: সংগঠনের মালিক বা প্রধানের বৈশিষ্ট সম্পর্কে আপনার মতামত দিন
(যেখানে ১= সম্পূর্ণভাবে ভিন্নমত পোষণ করি, ২= ভিন্নমত পোষণ করি, ৩=ভিন্নমত বা একমত কোনোটিই নয়, ৪=একমতপোষণ করি, ৫=সম্পূর্ণ একমত পোষণ করি)

Owner characteristics						
ক.	একটা কাজ নতুনভাবে করতে তিনি প্রায়শই বড় ধরনের ঝুঁকি গ্রহণ করেন	১	২	৩	৪	৫
খ.	সংগঠনের যেকোনো কাজের মূল ধারণা তাঁর মাথা থেকেই আসে	১	২	৩	৪	৫

Section E: রাষ্ট্র ও অন্যান্য সহযোগী শিল্পসমূহের অবকাঠামো সংক্রান্ত নিম্নলিখিত অভিব্যক্তিগুলো সম্পর্কে আপনার মূল্যায়ন নির্দেশ করুন
(যেখানে ১= সম্পূর্ণভাবে ভিন্নমত পোষণ করি, ২= ভিন্নমত পোষণ করি, ৩=ভিন্নমত বা একমত কোনোটিই নয়, ৪=একমতপোষণ করি, ৫=সম্পূর্ণ একমত পোষণ করি)

Technology infrastructure						
ক.	ইন্টারনেট সেবা সহজলভ্য ও দেশব্যপী সুবিষ্মুত	১	২	৩	৪	৫
খ.	দেশের ইন্টারনেট সার্ভিস উচ্চ-গতি সম্পন্ন ও সুলভ (high-speed and affordable)	১	২	৩	৪	৫
গ.	দেশে প্রয়োজনীয় হার্ডওয়্যার ও এক্সেসরীজ সহজলভ্য ও সুলভ (available and affordable)	১	২	৩	৪	৫
ঘ.	বিদ্যুৎ সরবরাহ সহজলভ্য ও পর্যাপ্ত (available and adequate)	১	২	৩	৪	৫

Human infrastructure						
ক.	দেশের সর্বস্তরে ব্যক্তি পর্যায়ে কম্পিউটার ব্যবহার ও ইন্টারনেট ভিত্তিক ব্যবসায় সংক্রান্ত জ্ঞান ও দক্ষতা সন্তোষজনক বলে মনে করি	১	২	৩	৪	৫
খ.	দেশের সর্বস্তরে প্রাতিষ্ঠানিক পর্যায়ে কম্পিউটার ব্যবহার ও ইন্টারনেট ভিত্তিক ব্যবসায় সংক্রান্ত জ্ঞান ও দক্ষতা সন্তোষজনক বলে মনে করি	১	২	৩	৪	৫
ঙ.	দেশের সর্বস্তরে আই.সি.টি শিক্ষা বিস্তারে কম্পিউটার বিষয়ক শিক্ষা প্রতিষ্ঠানের সার্ভিস সহজলভ্য ও সুলভ (available and affordable)	১	২	৩	৪	৫
Legal infrastructure						
ক.	আমাদের দেশের আইনগত পরিবেশ ডিজিটাল কমিউনিকেশন এবং ই-বিজনেসের জন্য সহায়ক বলে মনে করি	১	২	৩	৪	৫
খ.	আমাদের দেশের প্রচলিত আইন অনলাইন কনজুমার প্রটেকশনের জন্য কার্যকর বলে মনে করি	১	২	৩	৪	৫
Financial infrastructure						
ক.	দেশের বিদ্যমান অনলাইন ব্যাংকিং সুযোগ সুবিধা সমূহ আই.সি.টি নির্ভর ব্যবসায় পরিবেশ গঠনের জন্য পর্যাপ্ত বলে মনে করি	১	২	৩	৪	৫
খ.	দেশের সর্বস্তরে ক্রেডিট কিংবা ডেবিট কার্ড ব্যবহারের প্রবণতা (রেট) আই.সি.টি নির্ভর ব্যবসায় পরিবেশের জন্য পর্যাপ্ত বলে মনে করি	১	২	৩	৪	৫
Government policy and supports						
ক.	সরকারের কর ও শুল্ক নীতিমালা দেশের ব্যবসায় পরিমন্ডলে আই.সি.টি'র বিস্তারে অত্যন্ত কার্যকর ভূমিকা রাখছে বলে মনে করি	১	২	৩	৪	৫
খ.	সরকারী প্রণোদনামূলক কর্মসূচিসমূহ (motivational programmes) ব্যবসায় পরিমন্ডলে আই.সি.টি'র বিস্তারে অত্যন্ত কার্যকর ভূমিকা রাখছে বলে মনে করি	১	২	৩	৪	৫
গ.	সরকারি অনুদান আমাদের সংগঠন এবং আমাদের মত ক্ষুদ্র ও মাঝারি ব্যবসায় প্রতিষ্ঠানসমূহে আই.সি.টি'র প্রয়োগ বা বিস্তারে বিশেষ কার্যকর ভূমিকা রেখেছে	১	২	৩	৪	৫
ঘ.	সরকারী ভর্তুকি আমাদের সংগঠন এবং আমাদের মত ক্ষুদ্র ও মাঝারি ব্যবসায় প্রতিষ্ঠানসমূহে আই.সি.টি'র প্রয়োগ বা বিস্তারে বিশেষ কার্যকর ভূমিকা রেখেছে	১	২	৩	৪	৫

Section F: সংস্কৃতি সংক্রান্ত নিম্নলিখিত অভিব্যক্তিগুলো সম্পর্কে আপনার মূল্যায়ন নির্দেশ করুন
(যেখানে ১= সম্পূর্ণভাবে ভিন্নমত পোষণ করি, ২= ভিন্নমত পোষণ করি, ৩=ভিন্নমত বা একমত কোনোটাই নয়, ৪=একমত পোষণ করি, ৫=সম্পূর্ণ একমত পোষণ করি)

Power distance						
ক.	কর্মীরা তাঁদের নেতাদের মান্য করে এবং বিনাবাক্য ব্যায়ে তাঁদের কার্যদেশ মেনে চলে	১	২	৩	৪	৫
খ.	উচ্চতর ব্যবস্থাপনা স্তরেই সকল ক্ষমতা কেন্দ্রীভূত	১	২	৩	৪	৫

গ.	কর্মীরা তাঁদের নেতাদের মান্য করবে এবং বিনা বাক্যব্যয়ে তাঁদের কার্যদেশ মেনে চলবে, সেটাই প্রত্যাশিত হওয়া উচিত	১	২	৩	৪	৫
ঘ.	ব্যবস্থাপকের যেকোনো সিদ্ধান্তে অধঃস্তন কর্মীরা কোনো প্রকার প্রশ্ন করে না	১	২	৩	৪	৫

Uncertainty avoidance

ক.	ভবিষ্যত যেকোনো অনিশ্চিত পরিস্থিতির মোকাবেলার জন্য সংগঠনসমূহে নিয়মানুবর্তিতা ও সামঞ্জস্যপূর্ণ বিধিবিধান বিদ্যমান	১	২	৩	৪	৫
খ.	সংগঠন সমূহে চাকুরী সংক্রান্ত নির্দেশনা ও করণীয় বিশদভাবে প্রকাশিত হয় যার ফলে কর্মীরা তাদের করণীয় সম্পর্কে পরিপূর্ণভাবে অবগত হতে পারে	১	২	৩	৪	৫

In group collectivism

ক.	এই সমাজে, দলের সদস্যরা তাদের ম্যানেজারের ব্যক্তিগত অর্জনে গর্ববোধ করে	১	২	৩	৪	৫
খ.	দলের সদস্যদের ব্যক্তিগত অর্জনে ম্যানেজারের গর্ববোধ করে	১	২	৩	৪	৫
গ.	ব্যক্তিগত লক্ষ্যার্জন বাধাগ্রস্ত হলেও ম্যানেজারের দলীয় আনুগত্যকে উৎসাহিত করে	১	২	৩	৪	৫

Bengali value

ক.	এই সমাজে, মুখোমুখি যোগাযোগই (face to face) কর্মীদের দৈনন্দিন কার্যপ্রক্রিয়ার প্রধানতম যোগাযোগ পদ্ধতি	১	২	৩	৪	৫
খ.	যোগাযোগ এবং অনুভূতি প্রকাশের বাহন হিসাবে বাংলা ভাষায় যোগাযোগে কর্মীরা সাবলীল ও সচ্ছন্দ বোধ করে	১	২	৩	৪	৫
গ.	কর্মীরা খুব ঘনিষ্ঠ এবং মজবুত সামাজিক সম্পর্ক বজায় রাখে	১	২	৩	৪	৫

Ethical culture

ক.	আমাদের সংগঠন এবং আমাদের মত অন্যান্য ক্ষুদ্র ও মাঝারি প্রতিষ্ঠানের বিভিন্ন কার্যক্রমে ঘুষএবংদুর্নীতি (bribe and corruption) বিদ্যমান বলে মনে করি	১	২	৩	৪	৫
খ.	আমাদের সংগঠন এবং আমাদের মত অন্যান্য ক্ষুদ্র ও মাঝারি প্রতিষ্ঠানের বিভিন্ন কার্যক্রমে অনিয়ম, রাজনীতিকরণ বা আত্মীয়করণ (politicisation or nepotism) বিদ্যমান	১	২	৩	৪	৫

Section G: প্রতিষ্ঠানে আই.সি.টি ব্যবহারসম্পর্কিত আপনাদের সুপ্ত আকাংখ্যা পূর্বেই উল্লেখ করেছেন, যা হতে পারে একান্তই কল্পনা প্রসূত। পারিপার্শ্বিক সামাজিক-সাংস্কৃতিক অবস্থা, দেশের অর্থনৈতিক ও আইনগত অবস্থা, এবং আপনার নিজস্ব ব্যক্তিগত ও প্রাতিষ্ঠানিক সক্ষমতা বিচার করে উক্ত আকাংখ্যা বাস্তব সম্ভব নাও হতে পারে। অর্থনৈতিক, সামাজিক ও অন্যান্য পরিবেশগত বিষয়াদি বিবেচনা করে আই.সি.টি'র মাধ্যমে নিম্নলিখিত সাংগঠনিক কার্যক্রম সমূহ সম্পাদনে উক্তসুপ্ত আকাংখ্যার বাস্তব রূপদান সংক্রান্ত আপনার ধারণা নির্দেশ করুন (যেখানে ১= বর্তমান ব্যবহারকারি, ২= ১ বৎসরের মধ্যে ব্যবহার করবো, ৩=১-২ বৎসরের মধ্যে ব্যবহার করবো, ৪=২-৩ বৎসরের মধ্যে ব্যবহার করবো, ৫=অদূর ভবিষ্যতে ব্যবহার করা সম্ভব হবে না)

Behavioural Expectation

ক.	সাধারণ ব্যবহারকারি (কম্পিউটার ও ইন্টারনেট)	১	২	৩	৪	৫
খ.	ইন্টারনেট ও সাধারণ হোমপেজ (webpage) পরিচালনা	১	২	৩	৪	৫
গ.	ইন্টারনেট এবং অর্ডার-গ্রহন ও প্রসেসিং-এ সক্ষম হোমপেজ পরিচালনা	১	২	৩	৪	৫

ঘ. ইন্টারনেট ও অনলাইন লেনদেন বা ই-কমার্স-এ সক্ষম হোমপেজ পরিচালনা	১	২	৩	৪	৫
ঙ. আভ্যন্তরীণ ও প্রতিষ্ঠানের বাইরের সকল কার্যক্রম ও যোগাযোগ কম্পিউটার প্রযুক্তির মাধ্যমে পরিচালনা (ই.আর.পি.)	১	২	৩	৪	৫

Section H: নিম্নলিখিত কার্যক্রম সমূহ সম্পাদনে আপনার প্রতিষ্ঠানে আই.সি.টিব্যবহারের ধরন নির্দেশ করুন

(যেখানে ১=কখনোই ব্যবহার করি না, ২= মাঝে মধ্যে ব্যবহার করি, ৩= প্রায়শই ব্যবহার করি, ৪=ঘন ঘন ব্যবহার করি এবং ৫=খুবই ঘন ঘন ব্যবহার করি)

ICT Use

ক. সাধারণ ব্যবহারকারি (কম্পিউটার ও ইন্টারনেট)	১	২	৩	৪	৫
খ. ইন্টারনেট ও সাধারণ হোমপেজ (webpage) পরিচালনা	১	২	৩	৪	৫
গ. ইন্টারনেট এবং অর্ডার-গ্রহন ও প্রসেসিং-এ সক্ষম হোমপেজ পরিচালনা	১	২	৩	৪	৫
ঘ. ইন্টারনেট ও অনলাইন লেনদেন বা ই-কমার্স-এ সক্ষম হোমপেজ পরিচালনা	১	২	৩	৪	৫
ঙ. আভ্যন্তরীণ ও প্রতিষ্ঠানের বাইরের সকল কার্যক্রম ও যোগাযোগ কম্পিউটার প্রযুক্তির মাধ্যমে পরিচালনা (ই.আর.পি.)	১	২	৩	৪	৫

Section I: আপনার প্রতিষ্ঠানে আই.সি.টি ইন্টিগ্রেশনের স্তর সম্পর্কে মূল্যায়ন করুন

(যেখানে ১= সম্পূর্ণ ভিন্নমত পোষণ করি, ২= জোরালোভাবে ভিন্নমত পোষণ করি, ৩=ভিন্নমত পোষণ করি, ৪=ভিন্নমত বা একমত কোনোটিই নয়, ৫=একমতপোষণ করি, ৬=জোরালোভাবে একমত পোষণ করি, ৭=সম্পূর্ণ একমত পোষণ করি)

Level of Integration

ক. আমরা সংগঠনের সকল কার্যক্রমে আই.সি.টি'র ব্যবহার করছি	১	২	৩	৪	৫
খ. সংগঠনের সকল বিভাগ এবং কার্যক্রম একটি সিস্টেমের অধীনে ইন্টিগ্রেটেড	১	২	৩	৪	৫
গ. ক্রেতা সেবা এবং অন্যান্য সম্মুখ-অফিস কার্যক্রম পরিচালনার জন্য আমাদের ওয়েবসাইটটি তৈরি করা হয়েছে যা তথ্য সেবা দিতে সক্ষম	১	২	৩	৪	৫
ঘ. আমাদের ওয়েব এপ্লিকেশনসমূহ ব্যাক অফিস এবং ডাটাবেজের সাথে ইন্টিগ্রেটেড	১	২	৩	৪	৫
ঙ. প্রতিষ্ঠানের ডাটাবেজসমূহ সাপ্লাইয়ার এবং পার্টনারদের ডাটাবেজের সাথে ইলেক্ট্রনিক্যালি ইন্টিগ্রেটেড	১	২	৩	৪	৫

Section J: আপনার প্রতিষ্ঠানে নিম্নলিখিত ক্ষেত্রে কার্যকরভাবে আই.সি.টি প্রয়োগের স্তর নির্দেশ করুন

(যেখানে ১= আই.সি.টি'র কোনোরূপ প্রয়োগ নাই, ২= ২০% কার্যক্রম আই.সি.টি নির্ভর, ৩= ২০%-৫০% কার্যক্রম আই.সি.টি নির্ভর, ৪=৫০%- ৮০% কার্যক্রম আই.সি.টি নির্ভর, ৫= ৮০% এর অধিক কার্যক্রম আই.সি.টি'র মাধ্যমে সম্পাদন করা হয়)

Degree of utilisation

ক. উৎপাদন ও সেবা সংক্রান্ত কার্যক্রম	১	২	৩	৪	৫
খ. প্রশাসন ও হিসাব সংক্রান্ত কার্যক্রম	১	২	৩	৪	৫
গ. বিক্রয় ও মার্কেটিং সংক্রান্ত কার্যক্রম	১	২	৩	৪	৫

Section K: আই.সি.টি ব্যবহারের ফলে নিম্নলিখিত প্রেক্ষিত সমূহে আপনার প্রতিষ্ঠানের পারফরমেন্স সম্পর্কে আপনার মূল্যায়ন নির্দেশ করুন
(যেখানে ১=১০% এর অধিক কমেছে, ২= ৫%-১০% কমেছে, ৩=২%-৫% কমেছে, ৪= মোটামুটি স্থিতিশীল (±২%), ৫= ২%-৫% বেড়েছে, ৬= ৫%-১০% বেড়েছে, ৭= ১০% এর অধিক বেড়েছে)

Competitiveness						
ক.	সার্বিক বিক্রয় এলাকা	১	২	৩	৪	৫
খ.	ক্রেতা-সম্পর্ক ও ক্রেতা সেবা	১	২	৩	৪	৫
গ.	প্রতিযোগিতামূলক অবস্থান	১	২	৩	৪	৫
Internal operation						
ক.	কর্ম প্রক্রিয়ায় স্বচ্ছতা (transparency in process)	১	২	৩	৪	৫
খ.	কর্ম প্রক্রিয়ায় শৃংখলা ও পদ্ধতিগত উৎকর্ষতা	১	২	৩	৪	৫
গ.	কর্মীদের উৎপাদনশীলতা	১	২	৩	৪	৫
Financial performance						
ক.	সার্বিক কার্যক্রম (overall performance)	১	২	৩	৪	৫
খ.	লাভ(profit)	১	২	৩	৪	৫
গ.	বিক্রয় (sales)	১	২	৩	৪	৫

ডেমোগ্রাফিক প্রশ্ন

১. অনুগ্রহ করে আপনার প্রাতিষ্ঠানিক ভূমিকা নির্দেশ করুন:

মালিক ব্যবস্থাপক(ICT) ব্যবস্থাপক(general) কর্মচারী (ICT)

কর্মচারী(general) অন্যান্য(অনুগ্রহ করে উল্লেখ করুন)

২. আপনার বয়স গ্রুপ?

২৫ বৎসরের কম, ২৫-৩৪বৎসর, ৩৫-৪৪বৎসর, ৪৫-৬০বৎসর, ৬০বৎসরের
অধিক

৩. আপনার জেন্ডার? পুরুষ মহিলা

৪. অনুগ্রহ করে আপনার শিক্ষাগত অর্জন নির্দেশ করুন:

স্নাতকোত্তর, স্নাতক, এইচ.এস.সি, এস.সি,

প্রাইমারি, সাক্ষর জ্ঞান, অন্যান্য(অনুগ্রহ করে উল্লেখ করুন).....

৫. আপনার মাসিক আয়:

২০,০০০ টাকার কম ২০,০০০-৩০,০০০ টাকা ৩০,০০০-৫০,০০০ টাকা
 ৫০,০০০-৭০,০০০ টাকা, ৭০,০০০-১,০০,০০০ টাকা ১,০০,০০০ টাকার অধিক

৬. আই.সি.টি'র ব্যবহার সংক্রান্ত আপনার কোনোরূপ পূর্ব অভিজ্ঞতা আছে কি?

না হ্যাঁ

৭. আপনার প্রতিষ্ঠানে নিয়োজিত শ্রমিক কর্মীর সংখ্যা?

ফুল টাইম:

পার্ট টাইম/ক্যাসুয়াল:

৮. আপনার প্রতিষ্ঠানে কম্পিউটার লিটারেট কর্মীর সংখ্যা?

কম্পিউটার বিশেষজ্ঞ:

(সিস্টেম এনালিস্ট/কম্পিউটার প্রোগ্রামার ইত্যাদি)

কম্পিউটার অপারেটর:

সাধারণ কর্মচারী কিন্তু কম্পিউটার জ্ঞান আছে এমন কর্মীর সংখ্যা:

৯. আপনার প্রতিষ্ঠানের কত পারসেন্ট কর্মী আই.সি.টি ব্যবহারের সাথে সম্পৃক্ত?

.....

১০. অনুগ্রহ করে আপনার প্রতিষ্ঠানের ইন্টারনেট সংযোগের ধরন নির্দেশ করুন:

ডায়াল-আপ/ ডি.এস.এল ব্রডব্যান্ড (ক্যাবল) মোবাইল ব্রডব্যান্ড

অন্যান্য (অনুগ্রহ করে উল্লেখ করুন).....

১১. আপনি ব্যক্তিগতভাবে কতদিন ইন্টারনেট ব্যবহার করছেন?

.....বৎসর

১২. অনুগ্রহ করে আপনার প্রতিষ্ঠানের ইন্টারনেট বা আনলাইন যোগাযোগের মাসিক গড় খরচ উল্লেখ করুন:

ইন্টারনেট বাবদ গড়ে খরচ:

হোম-পেজ বাবদ খরচ:

অন্যান্য (অনুগ্রহ করে উল্লেখ করুন):

১৩. আপনার প্রতিষ্ঠানের আই.সি.টি কিংবা হোম-পেজ পরিচালনার জন্য কোনো বিশেষজ্ঞ কর্মী নিয়োগ
করেছেন কি?

না হ্যাঁ

[উত্তর না হলে ১৫ নং প্রশ্নে গমন করুন]

১৪. উক্ত বিশেষজ্ঞ কর্মীদের বেতন বা অন্যান্য ভাতা বাবদ মাসেক কত টাকা খরচ করছেন অনুগ্রহ করে তা উল্লেখ করুন

বেতন ও অন্যান্য ভাতা বাবদ:-----

১৫. অনুগ্রহ করে আপনার প্রতিষ্ঠানের মোট বিনিয়োগ/খরচ উল্লেখ করুন (আপনার ধারণা থেকেই উত্তর করুন)?

আই.সি.টি বিনিয়োগ/খরচ (গত বৎসর):.....টাকা

আই.সি.টি বিনিয়োগ/খরচ (গত ৩ বৎসর):..... টাকা

১৬. আপনার প্রতিষ্ঠানের অফিস/বিক্রয়কেন্দ্র/স্টোরের সংখ্যা?

১৭. আপনার সার্বিক ব্যবসায় একই অঞ্চলে আবস্থিত কি?

না হ্যাঁ

১৮. আপনার ক্রেতাগণ আঞ্চলিকভাবে আপনার থেকে বিচ্ছিন্ন কি?

না হ্যাঁ

১৯. আপনার প্রতিষ্ঠান আন্তর্জাতিক ব্যবসায়ের সাথে জড়িত কি?

না হ্যাঁ

২০. আপনার প্রতিষ্ঠানে কবে আই.সি.টি'র ব্যবহার শুরু করেছেন?

বছর:

২১. আপনার প্রতিষ্ঠান কবে প্রতিষ্ঠিত হয়েছে?

বছর:

২২. ক্ষুদ্র ও মাঝারী শিল্প (এস.এম.ই) হিসাবে আপনার প্রতিষ্ঠানের জন্য কোনো ধরনের অগ্রাধিকার বা বেনিফিট গ্রহণ করেছেন কি?

না হ্যাঁ

২৩. আপনার প্রতিষ্ঠানের আই.সি.টি'র উন্নয়নের জন্য কোনোপ্রকার অনুদান বা ভর্তুকি গ্রহণ করেছেন কি?

না হ্যাঁ

২৪. আপনার প্রতিষ্ঠান ৯০০০ বা ১৪০০১ সার্টিফাইড সংস্থা কি?

না হ্যাঁ

২৫. অনুগ্রহ করে আপনার প্রতিষ্ঠানের ২০১০-২০১১ (গত অর্থ বছর) অর্থ বছরের আয় নির্দেশ করুন:

২০ লক্ষ টাকার কম ২০-৫০ লক্ষ টাকা ৫০ লক্ষ-১ কোটি টাকা

১-৫ কোটি টাকা ৫-১০ কোটি টাকা ১০-২০ কোটি টাকা

২০ কোটি টাকার বেশী

২৬. আপনারা অনলাইন ব্যাংকিং অপারেশন করছেন কি?

না হ্যাঁ

২৭. আপনারা সংশ্লিষ্ট রেগুলেটরী অথরিটির সাথে অনলাইনে যোগাযোগ করেন কি?

না হ্যাঁ

২৮. আপনার প্রতিষ্ঠানের প্রধান ক্রেতাদের সাথে অনলাইনে যোগাযোগ করেন কি?

না হ্যাঁ

২৯. আপনার প্রতিষ্ঠানের প্রধান সাপ্লাইয়ারদের সাথে অনলাইনে যোগাযোগ করেন কি?

না হ্যাঁ

APPENDIX E

Decision Rules for Formative or Reflective Measurements

	Formative model	Reflective model
1. Direction of causality from construct to measure implied by the conceptual definition	Direction of causality is from items to construct	Direction of causality is from construct to items
Are the indicators (items) (a) defining characteristics or (b) manifestations of the construct?	Indicators are defining characteristics of the construct	Indicators are manifestations of the construct
Would changes in the indicators/items cause changes in the construct or not?	Changes in the indicators should cause changes in the construct	Changes in the indicator should not cause changes in the construct
Would changes in the construct cause changes in the indicators?	Changes in the construct do not cause changes in the indicators	Changes in the construct do cause changes in the indicators
2. Interchangeability of the indicators/items	Indicators need not be interchangeable	Indicators should be interchangeable
Should the indicators have the same or similar content?	Indicators need not have the same or similar content	Indicators should have the same or similar content theme
Do the indicators share a common theme?	Indicators need not share a common theme	Indicators should share a common theme
Would dropping one of the construct indicators alter the conceptual domain of the construct?	Dropping an indicator may alter the conceptual domain of the construct	Dropping an indicator should not alter the conceptual domain of the construct
3. Covariation among the indicators	Not necessary for indicators to covary with each other	Indicators are expected to covary with each other
Should a change in one of the indicators be associated with changes in the other indicators?	Not necessarily	Yes
4. Nomological net of the construct indicators	Nomological net for the indicators may differ	Nomological net for the indicators should not differ
Are the indicators/items expected to have the same antecedents and consequences?	Indicators are not required to have the same antecedents and consequences	Indicators are required to have the same antecedents and consequences

Source: Jarvis et al. (2003)