Interorganizational Collaboration and Its Effect on Business Performance in the Era of Globalization

A dissertation submitted by

Wu Lu

In fulfilment of the award of

Doctor of Philosophy

University of South Australia

2012

ABSTRACT

The purpose of this study is to present a framework to understand how and to what extent interorganizational collaboration affects business performance. E-business diffusion theory and trust theory are adopted to investigate the collaboration and, subsequently, its effect on business performance. The study focuses on the electrical industry in China's Wenzhou region, where approximately 80% of the electrical manufacturers are located.

This study adopts a mixed method where data is collected in two phases. The first phase consists of a qualitative method and the second phase involves a quantitative based approach. The qualitative phase comprises a series of pilot study interviews. The stage confirms the importance of five constructs affecting business performance. These constructs are trust, organizational capacities, e-business diffusion, collaboration and business performance. Accordingly, a questionnaire was developed based on these constructs.

In the second phase, the questionnaire was mailed to 500 Wenzhou electrical organizations listed in the Wenzhou SME Association directory. A total usable dataset of 400 was received, of which 395 responses were usable (signifying a response rate of 79%). Via validity, reliability and confirmatory factor analysis tests, three antecedent constructs were identified, namely, trust, organizational capacities and e-business diffusion dimensions. Hence, six research hypotheses and mediators have been identified and tested by Structural Equation Modelling (SEM) approach.

The most valuable findings from the quantitative phase indicate that trust and organizational capacity can significantly affect collaboration (standard coefficient of 0.15 and 0.55, significant relationship $\rho<0.001$); and organizational capacities also have positively affected e-business diffusion (standard coefficient of 0.62, significant at $\rho<0.001$). The results indicate that collaboration fully mediates the relationship between organizational capacity and business performance (significant at $\rho= .486 > 0.05$); and e-business diffusion is also a full mediator for the relationship of organizational capacity and business performance (significant at $\rho= .486 > 0.05$). The study shows that collaboration may not have a positive relationship with e-business diffusion (standard significant at $\rho=0.418>0.001$).

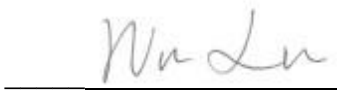
This study recommends that in order to improve the performance of interorganizational collaboration in Wenzhou's electrical industry, organizations need to focus on improving their trust and organizational capacities, but the effort in improving business performance by promoting organizational capacity and trust cannot be significantly achieved without collaboration. However, it is a misuse of investment to adopt e-business collaboration without a sound level of organizational capacities. This research is useful to e-business adoption and diffusion in the manufacturing industry due to the importance of trust and organizational capacities—which can be the basis for future decision-making in interorganizational collaboration expansion.

This research contributes to the literature by offering a further understanding of e-business diffusion theory and trust theory in the context of a developing country (China). This study will provide useful guidelines for organizations to assess their theoretical application of e-business diffusion by examining the mediating effect of organizational capacities construct on overall business performance improvement. This study also contributes to the knowledge by extending previous research on measuring organizational capacities, e-business innovation and trust environments towards adopting an effective collaboration performance by conceptualizing them as multi-dimensional constructs. Future work can be undertaken to test the applicability of the result via multiple organization representatives and cross-cases studies.

Keywords: Interorganizational Collaboration, Trust, Organizational Capacities, E-business Diffusion, Business Performance

CERTIFICATION OF DISSERTATION

I certify that the ideas, pilot study work, results, analysis, software and conclusions reported in this dissertation are entirely my own efforts, except where otherwise acknowledged. I also certify that the work is original and has not been previously submitted for another award, except where otherwise acknowledged.



2012.7.1

Signature of Candidate **Date**

ENDORESMENT

_____ _____

Signature of Supervisor **Date**

_____ _____

Signature of Supervisor **Date**

ACKNOWLEDGEMENTS

This dissertation would not have been written without the guidance, help, support and encouragement from my supervisor, respondents, family and friends. I would like to express my deepest gratitude to my supervisor Dr. Jing Gao and associate supervisor Dr. Latif Al-Hakim for their professional guidance, assistance, advice and encouragement.

This research would not have been possible without the cooperation of survey participants and the members from Wenzhou electrical industry SEMs Association who are involved in the pilot study interviews and the survey questionnaire validation stage. I would like to express my deepest appreciation to all these participants for their contribution, willingness to spend their precious time and for the exceptional cooperation they provided during the interviews.

Finally, my deepest gratitude and love is dedicated to my family. Their love, encouragement and support gave me strength and persistence to complete this long PhD journey. I would also like to thank all my friends and work colleagues at Zhejiang University City College for their support and encouragement.

PUBLICATIONS

Parts of this thesis have been published or are accepted for publication:

Refereed International Journals:

1. Wu Lu & Min He, "E-Business diffusion: a measure of e-communication effectiveness on the e-enabled interorganizational e-collaboration" (Accepted for publication), *Advances in Intelligent and Soft Computing (ISSN: 1867-5662).*

2. WeiWei Ye & Wu Lu 2011, "Case study on CDIO-based engineering education mode through college-industry linkages"，*Advanced Materials Research*, vol. 217-218, pp. 819-823.

3. Wu Lu & Luzhuang Wang 2010, "An empirical study of e-business innovation in customer-relationship marketing", *Human Resource Management*, vol. 7, p.9.

Referred International Conference Papers:

4. Wu Lu & Min He 2010, "An Empirical Study of Trust-Centric Customer-Relationship Based E-Marketing from Customer Collaborative Contributions", *Preceding of International Conference on Cooperation and Promotion of Information Resources in Science and Technology, IEEE Computer Society,* Beijing China, pp.187-191.

5. Wu Lu & Latif Al-hakim 2009, "Collaboration in the Era of Internationalization: A Chinese Case", *Preceding of International Conference on Cooperation and Promotion of Information Resources in Science and Technology, IEEE Computer Society,* Beijing China, pp.339-233.

TABLE OF CONTENTS

ABSTRACT i
CERTIFICATION OF DISSERTATION iii
ACKNOWLEDGEMENTS iv
PUBLICATIONS v
LIST OF ABBREVIATIONS x
LIST OF TABLES AND FIGURES xii
LIST OF APPENDICES xiv
CHAPTER 1: INTRODUCTION
1.1 Introduction 1
1.2 Research question 2
1.3 Research significance 3
1.4 Research methodology 4
1.5 Key definitions 5
1.6 Delimitations of scope 6
1.7 Structure of the dissertation 7
1.8 Conclusion 9
CHAPTER 2: LITERATURE REVIEW
2.1 Introduction 10
2.2 Electrical industry 12
2.2.1 The development of the electrical industry 12
2.2.2 The unique value of the research in Wenzhou area 18
2.3 Recognition of collaboration 21
2.3.1 Collaboration elements 23
2.3.2 Complexities of collaboration 29
2.4 E-business diffusion 31
2.4.1 Development of e-business and e-collaboration 32
2.4.2 E-business as innovation 33
2.4.3 The need for theoretical support to e-business innovation 38
2.4.3.1 Social-technical theory 40
2.4.3.2 Interaction theory 44

2.4.4 Conclusion 47
2.4.5 The selection of diffusion of innovation theory and attributes 48
2.5 The collaborative environment: trust 51
2.5.1 Definition of trust 52
2.5.2 Dimensions of trust 55
2.5.3 The value of trust on collaboration performance 56
2.6 Organization capacity in interorganizational relationship 59
2.6.1 Definitions of organizational capacities 59
2.6.2 Attributes of organizational capacities and their contribution to collaboration 61
2.7 Business performance measures for collaboration 63
2.7.1 Definition and attributes of business performance 64
2.7.2 The impact of collaboration on business performance 66
2.8 Gaps in the literature 68
2.9 Conclusion 70
CHAPTER 3: THE RESEARCH MODEL
3.1 Introduction 72
3.2 Trust and collaboration: factors and hypothesis 73
3.3 Organizational capacities, collaboration and e-business diffusion: factors and hypothesises 75
3.4 Downstream influencing factors and hypothesises 77
3.4.1 Collaboration and e-business diffusion 78
3.4.2 E-business diffusion and overall business performance 79
3.4.3 Collaboration and overall business performance 81
3.5 The research model 82
CHAPTER 4: RESEARCH METHODOLOGY
4.1 Introduction 89
4.2 Research paradigms 89
4.3 Research design 92
4.4 Qualitative research design 94
4.4.1 Introduction 94
4.4.2 Pilot study objectives and questions 95
4.4.3 Sample selection procedure and administration of the interview 96

4.5 Quantitative research design 97
4.5.1 Population and sample 97
4.5.2 Research design for the quantitative method 99
4.5.3 Ethics approval 101
4.5.4 Measurement instrument 102
4.5.5 Methods of data analysis techniques – the selection of Structural Equation Modelling 103
4.6 Conclusion 108
CHAPTER 5: PILOT STUDY FINDINGS
5.1 Introduction 109
5.2 Brief background of the cases 109
5.2.1 Case background of DG 110
5.2.2 Case background of HG 111
5.2.3 Case background of JEA 112
5.2.4 Case background of ZG 113
5.2.6 Case background of QE 115
5.3 Discussion 117
5.3.1 The importance of trust in the electrical industry 117
5.3.2 The importance of developing organizational capacities for collaboration 120
5.3.3 The important attributes of collaboration 122
5.3.4 The important attributes of e-business diffusion 128
5. 4 The selection of the revised attributes 131
5.4.1 Revised attributes related to trust 132
5.4.2 Revised attributes related to organizational capacities 133
5.4.3 Revised attributes related to collaboration 135
5.4.4 Revised attributes related to e-business diffusion 135
5.4.5 Revised attributes related to business performance 137
5.5 Conclusion 138
CHAPTER 6 DATA ANALYSIS AND VALIDATION OF THE MODEL
6.1 Introduction 140
6.2 Descriptive analysis 141
6.2.1 Descriptive analysis of data 141
6.2.2 Sample characteristics 143

6.2.2.1 Respondent organizations 143
6.2.2.2 The extent of collaboration 145
6.2.2.3 Local and international collaboration relationship 147
6.2.2.4 The stability of the collaboration relationship 148
6.2.2.5 The collaboration relationship and e-collaboration adoption 149
6.3 Testing the measurement model 151
6.3.1 Validity and reliability of the measurement model 152
6.3.2 Measures development of research model 156
6.3.3 Hypotheses testing 161
6.3.4 Test of mediators 163
CHAPTER 7 DISCUSSION AND CONCLUSION
7.1 Introduction 167
7.2 Main findings of the research 167
7.3 Research innovation and management enlightenment 176
7.3.1 E-business diffusion has no significant effect on the output of collaboration 177
7.3.2 E-business diffusion should be accompanied with a high level of organizational capacities 179
7.3.3 There is no significant direct effect between organizational capacities and business performance without effective collaboration involvement 181
7.3.4 Trust facilitates collaboration and results in a high business performance 183
7.4 Contributions of the study 185
7.5 Limitation and further researches 187
LIST OF REFERENCES 189
LIST OF APPENDICES 220

LIST OF ABBREVIATIONS

AVE	Average variance extracted value
B2B	Business-To-Business
BCR	Bar-Coding Reading
BPM	Business Performance Measurement
CRM	Customer Relationship Management
CPFR	Collaborative Planning, Forecasting and Replenishment
DOI	Diffusion Of Innovation
EAN	European Article Numbering
EBC	E-Business Capability
EDI	Electronic Data Interchange
EM	Expectation Maximization
ERP	Enterprise Resource Planning
HTE	Human-Technology-Environment
ICT	Information and Communication Technology
IPA	Important Performance Analysis
IS	Information System
IT	Information Technology
KM	Knowledge Management
KMO	Kmo –Meyer-Olkin
LAN	Local Area Networking
ML	Maximum Likelihood
MRP	Material Resource Planning
NET	Network Effects Theory
PLS	Partial Least Square
RFID	Radio Frequency Identification
RMSEA	Root Mean Square Error of Approximation
SCC	Supply Chain Collaboration
SCM	Supply Chain Management
SEM	Structural Equation Modelling
SFA	Sales Force Automation
SMEs	Small and Medium Size Enterprises

SSE	Shanghai Stock Exchange
STS	Sociotechnical Systems Theory
TAM	Technology Acceptance Model
TOE	Technology Organization Environment
UPC	Universal Product Code
UTAUT	Unified Theory of Acceptance and Use of Technology
VAN	Valuated Network
WSMEA	Wenzhou SMEs Association
YCLCC	Yueqing city local chronicles committee

LIST OF TABLES AND FIGURES

Table 2-1: Brief analysis of SWOT for China's electrical industry 15
Table 2-2: A comparison of cooperation and collaboration 22
Table 2-3: Brief conception review of collaboration framework 24
Table 2-4 : A review of collaborative elements 27
Figure 2-1: E-business technologies adoption ladder 34
Figure 2-2: General benefits from e-business 36
Table 2-5: The chief benefits and drawbacks of online communication technologies 38
Table 2-6: Comparison of multiple theories 44
Table 2-7: Brief identification of trust 53
Table 2-8: Dimensions of trust 56
Table 2-9: Attributes of interorganizational organization capacity 62
Figure 3-1: Relationships between research question, research objectives and hypotheses 84
Figure 3-2: The research model with hypotheses 85
Figure 3-3: Mediation hypothesis of collaboration between trust and business performance 86
Figure 3-4: Mediation hypothesis of collaboration between organizational capacity and business performance 87
Figure 3-5: Mediation hypothesis of e-business diffusion between organizational capacities and business performance 88
Table 4-1: Research methodologies 94
Table 4-2: Quality of the research design 103
Table 4-3: A brief process of data preparation and analysis 104
Table 4-4: Acceptable threshold levels of the main model fit index 106
Table 5-1: Brief description of the cases and collaboration situation 110
Table 5-2: Important trust dimensions of each organization 119
Table 5-3: Important attributes of organizational capacities 121
Table 5-4: Perceptions of collaboration 123
Table 5-5: Important attributes of collaboration 127
Figure 5-1: E-business configuration for collaboration 129

Table 5-6: Important attributes of e-business diffusion 131
Table 5-7: Summary of the revised attributes 138
Table 6-1: Descriptive analysis of study variable 143
Table 6-2: Company profiles 144
Figure 6-1: Type of collaboration partners 146
Table 6-3: The descriptive statistics of collaboration activities 146
Figure 6-2: Number of local and international collaboration partners 148
Figure 6-3: the percentage of local and international collaboration partners 148
Figure 6-4: The duration of collaboration 149
Figure 6-5: The frequency of e-communication 150
Table 6-4: Descriptive statistics of the e-collaboration technologies 151
Table 6-5: A brief description of the main quality test 152
Table 6-6: The confirmatory factor analysis 155
Figure 6-6: The research model 156
Figure 6-7: The adjusted research model as the initial model 157
Table 6-7: Regression weights 157
Figure 6-8: Interaction 1 with the deletion of A4 (Benevolence) 158
Figure 6-9: Interaction 2 with the deletion of C3 (Organizational Effectiveness) 159
Figure 6-10: Interaction 3 with the deletion of D3 (Trialability) 160
Table 6-8: Interactions of the research model 161
Figure 6-11: The final research model results 162
Figure 6-12: The test of the mediation effect of collaboration 164
Table 6-9: Assessment of the mediation effect of the collaboration 165
Table 6-10: Results of the mediation tests 166
Table 7-1: The results of the hypotheses testing 171
Table 7-2: Brief summary of the mediation testing 172

LIST OF APPENDICES

Appendix 1: The characteristics of the revised items in final questionnaire. 220
Appendix 2: Abbreviation in the research model 222
Appendix 3: The reliability statistics 223
Appendix 4: Total variance explained 224
Appendix 5: Model fit summary of the initial model research model.....226
Appendix 6: Guideline for the pilot study interview 229
Appendix 7: Questionnaire 233

CHAPTER 1: INTRODUCTION

1.1 Introduction

Being competitive in a globalized environment requires a holistic perspective on the proactive integration and synergy from all business partners' activities (such as manufacturers, supplier, distributors, buyers, service agencies and so on) and their trading systems (Zheng 2006). Collaboration refers to joint actions that two or more organizations carry out to achieve reciprocal benefits, involving the fields of manufacturing, product and services, R&D, logistics and distribution, and higher marketing/promotion force etc. (Wang & Archer 2004). As emphasized by the President of China Mr. Hu Jingtao in the G20 summit in Toronto, Canada, the manufacturing industry in China recognizes the increasing importance of interorganizational collaboration and increasingly engages in globalized partnerships with their business partners to survive (World Bank 2006; Newell et al. 2009). Manufacturers and their partners are working together in close collaboration to gain benefits from resource sharing, e-technologies, risk management, information sharing and so on (e.g. Zedtwitz & Gassmann 2002; Brown et al. 2010). To increase competition, many researchers have examined the concepts put forth in the area of collaboration relationships, especially the interorganizational collaboration, with its emphasis on its benefitsl to business success (e.g. Chen 2003; Simatupang et al. 2004).

An e-enabled collaboration coming from e-business innovation gradually becomes an attractive phenomenon. To support collaboration, e-business is capable in assisting continuous improvement, building competitive advantage, conducting business process reengineering and even assisting business alliances in collaboration (e.g. Levy & Powell 2005; Turban et al. 2006). The changes toward e-collaboration, the electronic integration and management of all collaboration activities, is expected to improve overall organizational efficiency, marketing performance, products and services performance and customer satisfaction, etc. (e.g. Chaffey 2006; Evans & Lindsay 2008).

Additionally, e-business facilitated business interactions require sound organizational capacities in managing wide value-chain wide interorganizational collaboration and relationships (e.g. Zheng 2006; Riemer et al. 2009). Sound organizational capacities would effectively support the development of reliable and flexible responsiveness, facilitate enterprise-wide communication, and improve the innovative ability and problem solving capability by providing quick access to global innovative networks and resources and etc. (e.g. Barratt & Oliveira 2001; Handfield & Bechtel 2004; Wong 2008; Riemer et al. 2009).

Moreover, a sustained collaboration is embraced when trading partners have an atmosphere of trust and a trustful flow of information (e.g. Chui 2009; Dong 2009). As analyzed by Ryssel et al. (2004) information technology is an enabler but cannot solely guarantee the creation of additional value, especially due to high risks from globally distributed e-business work. A trusting interorganizational collaboration relationship would result in greater willingness to establish knowledge-sharing, alliances and long-term stability with each other (e.g. Martinez et al. 2004; Lin 2008). Consequently, taking advantage of a high level of trust, the adoption of collaboration via e-business diffusion is expected to grow as it fosters business performance — not only for larger enterprises, but also for SMEs.

1.2 Research question

Collaboration has previously been characterized as a mutual business procedure and its success would be challenged by various internal organization management practices as well as those outside the organization (e.g. Wilson 1995; Wang & Archer 2004). There are few studies which discuss the success factors in interorganizational collaboration from the perspective of the e-business diffusion, the supporting organizational capacities and the vital trust trading environment. If there is no equity of organizational capacities for all the partners, the collaboration is not sustainable and it becomes difficult for collaboration to quickly and effectively improve the collaboration performance (Spekman & Carraway 2006). Therefore, understanding how to achieve a positive

outcome for an organization's performance by the introduction of collaboration becomes important and justifies a thorough and structured study.

In order to acquire strategic thinking about these valuable innovation capacities and competent performance in business, this research attempts to answer the research question: *How and to what extent does interorganizational collaboration affect business performance?* The importance of addressing this research question and the conceptual framework will be discussed in detailed in Chapter 3.

Therefore, the research objectives derived from the above research question are:

1) to articulate the effect of trust on interorganizational collaboration and business performance;
2) to investigate the effect of organizational capacities on interorganizational collaboration and business performance; and
3) to examine the interaction among collaboration, e-business diffusion and business performance.

1.3 Research significance

There are several reasons for this study. Firstly, there are many studies on the factors that encourage adoption of various e-business technological innovations according to the business functions (e.g. Gottschalk 2006; Mohtadi 2008) and the benefits (e.g. Ward & Daniel 2006). However, to date, limited attention has been given by researchers to the factors that influence e-business diffusion, which is another type of innovation diffusion. Therefore, this study is deemed necessary as e-business diffusion is one of the important elements in collaboration management nowadays. It is important to fill this gap in the literature because adopting e-business diffusion in interorganizational collaboration has different characteristics.

Secondly, interorganizational collaboration relationships involve many parties such as manufacturers, buyers (retailer, wholesaler), suppliers, and consumers. This study looks at manufacturers' perceptions of trust and organizational capacities towards their

partners so that a comparison can be made in order to establish their influence on the effectiveness of collaboration adoption and in cultivating stronger business performance.

Thirdly, in practice, collaboration and innovation process in the electrical industry is typically taking place by chance (McAdam et al. 2004). Few electrical product manufacturers have managed a sustainable collaboration management and its vital influencing success factors to enhance business performance. The findings can also be used to benchmark the Chinese electrical industry practices against those practices used in developed countries. The findings are expected to assist business managers or policy makers in creating policies targeting appropriate factors that hinder collaboration in their organisations.

1.4 Research methodology

The research methodology for this study consists of four different stages. The first stage of this study involved an extensive literature review to identify gaps in the literature and to understand the theories that will guide the conduct of this study on collaboration. The second stage involved pilot study interviews, conducted with key informants from 6 electrical organizations in Wenzhou China. The interview process involved open-ended questions that required the interviewee to explain the experience of collaboration, types of collaborating partnership, any e-business system that they have adopted, their perception of the level of trust, and the organizational capacities factors influencing collaboration performance.

The third stage was the quantitative data collection process involving a survey questionnaire. Most survey questionnaires are prepared and distributed by mail and face-to-face with the assistance from the Wenzhou SMEs Association. The survey was developed based on findings from previous research and also the findings from six cases in the pilot study.

The fourth stage was the data entry and analysis process of the 395questionnaires returned by the respondents. Data was coded into SPSS (Statistical Packages for Social

Science) version 16 before it was transferred to AMOS software to test the research model and the hypothesis of the study. The same data was also analysed using SPSS for factor analysis with the purpose to identify the main attributes for the trust, organizational capacities, collaboration, e-business diffusion and business performance factors. Structural equation modelling (SEM) statistical approach was adopted for the research hypotheses test and mediation test. The final stage was the writing up process, mainly discussing the findings generated from the data analysis stage to draw conclusions from the outcomes of the study.

1.5 Key definitions

Collaboration: Collaboration is the process of engagement from two or more organizations which make commitment and joint efforts on achieving benefits to all partners (Wang & Archer 2004). Despite the main benefits of collaborative relationships, different collaboration levels depend on the collaborative elements and their specific environments and collaboration would still fail when these collaboration elements are not properly managed (Bititci et al. 2002).

E-collaboration: E-collaboration is an interaction between outside and inside partners, which provides more intensive information and opportunities than traditional collaboration (Chaffey 2002). When trading partners are involved in interorganizational relationships, it helps reconcile the interconnectivity linking the external and internal to support radical changes in the structure and functions of an organisation's activities (Spekman & Carraway 2006).

E-business diffusion and Diffusion of Innovation (DOI): E-business is the utilization of Internet technologies to promote transformation in business processes (Chaffey 2002; IBM 2010). Moreover, researchers started to focus more on technological utilisation processes via different innovation diffusing patterns (e.g. Currie 2004; Kim & Mauborgne 2005). DOI is where the members of a social system participate in and communicate with the ideas, practices or technologies through certain communication channels and cultures over time (Rogers 2003). E-business is an attractive example of

innovation and e-business diffusion is also expected to address the same action and evaluation attributes (Dong 2006).

Trust: Trust is the willingness to rely on another party and to take action in circumstances where such action makes one vulnerable to the other party (Doney, Cannon & Mullen 1998). Trust provides a reliable interorganizational environment and is regarded as an essential ingredient in a long lasting business relationship for innovation diffusion (Goo & Huang 2008; Verdechoa et al. 2009)

Organizational capacities: Capacity is an abstract term covering a wide variety of knowledge, resources and capabilities, and organizational capacities are continually evolving and are multi-faceted capacities (Kogut & Zander 1992; Rycroft & Kash 2004). With the purpose to make a 'rededication' to achieve effective results in the organization, the strength of the organization depends upon the ability and the degree to which different collaborating participants support innovation as a whole (Zedtwitz & Gassmann 2002; Chen & Xu 2010).

Business performance and business performance measures: Business performance generally is an organization's outcomes, which would be assessed on the subject of the attainment of organizational objectives, goals, growth, human resource effectiveness, product and services quality, supplier performance, customer and markets and other key factors such as profitability (Fielden et al. 2003). Business performance measurement is a multi-disciplinary field used as a indicative tool to evaluate internal and external actual results with pre-determined overall organizational goals and customer expectation – which can convery what has happened (regarded as lagging measures) and what will happen (regarded as leading measures) (Chen & Cheng 2007; Evans & Lindsay 2008).

1.6 Delimitations of scope

There is some delimitation in the scope of this study to ensure that it concentrates on the research questions and objectives only. The interest of this study is on interorganizational collaboration that exists between manufacturers, their suppliers,

wholesaler or retailer, distributors, customers, agents and other trading partners. Accordingly, the term of *organizational capacities* is limited to these capacities in dealing with the interorganizational relationships and issues. Factors influencing internal collaboration will not be considered. Furthermore, this study only deals with companies within one geographical location in China which is in the Wenzhou region.

Secondly, trust is a multi-dimensional construct and a number of dimensions have been identified by researchers. The trust which links the organization to the partners may not sufficiently address the dynamic nature within the organization's environment. This is because organizational behavior and human nature cannot adequately be enshrined formally (Martin 2002). It will be appropriate to assume that trust is essential to partner-relationships and corporate survival in the social system (Ryan et al. 2004). The basic assumption is that the nature of the social system, beliefs, values, norms, reputation, or the role of leaders under similar culture or common objectives will encompass the occurrence of the diffusion process and trust over time (Gregor & Jones 1999; Rogers 2003). Approximate dimensions are selected for the research questions only and they will be determined via a pilot study.

Thirdly, this study will concentrate on how e-business diffusion influences the implementation of collaboration only – and not investigate other techniques and specific type of application related to e-business. Rogers (1995) identified five variables that determine the rate of innovation adoption, but this study will examine only one of the variables – attributes of technology – rather than the type of technology, communication channels, the nature of the social system and change agent's promotion efforts. Technology attributes by itself consists of five dimensions: relative advantage, compatibility, complexity, trialability and observability.

1.7 Structure of the dissertation

This first chapter has discussed the background of this study which includes the research problem and questions, significance of this study, research methodology, and definition of key terms used throughout this dissertation.

The second chapter discusses the relevant literature on collaboration, trust, organizational capacities and business performance. Firstly, the interest of this study is on the interorganizational collaboration which encompasses a network of many trading partners involving manufacturers, distributors, customers and suppliers and so on. The importance of collaboration posted as beneficial means to knowledge and information sharing, efficiency in competition and business success is readily understood. Especially in the recent global economic meltdown, and taking the electric industry in the area of Wenzhou China as an example, the challenges and complexities of collaboration at the global level reflects the need to coordinate both the management of the collaboration elements and specific collaborating environments such as the level of rust and e-business adoption.

The trust which links the organization to its trading partners addresses the reliability of organizational behaviors and process within the organization's environment (Martin 2002). It will be appropriate to assume that trust is essential to interorganizational collaboration relationships and significantly contributes to the long-term performance of an organization. Organizational capacities focus on factors influencing the collaboration adoption and support innovation as a whole. In order to further characterize collaborative relationships, the role of the different attributes of organizational capacities needs to be further tested.

Moreover, the significance of the diffusion of e-business brings a fundamental shift in business performance. Modern organisations are now relying on the use of e-business initiatives to communicate and collaborate with each other for various business ventures, which signifies the importance of e-business adoption in this study. The attributes of e-business diffusion is based on the five variables from Rogers (1995) concerning the rate of innovation adoption. This research is interested in determining how e-business diffusion influences the implementation and performance of interorganizational collaboration.

However, there is no prior research that has studied each and every dimension at the same time. Based on the above argument, this study will incorporate appropriate

attributes from these dimensions that relate to the research questions. Therefore, in Chapter three, a theoretical research model is developed and discussed, together with the hypothesis and revised attributes according to the pilot study.

Chapter four reviews the research methodology approach for data collection and analysis. The main procedures are qualitative and quantitative data collection methods. The sample selection and questionnaire development processes are then discussed, followed by a discussion on the data analysis technique used in this study.

Chapter five presents the pilot study interviews with the six electrical manufacturers in Wenzhou and the findings from the qualitative data collection, which is the first phase of this study. A summary of the findings are then provided.

Chapter six discusses the empirical findings from the quantitative data analysis gathered through the survey questionnaires. Data analysis and validation of the model are also presented regarding the hypotheses testing and meditation testing. The final chapter (Chapter seven) concludes with a discussion of the findings, conclusions, contributions and limitations of the study.

1.8 Conclusion

While e-business diffusion attributes, trust, and organizational capacities influence on collaboration have been explored by previous studies, there are relatively few studies that particularly concentrate on the joint impact of all these three factors on collaboration and how the interaction among them affects business performance. This study seeks to fill that gap in the literature and enhance the body of knowledge on factors that influence collaboration adoption and performance, specifically by looking at e-collaboration, a system that revolutionises the collaborating process specifically, and collaboration activities as a whole.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

Globalized business takes a holistic perspective on the proactive integration from all business partners (such as suppliers, distributors, buyers, service agencies and so on) in their activities, as well as their e-business systems (Lin et al. 2006). Previous studies have highlighted the importance of collaboration (e.g., Zedtwitz & Gassmann 2002; Wang & Archer 2004). Collaboration considerably facilitates the sharing of knowledge and information and subsequently significantly improves business performance. To become more efficient in competition, collaboration relationships – especially the interorganizational collaboration – are posted as a beneficial means to success (e.g. Singh & Mitchell 1996; Wang & Archer 2004; Fawcett et al. 2008). Especially in view of the recent global economic meltdown, there is increased complexity about how to optimise business resources on a worldwide scale. Hence, the role collaboration plays in business management is not only to facilitate information sharing but more importantly, to enhance business performance.

Literature identifies trust as a critical factor for success in the development of inter-organisational relationships (Luo 2002; Perry, Sengupta & Krapfel, 2002; Ryan et al. 2004). Effective information sharing in collaboration is heavily dependent on trust, which begins within the organisation itself and extends to its collaboration partners (Bowersox et al. 2003). Trust is often seen as an invaluable asset and a fundamental ingredient of any successful relationship (Walker 2004). The consensus is that trust can contribute significantly to the long-term stability of an organization (Ba & Pavlou 2002). Fukuyama (1995) further describes trust as the 'social glue' that holds diversified, global organizational structures together, and a lack of trust between partners could cause failure in those networks or relationships (Creed & Miles 1996; Usoro et al. 2007; Paterson et al. 2008). Therefore, effective collaboration requires a foundation of trust and commitment (Spekman et al. 1998; Simatupang & Sridharan 2004; Simchi-Levi et

al. 2003).

Collaboration encompasses some special characteristics (collaboration elements) and sound organizational capacities are required to manage them properly in order for organizations to succeed (eg. Wong 2008; Brown et al. 2010). When moving from an intraorganizational-oriented to an interorganizational – oriented way of operation, organizations and their collaboration partners will widely benefit from sharing their sound organizational capacities, that is, cross-organisational collaboration (Hafeez et al. 2006; Peng & Woodlock 2011).

The impact of collaboration on business performance largely depends on e-business adoption (e.g. El 2001; Turban et al. 2006). The diffusion of e-business has been the backbone in business performance management which brings about a fundamental shift in the business approach of an organization (e.g. Hafeez et al. 2006; Turban et al. 2006). Modern organisations are now relying on the use of e-business initiatives to communicate and collaborate with each for various business ventures, which signifies the importance of e-business adoption. Therefore, the diffusion of e-business is an important component of effective interorganizational collaboration. Understanding how and to what extent the diffusion of e-business affects the outcome of collaboration performance becomes of paramount importance and merits more structured research.

In fact, these elements and attributes are not really isolated but, rather, are interrelated. Given the context above, the main purpose of this chapter is to provide a comprehensive review of the related literature on interorganizational collaboration in the e-business and trust environments. Business performance measurement (BPM) may support the management of such relationships by helping define and collect the necessary information.

Via a brief review of collaboration literature, a few empirical studies exist, which have investigated the effect of collaboration on business performance, and the role of e-business diffusion posted in their relationship. Moreover, there is a dearth of empirical studies, investigating the two important antecedents of collaboration in the context of business performance management, namely trust and organizational capacities.

Section 2.2 introduces the electric industry in the area of Wenzhou, the research area of this project. Wenzhou's electric industry is highly export-oriented and is following a 'strategy of going global'. Section 2.3 also reviews the motives of the collaboration as well as the challenges and complexities of collaboration at the global level. The literature also displays the complexities on the collaboration definition, elements, and industry practices. Section 2.4 presents a detailed discussion of the importance of the trust underpinning interorganizational collaboration. The impact of organizational capacities is discussed in Section 2.5. Section 2.6 examines the impact of the information technology on collaboration and the role of e-business diffusion in collaboration. Section 2.7 explains the business performance themes and measurements in the content of the present study. Moreover, Section 2.8 analyzes these related theories to integrate the whole variables, such as social-technical theory and interaction theory. The need for revising and developing of new theories is also discussed. Section 2.9 concludes the gaps in the literature, and provides a summary of the observations in the review of this chapter.

2.2 Electrical industry

2.2.1 The development of the electrical industry

Electrical products manufacturers cover low-voltage and high-voltage electrical products, which include 21 major products and 9 sub series. These include dynamos, electromotor, transformers, power generation (wind, solar, nuclear, hydraulic power) and lighting, rectifiers, inductance, insulation conductors, measuring instruments, capacitor, electronic components (fasteners, bolts, socket connectors, instrumentation parts), switch and sockets, electric meters, electric plastic, cables, tubes, fusegear, temperature controllers, electrician tools, electronic devices, pneumatic circuit, compressors, punching mould, other electric machinery and equipments apparatus (YCLCC 2009; ZNNES 20`10).

According to the World Energy Agency (IEA), from 1995 to 2020, the world's electrical

industry expects an investment of $ 33 trillion in funds to support the increase in electrical products worldwide scale (BYF 2006). Shown in the year's statistics, as one of the electrical industry key statistics, this industry shows a dramatic increase from 20% up to 67.88% (2009 – 2011). Particularly, turbine power generation equipment continues to maintain rapid growth with an annual increase of 52.24% (LLM 2011). This is an important and valuable industry in the Chinese manufacturing section.

The unpredictable global market and the remarkable competitiveness from developing countries (such as China, South Korea, and India) challenge the future development of this industry. More brands, scales and specialization are emerging to support this industry's strong pillar, and a great potential for further development exists (ZPPGRC 2005). As American Electric Power Information Institute (UDI) predicted in 2010, although almost half of the current electrical market is occupied by major power giants from Europe and USA (such as ABB from Switzerland, Germany's SIMENES and SCHNEIDER, France's Alstom, America's GE), Asia is becoming an important manufacturing sector, especially in electrical power generation which nearly takes up 45% of new power generation capacity (BYF 2006).

China contributes the majority of manufacturing values of the electrical industry in Asia. The electrical industry, when considered as a single article of trade, is regarded as one of China's largest export earners (ZNNES 2010). In China, the electrical industry forms 6.08% of the total manufacturers and contributes 6.2% of the gross industrial output value in China. Within the industry, more than twelve thousand manufacturers producing electrical products (the designated size is an annual sales income of over 5 million RMB – nearly 0.75 million U.S. dollar) are identified in NBSC 2008. The number of industrial enterprises has risen to 26443 enterprises in 2009 and 32200 in 2010 (NBSC 2010). It means the electrical industry is undergoing a sound development in terms of size and value in China. Research in this industry would contribute a high value to the economic development.

According to the major economic indicators (such as sales, profits, import and export growth of the electrical production), China's electrical industry has gone through a period of restorative development since 2008, achieving approximately 20% growth rate.

There are three main reasons for this. Firstly, the national macro-economic recovery has brought policy continuity and stability, which has provided a favourable macroeconomic environment for the electrical industry; secondly, the promotion from China's electric power re-construction policy facilitates a relatively large investment demand of the electrical industry; and thirdly, the flourishing external demands from the world's economic recovery also boosted the export of electrical products and aided the growth of this industry (ZNNES 2010).

However, the electrical industry is challenged by several uncertainties in its rapid development, researched by several government institutions and industry practices (e.g. ZPPGRC 2005; LLM 2011; SPMP 2011). Firstly, because of the electrical products export trade friction, the global economic situation is not optimistic. Trade barriers in the global market seriously affect the exporting business of China's electrical industry. Secondly, the domestic demand structure of China is not reasonable. Once the economic stimulus policy withdraws, the electrical industry will be negatively affected. Moreover, because of the increased price of silicon, copper and other raw materials, the manufacturing cost of transformer, wire and cable products, small motors and other electrical products has increased by more than 80%. As well as the rising cost of energy prices, transportation and human resources, the total costs of the electrical products are substantially promoted. On the other side, the products prices are hard to improve due to fierce price competition, especially in the low added value and low-end products. Therefore, a considerable number of enterprises are at a loss and facing a serious crisis of survival. The summary of SWOT for China's electrical industry is displayed in the Table 2-1.

Table 2-1: Brief analysis of SWOT for China's electrical industry

Internal	
Strength	Weakness
◆ Productivity capacity ◆ Low cost of operation ◆ Efficiency ◆ Industry expertise	◆ Weak sense of brand and pattern ◆ Lack of R&D and innovation ◆ Deficit in the high-end products ◆ Duplication in manufacturing
External	
Opportunities	Threat
◆ Macro-economic recovery ◆ Infrastructure re-construction investment ◆ Policy ◆ E-business technologies ◆ Industry cluster	◆ Foreign dependency ◆ More brands and scale ◆ Specialization ◆ Cost of resources ◆ trade barriers ◆ price competition

(Source: ZPPGRC 2005; SPMP 2011)

From the above table, the use of Internet and e-business technologies becomes a remarkable focus in this industry's practice, which brings an exceptional opportunity for collaboration and business performance enhancement (SPMP 2011; LLM 2011). Attaching the importance to the role of e-business, especially for small and medium organizations, the benefits not only a reduction in transaction costs, but also the creation of a free and equal competitive environment and more extensively globalized cooperation (Chaffey 2006; Ward & Daniel 2006). For example, electrical organization can utilize the e-commerce website of Alibaba (one of the biggest e-commerce websites in China), win-win network (China) and Quality Supplier (BQS) to access substantial export-import trading information and opportunities and 'Exit Pass' for foreign enterprises. German Federal Association of Purchasing and Logistics (BME) even set up the special 'The Vast, Bo' website to provide access to the Chinese electrical manufacturers for more than 7,000 European organizations (BYF 2006). However, there are limited studies, considering the adoption of e-business in facilitating the collaboration in the area of buy-sell transactions, marketing, product and service research and developments, or distribution in the electrical industry. Business practice

via using the Internet is becoming extremely urgent to solve these problems faced by this industry.

However, Table 2-1 shows that China's electrical industry cannot ignore their critical weaknesses: excessive production capacity on the low-end products with quite common features, but deficit in the high-end products (ZPPGRC 2005; SPMP 2011). A large number of enterprises hold a relatively high foreign dependency and rely on OEM production due to the lack of independent intellectual property rights and independent brands. For example, the China Electrical Equipment Industry Association has recently published a report to demonstrate some cross-linked cable organizations, despite the seriously surplus production capacity of low-end products, and introduced 'Legislation Tower Production' lines from overseas, which results in induplication and waste of money (SPMP 2011). At the same time, the production capacity of these high-end appliance organizations (which includes high voltage cable and special purpose cables) is in deficit.

According to the discussion above, a study about how to improve business performance in this industry would be significant for China's and even the world's economy (ZPPGRC 2005; ZNNES 2010). There are some degrees of past researches focusing on the challenges of productivity, technological innovation, efficiency and cost inside the organization (e.g. Hines, Holwe & Rich 2004; Wong & Cheah 2011). However, in the highly competitive electrical industry, no individual organization can successfully develop large-scale operations to solve these problems in seizing the global electrical market. Organizations require more investigations about how to facilitate the interactions and competitiveness via their external collaborative work.

Furthermore, as learned from Table 2-1, it can be recognized that China's electrical industry is at the low level of the value chain with limited pricing/bargaining power and a shortage in R&D and innovation capacities (ZPPGRC 2005; ZNNES 2010; SPMP 2011). Electrical organizations are tending to collaborate with others to overcome the problems of weak sense of brand strategy, lack of pattern and R&D capacity, and deficiencies in innovation in a shorter time (SPMP 2011). Moreover, Chinese electrical

organizations are under a great pressure to maintain or reduce the cost of their operations (such as human resources, material cost, and other transaction cost) and achieving a higher efficiency (such as deficit rate and response time). In this circumstance, these electrical organizations need to extensively adopt e-business to enhance their capacities in managing this interorganizational collaboration in a close industry cluster to maintain their competitiveness (SPMP 2011). Any change or poor performance among the collaboration network would destroy the profit margin in this industry. This implies that research on how to improve interorganizational capacities in collaboration would not only be appropriate but critical in the context of this industry in China.

The necessity of a research focusing on how to enhance collaboration is because the electrical industry has gradually formed as a worldwide linked industry. Electrical Industry growth is inseparable from world economic growth. Globalization brings innovation to its business model, as well as the industry structure (Ifeng 2011). According to the tendency of global resource optimization, organizations are keen to enhance their specialist area to form their core competitive advantage, and outsource their non-core competitive advantage on a worldwide scale. Some of the manufacturing and assembllt activates are moving to south Asian countries from Europe, and these European and American electrical industries are investing more resources on the R&D (ZNNES 2010). Take the biggest electrical organization – ABB's inverter series – as an example. Their product line covers the high, medium and low voltage products. The R&D center built in Finland, German and U.S. has a certain production line for Direct current velocity modulation drives, inverters and other high-end products. Over 400 series are manufactured and assembled in China. A performance-oriented strategy is established to guide employees and partners in more than 100 countries to work together seamlessly to conduct and deliver benefits for their customers (ABB 2011).

To sum up, according to the characteristics and development situation of the electrical industry (as shown in Table 2-1), it is an ideal industry to study the important role of collaboration for organizations in era of globalization and e-business innovation. Currently, a research gap exists in the examination of the relationships between collaboration and business performance via diffusing e-business in this industry. Most

previous researchers only focused on investigating either one or a very limited set of collaboration (as discussed in Section 2.3). The combined impact from e-business diffusion, trusted relationships and supported organizational capacities on collaboration certainly needs to be explored. Especially, a thorough and holistic investigation is crucial to better understand e-collaboration in organization's business performance.

2.2.2 The unique value of the research in Wenzhou area

In China, different provinces have different focuses on the country's industry development strategy (NBSC 2010). Zhejiang province is the fifth largest total value of import and export by location of Importers/Exporters, after Guangdong, Jiangsu, Shanghai and Beijing (NBSC 2010). The city of Wenzhou is one of three central cities in Zhejiang province and ranked as the second main open city (ZNNES 2010). With an area of 11784 square kilometer, Wenzhou produced 242.429 billion gross region products value in 2008 (NBSC 2008). The attractive value of this city is because it dominates the manufacturing of low-voltage electrical products in China in terms of production and exportation value (compared to other electrical products such as white home electrical appliances). Eighty percent of low-voltage electrical manufacturers are located in Wenzhou area (China Market Yearbook 2008). It is regarded as one of the first groups of fourteen open economic developing cities in China and recognized as one of the Ten Most Energy Cities in China (ZNNES 2010). The electric is a blooming economic developing area regarded as a 'low-voltage electrical industry cluster'.

For example, one main electrical market in Wenzhou is Yueqing Liushi Electrical City Wall, which contained 927 stalls of stalls and produced $166 million annual transaction value in 2009 (Wenzhou Statistical Office 2009). The Trade Association of Electrical Industry in China is located in Wenzhou and the 'China Electrical Cultural Festival – Global Electrical Products Expo' is held in Yueqing, Wenzhou every February. Moreover, four organizations (CHIT, Maige, Wankong, Gonggu) are invited to draft ten national standards, such as the General Specification for Low-Voltage Cabinet, Electrical Safety Guideline, etc. The industrial output of Wenzhou Electrical industry is expected to break through 100 billion RMB (nearly 16 billion dollar) in 2012.

As pointed out by ZNNES (2010), following the policy 'strategy of going global', Wenzhou electrical organizations have achieved positive results by actively developing the overseas markets. In 2007, more than 75% of organizations in Wenzhou now collaborating with global businesses, achieving export income of approximately 5 billion RMB (nearly 0.75 billion dollar) (Zhao 2008). In 2010, 8395 Wenzhou organizations obtained independent export licenses and established trade relationship with 201 countries and regions. 43 new institutions were approved to enter the global market with 145 million dollar investment (a 95.9% increase rate).

Like other industries, electrical product manufacturers receive products from or supply products to other organizations, either within or outside China. One of the respectable values in Wenzhou business culture is collaboration, which has formed thousands of professional markets around the world (Wenzhou Statistical Office 2009). The Wenzhou Electrical Industry has established a large market size, a long industrial chain, wide applications, and fast technological updates. The 'Wenzhou Electrical industrial transformation and upgrading program' prepared by Wenzhou City Economic and Trade Commission has implied the confidence to create a 'Global Electric City'.

However, since 2008, China has been confronted with an extremely complicated and varied macro-environment (e.g. the global financial crisis). There appeared a negative increase rate in the straightforward product export in Wenzhou for the first time in the last two decades in 2009 (ZNNES 2010). In 2010, the total exports volume was 10.936 billion RMB (nearly 1.684 billion dollar) (a decrease of 5.1%), the foreign investment actually used was 234 million RMB (nearly 36 million dollar) (down by 10.4% in line with last year), and the dependence level on foreign trade was 35.9%. The Wenzhou's export-oriented economy was highly challenged in this so called 'post-financial crisis period' (Wenzhou Statistical Office 2009).

To upgrade the economic structure in Wenzhou, the Central Policy Research Office of Zhejiang Province issued a specific guideline for 'Wenzhou model' development, which highly emphasized the leading role of business structure transformation in economic development, stressed industry cluster development, highlighted innovation orientation

in practice and underlined e-business and e-network in business innovation (Zhejiang Government 2009). Moreover, in 2009, the export of high-tech products hit 330 million U.S. dollars, an increase of 28.2% (Wenzhou Statistical Office 2009). From these foreign trade data, a new tendency can be illustrated that, although the sole labor-intensive product is still dominant in this industry, Wenzhou organizations are trying to upgrade the business model and 'competitive advantage revolution' in this industry. One interesting occurrence is that the manufacturers are displaying more interest in collaborating with outside organizations through adopting the Internet and e-business technologies in establishing these interorganizational partnerships (Zhejiang Government 2009).

Similar to other sections of industry in China, because of the high level of specialization but low position in the global product manufacturing chain, Wenzhou electrical organizations have to keep a high level of flexibility to match the changed orders overnight. Enhanced interaction among the collaboration network or e-collaboration network is extremely importance. Therefore, the research conducted in Wenzhou's electrical organizations would provide a representative and valuable perspective for the electrical industry analysis in China, and also for other globalized industries.

To sum up, this study focuses on the electrical industry in Wenzhou area and there are several reasons for this particular interest:

(a) China has more than thirty thousand manufacturers producing electrical products (the designated size is an annual sales income of over 5 million RMB (nearly 0.75 million U.S. dollar) (NBSC 2010).

(b) 80% of the electrical manufacturers are located in Wenzhou area (China Market Yearbook 2008).

(c) After fifty years of development, Wenzhou's electrical industry has fostered a well-rounded electrical industry cluster, equipped with a collaborative supply chain (ZPPGRC 2005). In the early years, the relative abundance of electrical products and their low price challenged the traditional Wenzhou's export-oriented economy.

(d) By following the culture of collaboration, Wenzhou has benefited from the export-oriented economy and actively participated in global markets. However, the drawbacks from these labor-intensive products evoke a competitive advantage in innovation and revolution, covering the field of marketing, R&D, distribution, etc. Most importantly, the e-collaboration with domestic or overseas organizations is highlighted in these business innovations.

2.3 Recognition of collaboration

The successful organization will be one who is good at collaboration in the global market (Thomas 2005), because businesses in every industry are complex and success is difficult to achieve without collaboration – either within firm or across firm boundaries. Under the competitive pressures in a flat world, one rule is to improve the business performance by exploring potential capabilities from business trading partners, customers and employees, rather than building a roadblock (Thomas 2005).

When the inter-organizational networks have been linked to a faster subsequent growth, organizations start to learn about their prospective partners as well as how to collaborate with them (Hill & Hellriegel 1994; Powell et al. 1996). Collaboration occurs when two or more organizations have made efforts to achieve results that they cannot achieve separately, and these synergistic efforts often result in innovations that benefit all partners (Wang & Archer 2004). Scholars in the innovation and interorganizational learning literatures have argued that collaboration networks are the key vehicles for several distinct kinds of network benefits. Generally, an interorganizational collaboration relationship would be developed to secure the sharing of brand names, a manufacturing process, a new technology or marketing assets (Singh & Mitchell 1996). Moreover, Chipika & Wilson (2005) also pointed out the networks with customers are as important as networks with enterprises, especially in product improvement or new product design.

One key limitation is that partners may be unwilling to commit to a long-term

relationship when they consider all of the potential costs and disadvantages. To manage these tensions, organizations need qualified capabilities to direct them toward greater collaboration and to permit the partners to hold together. Wilson (1995) characterizes collaboration as the element that inter-relates variables with collaboration relationships.

In the collaboration relationship, partners are highly interdependent, and as shown in Table 2-2, collaboration requires a high level of trust. These partners will enjoy the innovations and the benefits of shared resources from those synergistic efforts (Zedtwitz & Gassmann 2002) and in turn, result in greater value than solitary efforts (Simatupang & Sridharan 2002; Simatupang & Sridharan 2004).

Table 2-2: A comparison of cooperation and collaboration

	Cooperation	Collaboration
Resource sharing	No, full independent autonomy	Yes, new structure organized
Mutuality of goals	Not clear	Sharing of mutual goals
Trust	Low, with definitive agreements	High, with relational contracts
Commitment	Low	High

Source: Wang & Archer (2004)

Overall, collaboration is characterised by sharing information, knowledge, risk and profits in collaboration, especially supply chain collaboration (SCC) (Mentzer 2001). Lack of the understanding of the collaboration structure and elements is considered the main cause of failure in collaborative initiatives (Busi & Bititci 2006). For this reason, it is necessary to further the understanding of the main elements of collaboration and how they can be integrated within an interorganizational collaboration network. However, influences from environment, organization changes and technology development would affect the performance of collaboration. A review of the interorganizational relationships should be performed with the aim of analysing in depth all the elements that have to be considered for characterising and measuring such collaboration. Therefore, a research model should be structured to consider these influencing factors, such as the attributes from trust in the organizational collaboration environment, the organizational capacities from the interorganizational management capacity or e-business innovation from technology revolution in business.

2.3.1 Collaboration elements

There are a number of elements of B2B collaboration (Spekman & Carraway 2006), as briefly shown in Table 2-3. The elements of interdependence were initially introduced to collaboration from the social relationships concept by Fiske (1990) in the beginning. Wilson (1995) indicated that collaboration would be affected by variables from interorganizational environments and relationships management. The interaction of the collaboration in interorganizational activities generally consists of three variables – communication (information exchanges), coordination (aligned scheduling and activities) and collaboration (shared objects, goals and responsibilities).

Moreover, the collaboration work has been developed from the focus of the interdependent resources exchanges (Fiske 1990; Singh & Mitchell 1996) to the enhancement of interaction in interorganizational relationship network (Brown et al. 2010) and the synergistic efforts interrelated within interorganizational environments (Zedtwitz & Gassmann 2002; Simatupang & Sridharan 2005). Bowersox et al. (2003) purported that sustaining cross-enterprise collaboration would be affected by the different levels of processes (strategic, tactical and operational), competencies (communication and commitment) and capabilities (leadership, planning and control).

Additionally, Mohr & Spekman (1996) added commitment and trust, as well as coordination, to the elements of collaboration. They also studied the importance of the role of communication (participation and communication quality) in contributing to the successful collaboration. In recent research, more focus is directed to networked collaboration with the assistance of e-technologies (e.g Azadegan &Teich 2010; Varda, Shoup & Miller 2012). In any case, the deeper the relationship becomes, the more potential benefits organizations can achieve (Matopoulos et al. 2007).

Burgess & Singh (2006) and Fawcett et al. (2008) pointed out that the interorganizational relationships could be related to technological and structures (hard elements), as well as the social and behavioural (soft elements) aspects. From the statistical perspective, effective governance and leadership practices are accomplished by organizational board of directors' participants, who are invisible in supervising the

strategic relationships, financial status, strategic goals, and other management and operations processes (Danese 2006; Westphal et al. 2007). Additionally, the strength of collaboration involves the dependence upon the capacities to process and supports those activities. Therefore, when these organizational capacities are more effective, the organization will establish a more strengthened collaboration (e.g. Spekman 1988; Hartono & Holsapple 2004).

Table 2-3: Brief conception review of collaboration framework

1990	Fiske	Interdependence and the social relationships theory; communication, coordination
1995	Wilson	Inter-relate variables within interorganizational environments
1996	Mohr & Spekman	Relationship attributes (commitment and trust)
	Singh & Mitchell	The sharing of brand names, a manufacturing process, a new technology or marketing assets
2000	Anthony	Exchanging common planning, management, execution and performance measurement information
	Boddy et al.	Symmetry of investments, profits and rewards
2001	Mentzer	Characterized by sharing knowledge, information, profits and risk
2002	Zedtwitz & Gassmann	Synergistic efforts
	Mclaren et al.	Partnerships and network design
2003	Bowersox et al.	Commitment of human, financial or technical resources; processes, competencies and capabilities
2005	Simatupang & Sridharan	Behavioral aspects, such as trust, commitment, interdependence and mutual involvement
2007	Bititci et al.	Five connected features: information sharing, decision synchronization, incentive alignment, integrated processes and collaborative performance system
2009	Mun et al.	Goal-oriented trust evaluation model in the virtual enterprise
2010	Azadegan &Teich	E-technologies and virtualized collaboration
2011	NAS	Access to Internet, globalization, mobility of information, innovation, people
2012	Varda, Shoup & Miller	Network structure, management strategies, outcomes of collaboration

From the process perspective, collaboration can be generally found in every business area: input side, internal side and output side of an organization; on the contrary, some researchers have preferred to divide the depth of collaboration into three levels: strategic/ tactical, operational and management levels (Boddy et al. 2000; Barrat 2004). Sabath and Fontanella (2002) identified the strategic value of collaboration relationships. Collaboration is differentiated as horizontal and vertical linkages in an organization's trading channels, and Lawrence & Puranam (2005) also put technical linkages between organizations in the same industry. Moreover, Danese (2006) exposed collaboration based on the maturity of planning, forecasting and replenishment (CPFR) processes, ICT/IT (Information and Communication Technology/ Information Technology) and coordination mechanisms. In most cases, buyers and sellers have different comfort levels and seek varying degrees of collaboration (Wang & Archer 2004; Spekman & Carraway 2006).

The engagement in different collaboration levels depends on the specific environment in which collaboration is embedded, such as the people, processes, organizational structure, technology, trust, culture and resources developed by Boddy et al. (2000) and Lockamy & McCormack (2004). Besides commitment and mutual trust, Birnbirg (1998) and Spekman et al. (1998) pointed out the extent uncertainty, information sharing, Information and Communication Technology (ICT) infrastructure, and the symmetry of rewards would also affect the interorganizational relationships. Handfield and Bechtel (2004) explored the role that the economy situation, power disciplines and dependency also play as environment influencers in these relationships. Researches on supply chain collaboration performed by Gabel & Pilnick (2002), Zaklad et al. (2004) and NAS (2011) also mentioned that 50% of the supply chain performance depended on human factors, 30% is assessed by process, and cultural factors were considered as a powerful driver in business relationships.

Strategic joint decision-making requires the commitment of technical resources and humans to build and maintain a new or more competitive collaboration model with controlled risks (Brown et al. 2010). Those elements of risk management aim to enhance collaboration via minimizing the risks (Chipika &Wilson 2005). When the

competence of partners is integrated, relevant risks along the innovation process can be minimized. For example, as the research undertaken by Narula (2004) in European electronics hardware-based sector showed, SEMs are more actively involved in R&D partnerships than large organizations, but on the other side, SEMs are more cautious when choosing partners because they do not have abundant resources to overcome unsuccessful projects. From the literature on business management, the tolerance level of risks or uncertainty would be raised with the enhanced mutual trust from interaction (e.g. Birnbirg 1998; Goo & Huang 2008). The consideration of the risk management ascertains the spirit of collaboration, thus facilitating business performance, which requires appropriate behaviours (such as open communication, acceptance of influence, forbearance from opportunism, etc.) (Simatupang & Sridharan 2004; Walker 2004).

Despite the main benefits of collaborative relationships, collaboration would still fail when these collaboration elements are not properly managed (Bititci et al. 2002). According to Lockamy & McCormack (2004) and Danese (2006), organizational structure, coordination mechanisms (such as collaborative planning, forecasting and replenishment (CPFR) process), organizational capacities and trust would affect the performance of collaboration. The designing of collaborative systems need to proceed with reliable collaborative elements and their environments. A brief conclusion of collaborative elements and the corresponding pictorial representation is presented in Table 2-4. In this research, the selection of these attributes will be revised from the pilot study, as described in Chapter 5.

Table 2-4 : A review of collaborative elements

Category	Elements	References
Strategy	Strategic Value	Wilson (1995), Lorenzoni & Lipparini (1999), Brewer & Speh (2000), Sabath & Fontanella (2002), Bowersox et al. (2003), Barratt (2004), Bititci et al. (2005) , Angerhofer & Angelides (2006), Alfaro et al. (2007), Gruat La Forme et al. (2007), Westphal et al. (2007), Varda et al. (2012)
	Goal Congruence	Wilson (1995), Scheff & Kotler (1996), Jassawalla & Sashittal (1998), Brewer & Speh (2000), Chan & Qi (2003), Mun et al. (2009)
	Culture Congruence	Roberts & Bradley (1991), Gray a& wood (1991), Boddy et al. (2000), Barratt (2004), Folan & Browne (2005), Burgess & Singh (2006), Bititci et al. (2007)
Processes	Leadership, Planning, Governance, Control,	Gray (1989), Gray & wood (1991), Boddy et al. (2000), Gunasekaran et al. (2001), Chan & Qi (2003), Kaplan & Norton (2004), Lockamy & McCormack (2004), Simatupang & Sridharan (2004); Folan & Browne (2005) ,Bititci et al. (2005) , Angerhofer & Angelides (2006) , Danese (2006), Burgess & Singh (2006), Gruat La Forme et al. (2007), Alfaro et al. (2007), Westphal et al. (2007)
Structure	Function and Infrastructure	Spekman (1988), Gray & wood (1991), Roberts & Bradley (1991), Scheff & Kotler (1996), Jassamalla & Sashittal (1998), Gulati & Gargiuto (1999), Phillips, Lawrance & Hardy (2000), Boddy et al. (2000), Chan & Qi (2003), Lockamy & McCormack (2004), Hartono & Holsapple (2004), Bititci et al. (2005), Gaiardelli et al. (2007)
Competence	Commitment,	Wilson (1995), Spekman et al. (1998), Birnbirg (1998), Brewer & Speh (2000), Gruat La Forme et al. (2007)
	Interdependence	Fiske (1990), Wilson (1995), H&field & Bechtel (2004), Matopoulos et al. (2007), Bititci et al. (2007)
	Coordination	Jassawalla & Sashittal (1998), Poltrock & Handel (2010)
	Trust	Wilson (1995), Spekman et al. (1998), Birnbirg (1998), Boddy et al. (2000) ,Brewer & Speh (2000), Chan & Qi (2003), Wang & Archer (2004), Handfield & Bechtel (2004), Lockamy & McCormack (2004), Kaplan & Norton (2004), Alfaro et al. (2007) ,Gruat La Forme et al. (2007), Matopoulos et al. (2007)

	Resources Sharing	Kogut &Zander (1992), Powell-Koput & Smith-Doerr (1996), Madhok (1997), Holsapple & Singh (2000), Zedtwitz & Gassmann (200bhv2), Hartono & Holsapple (2004), Bowersox et al. (2003);Rycroft & Kash (2004), Chiffoleau (2005), Kodama (2005)
	e-Technologies (ICT ,IS, and other e-business technologies)	Wilson (1995), Szulanski (1996), Spekman et al. (1998), Boddy et al. (2000), Zedtwitz & Gassmann (2002), Sabath & Fontanella (2002), Bowersox et al. (2003), Barratt (2004), Angerhofer & Angelides (2006) , Danese (2006), Gruat La Forme et al. (2007), Azadegan &Teich (2010), Varda et al. (2012)
	Risk Management	Birnbirg (1998), Gulati & Gargiulo (1999), Handfield & Bechtel (2004), Narula (2004), Chipika &Wilson (2005), Matopoulos et al. (2007), Varda et al. (2012)
	Knowledge and Information Sharing	Kogut &Zander (1992), Powell-Koput & Smith-Doerr (1996), Spekman et al. (1998), Jassawalla & Sashittal (1998), Brewer & Speh (2000), Gunasekaran et al. (2001), Zedtwitz & Gassmann (2002), Bowersox et al. (2003), Chan & Qi (2003) , Rycroft & Kash (2004), Chiffoleau (2005), Kodama (2005), Gruat La Forme et al. (2007), NAS (2011)

Although collaboration has obtained increasing popularity, previous researches tended to measure the degree to which an organization collaborates with its partners in a supply chain (e.g. Simatupang & Sridharan 2004; Danese 2006; NAS 2011), but there is limited attention to measuring the degree or to what extent these collaboration elements affect the business performance improvement. Moreover, although a few pioneering studies have investigated network structure from the perspective of innovation generation (Shan, Walker & Kogut 1994; Podolny & Stuart 1995; Powell et al. 1996), the specific and systemic analysis of the effects of the dynamic collaboration behaviours within an interorganizational network on business performance still remain unclear.

2.3.2 Complexities of collaboration

Globalization has been one of the three main economic drivers in China Development Policy since 1984. The Chinese manufacturing industry recognizes the increasing importance of collaboration and aims to gain competitive advantages through collaboration with domestic and overseas organizations (World Bank 2006; Newell et al. 2009). China has become the second most attractive country for foreign investment and has the third largest FDI in the world (UNCTAD 2008). On the other side, China has become the first largest overseas investment country of developing nations with an average annual growth rate of 54% (UNCTAD 2008). Globalized collaboration has posed an undeniable contribution to the local economy (Wang & Yu 2006; Sun 2006; Dong 2007).

As emphasized by the President of China Mr. Hu Jingtao in the G20 summits in TORONTO, Canada in 2010, China should build up competitiveness through accelerating global industrial transfer, following a further globalization by advanced information technologies, creating a fair climate for the growth of the world economy, enhancing its innovative ability and trying its best to achieve mutual benefits and a win-win result from world-wide collaboration. Complications from these changes and opportunities, and the significance of global cooperation and collaboration are the main issue now facing China (Lau et al. 2001; Wong 2008; Wu 2010).

In the era of globalization, studies have showed that collaboration goes through three

stages (Pearce & Singh 1999; Pearce & Papanastassiou 1999). In the first stage, organizations promote their products to the global market. Collaboration allows partners to adjust their products to match the market preferences. In the second stage, organizations innovate new product R&D by collaborating with local or overseas organizations, for the purpose of maintaining product competitiveness. Relevant business functions and organizational capacities will be established during this stage. The third stage concentrates on long-term development strategy, where organizations want to update their core competitive advantage by collaborating with highly successful organizations.

Generally, the literatures has recognized three main drivers for businesses changing to globalized collaboration and flexible internal structures. Firstly, the liberalization and globalization prompts the venture in diversified markets, which spurs the emergence of multi-national alliances (Ciborra 1992; Ireland et al. 2002). Organizations, such as Procter & Gamble and Hewlett-Packard, have worked closely with their partners and captured the advantage of collaboration to enhance revenue, reduce cost, and improve operational flexibility to cope with high demand uncertainties (Lee et al. 1997; Callioni & Billington 2001). Currently, in pursuing shorter product life-cycles, flexible logistics and distribution time, and higher marketing/promoting force, organizations constantly pressure the changes in these multi-partner collaboration programs. Subsequently, the ways organizations organize their business have changed from traditional internal structures to more flexible, responsive and open work setups (Riemer, Steinfield & Vogel 2009).

In reality, the tightening business environment both at local and overseas pushes the Chinese industry to face the trends of cost-reduction, differentiation, diversity, fast rate of change, focus of quality, customers' needs and so on (World Bank 2006; Locker 2008). In particular, the electrical industry needs to face these critical shortcomings including the problems of low quality, simplified products, high row materials prices, low technological content, duplicated production, unfavourable export policy and weak global economy (Zhang 2008). Electrical manufacturers are expecting a vast innovative improvement inside the industry (Wang 2007). One study on the electronics hardware-based sector in Europe found small and medium size organizations (SMEs) utilize nearly twice as much of their R&D expenditure from collaborating partners than

large organizations (Narula 2004). SMEs tend to be more cautious in selecting partners because of the limited resources to overcome unsuccessful project.

The way of value creation in an organization has been fundamentally changed according to the globally expanded markets (Bleecker 1994). Gerybadaze and Roger (1999) also affirmed that traditional collaboration is primarily about the transfer of information, new knowledge, or new techniques from domestic organizations to outside or even overseas trading partners. For many industries, for example, suppliers are regarded as valuable partners who not only play the role of straightforward providers of goods but also as new product or process developers (Riemer et al. 2009). In review of the challenges from globalization, the new practice is aiming to organize the participating members to form an innovative network in a globalized supply chain (Gerybadaze & Roger 1999; Barratt & Oliveira 2001; Simatupang & Sridharan 2004). As also shown in the Table 2-1, synergy e-business networks with trading partners would play an important role in bringing opportunities for competitive advantage development in China. Therefore, the discussion of collaboration elements with corresponding e-business innovation could be an important perspective for furthering the collaboration study in the era of globalization (Zheng 2006; Verdechoa et al. 2009).

2.4 E-business diffusion

There is a tendency that collaborating business partners try to keep pace with the increasing diversity of business operations by launching ICT or e-business technologies (such as the ‘collaborative business solutions’ from SAP) (Ratnasingam 2004). The different geographical sites and organizational backgrounds in dispersed setups require an adoption of Internet technology and e-business technologies in intra-corporate and inter-corporate transactions (Riemer et al. 2009). When trading partners are involved in interorganizational relationships, e-business certainly is a critical capability facilitating collaboration (Chaffey 2002). It helps reconcile the interconnectivity linking the external and internal to support decision processes and transactions across organization boundaries (Spekman & Carraway 2006). Hence, e-enabled collaboration is a field in motion (Ratnasingam 2004).

With the growing interest in using e-business technologies in small and medium businesses, it is expected that organizations, especially those having business across the globe, will become more dependent on information technologies and their adoption and implementation. The extant literature on electronic business contributes significantly to the understanding of e-collaboration. E-collaboration is an interaction working with outside and inside partners, which provides more intensive information and opportunities than traditional collaboration (Chaffey 2002). To diffuse e-business for an e-enabled collaboration is an attractive example of innovation which causes radical changes in the structure and functions of an organisation's activities. The foregoing discussion reinforces the importance of e-business diffusion as an essential tool for facilitating collaboration. An analysis of theoretical models for the adoption of new technologies or innovation would be valuable to better assess the impact of the characteristics of these technologies on business performance.

2.4.1 Development of e-business and e-collaboration

E-collaboration is the utilization of e-business technologies to collaborate researching, planning, designing, developing and managing products or services crossing organizational boundaries (Moenaert et al. 2000; Turban et al. 2006). It represents a dynamic networking alliance to permit information-sharing, gather resources and capture changing market opportunities via using innovative e-business technology (Yang & Lin 2008).

E-collaborations have a significant effect on the manufacturer's value chain rather than supply chain partners only, particularly for multinational organizations (Worthington & Boyes 2001; Vaidya 2009). These timesaving technologies for directing an interactive working gain rich information and facilitate quick collaborative decision-making (Turban et al. 2006). Besides the e-business technologies and applications, interactive networking in the manufacturing industry requires supports from internal and external processes, which contain various information technologies focusing on redesigning user–centred e-business processes and smoothing organisational changes (Turban et al. 2006). E-collaboration facilitates innovation in terms of information collection and information processing because innovation is often regarded as an information-intensive

activity.

Via the assistance of e-business, these activities of target markets management, resource allocation, R&D, logistics and customer communications can be arranged by these trading partners to gain competitive advantages (Turban et al. 2006). For instance, an e-marketplace with statistical software enables organizations to set a better customer segment and target. E-enabled customer services management could record customer visits, allow employees to access information on a centralized database (such as the customer's history records and product descriptions), respond to customer requests in real time, and produce an automated account management of the sales process without the limitation of space and time (such as Sales force automation (SFA), e-Payment and e-Billing systems). Moreover, a back-desk system will also analyze those customer records to establish their preferences and specific requests, which enables the manufacturing industry to polish marketing policy and offer customized services. The raised satisfaction of customers' online experiences from improved e-marketing techniques would assist organizations to catch customers' unique value and loyalty, and enhance competitive advantage.

2.4.2 E-business as innovation

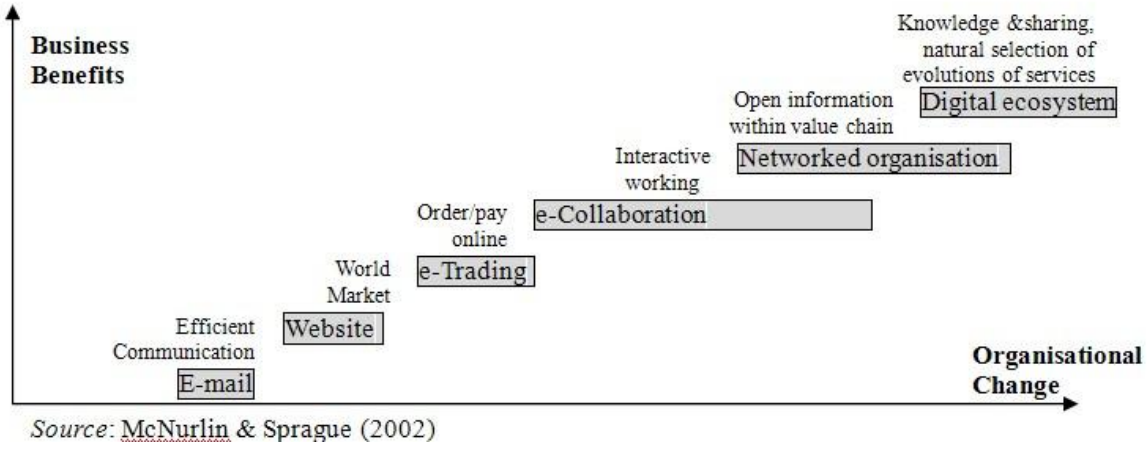
The most agreeable definition of e-business is from Chaffey (2002) who believes that e-business is an outcome of technique innovation enhancing a wide range of business interactions and bringing potential values of improvement in business performance. IBM regards e-business as the utilization of Internet technologies to promote the transformation in business processes (IBM 2010). The main sectors of adopting e-business in the manufacturing industry will typically concentrate on Business-to-Business (B2B) transactions and, accordingly, support processes (Trienekens et al. 2008). These information communication technologies typically cover the network integration of front-end system and back-end processing systems.

Gottschalk (2006) drew a map of e-business technologies according to the business functions. Website Local Area Networking (LAN), and Valuated Network (VAN) are helpful to build up the e-business infrastructure; Enterprise Resource Planning (ERP)

optimizes the material flow, information flow and capital flow; European Article Numbering (EAN), Bar-coding Reading (BCR), Universal Product Code (UPC) Radio Frequency Identification (RFID), Electronic data interchange (EDI), Supply Chain Management (SCM) facilitate the procurement and logistics process (Svensson 2000; Kwon & Suh 2005; Paik & Bagchi 2007; Mohtadi 2008).

McNurlin & Sprague (2002) described six adoption ladders of e-business technological innovation, which represent the evolutionary process from defusing e-business innovation, as shown in Figure 2-1. E-mail and websites are the two easiest and most flexible online technologies, which can provide organizations a global-connected platform at relatively low cost. E-trading solutions facilitate an efficient order operating process. Higher levels of e-business adoption present organizations with the opportniity to develop into e-collaborated and networked organisations where information can be shared and integrated within the value chain (McNurlin & Sprague 2002). A digital ecosystem is the ultimate stage for a natural selection of evolution of services. Actually, the last three stages imply the importance of collaboration with an increasing business benefit, which emphasises an open information and knowledge sharing through interactive working.

Figure 2-1: E-business technologies adoption ladder



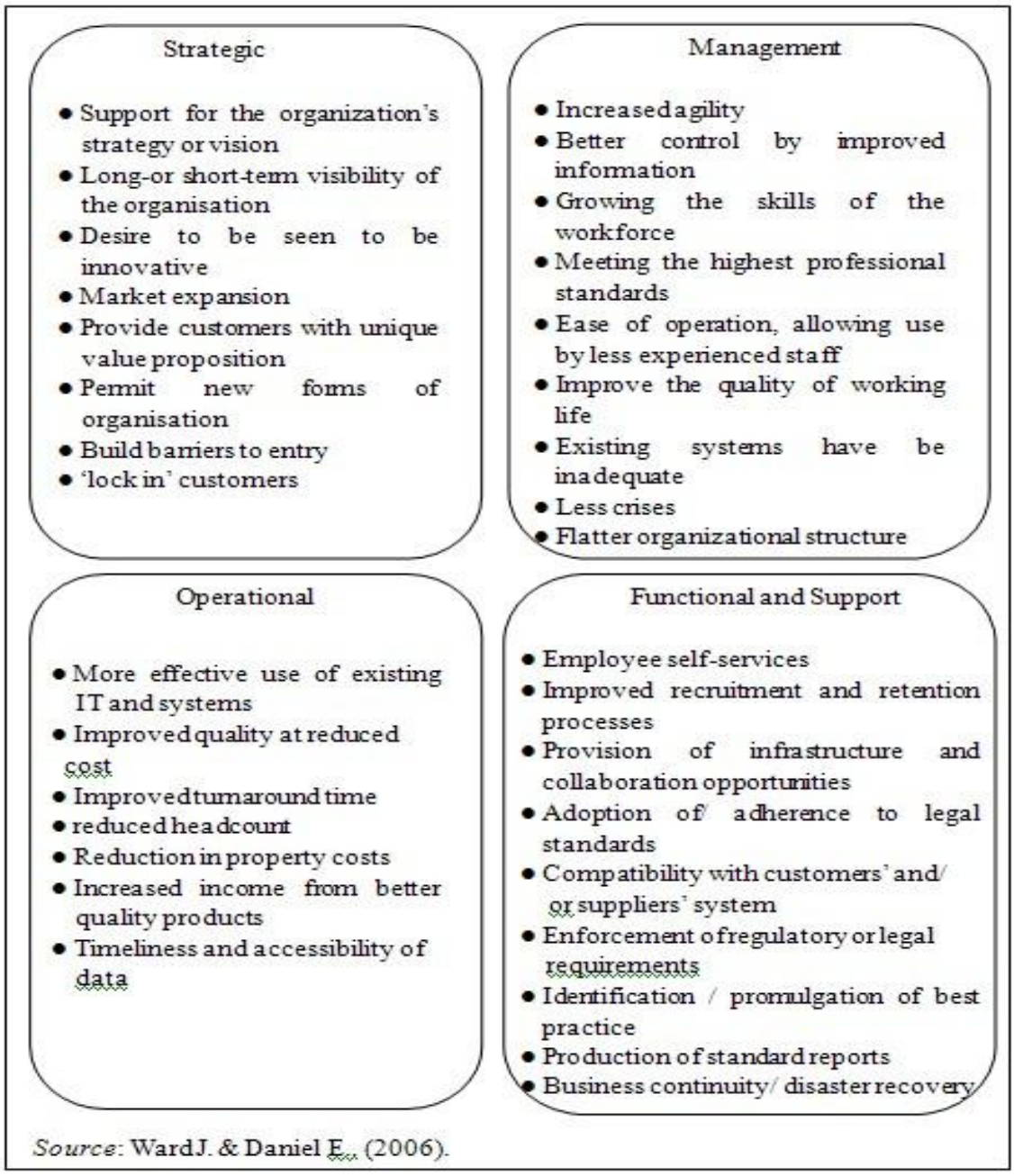
Source: McNurlin & Sprague (2002)

Moreover, e-business technologies create opportunities for accessing global markets (Ian et al. 2004). Albert and Sanders (2003) took on-line communications tools as a potential way to grasp large audiences and expand the brand worldwide without any cost to organizations. However, Deitel et al. (2001) showed that it cannot be denied that

people will ignore these numerous banners, e-mails or other advertisements online when they are treated as valueless for them. For example, a well-designed, functional, user-friendly website can carry out a wide range of marketing functions intelligently. With the development of the Web, PDA and WAP phones, those self-servic channels can result in organizations' products or services being automatically captured by customers (Turban et al. 2006).

Ward and Daniel (2006) categorized those e-business benefits into the operational, management, strategic and functional and support sectors of an organisation, as shown in Figure 2-2 below. E-business enables the organizations to use minimal capital to support the core business activities.

Figure 2-2: General benefits from e-business



For example, an effective utilisation of e-business technologies in internal operation can improve staff productivity, speed up work processing, upgrade the business turnaround time but reduce headcount. At the same time, service quality and accuracy would be improved. From the perspective of strategy, e-logistics and supply chain e-business platform improves the ability of agility in organisations with reduced costs and increased efficiency and, more importantly, it looks after long-term relationships with business partners (MacDuffie & Helper 2003; Galloway & Mochries 2005). For functional and business support reasons, for example, self-service applications

contribute to a quick customer response time and relieve specialist staff from repetitive enquiries. Accordingly, the following overhead experience will be lessened (Chaffey 2006).

Besides the tangible benefits such as cost reduction and improved business efficiency improving, various studies emphasise the intangible outcomes, such as customer relationships and customer loyalty. Research conducted by Reicheld and Schefter (2000) showed that online tools can keep 5 percent of customers' loyalty, and their profit contribution would be boosted from 25 percent to as much as 95 percent. Additionally, there are various cost-effective online e-business technologies that can be widely used for accelerating brand awareness and customer loyalty for the manufacturing industry (Chaffey 2006). Online shared workspace, Asynchronous communication tools (e-mail, corporate blogs, forum, etc.), Synchronous communication tools (instant messaging, virtual white boarding, e-conferencing, VOIP, et al.), Customer Relationship Management System (CRM), Customer Database, E-marketing technologies, E-trading and e-procurement system can support customized marketing, facilitate trading procedures and strengthen relationships (Chaffey 2006; Turban et al. 2006).

In addition, via the utilisation of interactive web technologies and analysis technologies, Chaffey et al. (2006) mentioned that the investments in e-customer services, online communication, online customer relationships and e-marketing functions are accelerating profitability of manufacturing industry. These e-business technologies support promotional activities such as search engine marketing, permission-based (opt-in) e-mail marketing, interactive advertising, direct marketing, online public relationship and partnerships management, and viral marketing (Currie 2004; Smith & Chaffey 2005). Each online communication technique has its benefits and drawbacks, as shown in Table 2-5 below:

Table 2-5: The chief benefits and drawbacks of online communication technologies

	Benefits	Drawbacks
search engine marketing	Easily , free or paid, popular used	Loose control, less competitive
Permission (e-Mail) Marketing	A directly push marketing	Need to purchase e-mail lists
Interactive Advertising	Rich media	Advertisements blindness
Online PR	Relatively low cost	Time-consuming
Partnerships	Cost--effective	Indirectly to sale
Viral Marketing	Creative media to grasp large audiences potentially	Loose control of the target customer

Source: Chaffey, D., (2006)

2.4.3 The need for theoretical support to e-business innovation

Regardless of the burst of the dot-com disputation, e-business is an overwhelming technology extensively adopted in improving organizations' operational efficiency by integrating e-business into their business models (Hafeez et al. 2006). The main barriers of e-business adoption in the business-to-business (B2B) e-marketplace are the poor telecommunications infrastructure (Huggins & Izushi 2002) and a comparatively inadequate understanding of the potential benefits of the e-business infrastructure such as information and communication technology skills and expertise (Ramsay et al. 2003; Chaffey 2006). Smith and Chaffey (2005) believe there are still a range of promotion and e-business management issues that should be considered by the manufacturing industry, such as how to widely reach the target market and customers, and how to improve the richness (the depth) of the information to customers and from customers, for effective e-marketing activities.

As Mauborgne and Kim mentioned (2005) the value of innovation from e-business is not the same as information technology innovation. E-business technologies emerged to evoke evolution in the novel ways of business process, or even redesign the collaborative process (Porter 2001). Currie (2004) pointed out e-business should be engaged with a business pattern innovation, not only a technical solution. As developed from Linstone' TOP framework (Mitroff & Linstone 1993), Kay et al. (2007) discussed the relationships of TOP model in e-business diffusion capability with business performance, which are 'technological', 'organisational' and 'people'. They emphasized

the focus on the three dimensions should be integrated and managed within and outside an organization in order to achieve full business integration of disparate operation functions.

Furthermore, Austin and Nolan (2000) believed business intelligence management should be seen as another important aspect. In the dramatic information swarming time, Turban et al. (2006) regarded knowledge management (KM) as another innovative model in e-business adoption. A sound e-business adoption capability involves relative knowledge, positive attitudes, competitive strategies, qualified technologies and skills to fulfil its roles and relationships and optimize resources allocation via collaborating with intra-and inter-corporate partners (Turban et al. 2006).

Additionally, some literatures regard e-business capability as a 'readiness' of the organisation in possessing suitable technology, knowledge, skills and attitudes to support e-business operations (Hafeez et al. 2006), which is also emphasized by the interorganizational collaboration capability. The re-engineered relationships among these e-enabled business partners require efficient e-business capability for implementation (Daniel 2003). In both SMEs and large enterprises, e-enabled or internet-enabled capability is required to distribute products and organizational information, administer inventories via electronic transactions (e.g. EDI) with suppliers and to strengthen online connection with customers with quick-response services (Barua and Mukhopadhyay 2000; Martinsons & Martinsons 2002). E-business capability (EBC) includes the factors of business strategy, supply chain strategy and e-business adoption (Kay, Khalid & Siau 2007), which is further beyond the buying and selling skills via Internet (Turban et al. 2006).

By integrating powerful e-business technologies into overall strategy, e-business adoption capability will become an equally powerful force for competitive advantage (Hafeez et al. 2006). E-business and thus e-collaboration, as explained above, is the utilization of an internet-based inter-organisational information system via a value-added network, which is expected to support information exchange, communication and transaction.

Overall, the manufacturing industry need not necessary adopt all of those technologies, but, according to the scenario of particular business requirements (Albert & Sanders

2003). The most important point is those e-business technologies should be appropriately applied, together with properly interorganizational communication and relationship management, to maintain an online dialogue between manufacturing industries and existing customers and business partners over time.

E-collaboration is a reference to collaboration between businesses (B2B) via e-business technologies. Therefore, e-collaboration can be treated as innovation requiring diffusion and adoption. However, the speed of e-business adoption and assimilation, as well as the corresponding benefits on collaboration performance are at variance. The analysis of technology adoption theories would be valuable to provide the relevant explanation of the attributes from organizations and end users.

The technology adoption theories analysis primarily covers three basic theories representing the main perspectives in the acceptance of new technologies in business change. They are Diffusion of Innovation theory (DOI), Technology Acceptance Model (TAM) and Sociotechnical Systems Theory (STS). Moreover, the interaction theory is valued in this literature review to the social environment factors' effect on the process of change. Interaction Theory provides a holistic approach in which different theories can be interacted. The theory would be applied to balance the technological powers and environmental powers from intraorganization and intraorganization. Therefore, the preliminary stage of this research will be guided by these conceptual theories as empirical evidence related to the technology adoption theories.

2.4.3.1 Social-technical theory

Given the high value of inter-organizational network as an information-gathering device and information channel of knowledge exchange (Powell, Koput & Smith-Doerr 1996), investigating e-enabled interorganizational collaboration is significant in improving business performance. Once e-business is adopted, e-enabled organizations and the end users (in most cases these are employees) must settle in even if a system is supposedly mandatory. However, just implementing an e-business system does not guarantee an improvement in collaboration performance (Chaffey 2006). Despite the potential benefits, the speed of e-collaboration assimilation and the level of actual achieved

benefits differ among organizations who have implemented these technologies and systems (Karsha et al. 2006).

Thus, theories that explain what motivates organizations and end users to choose to adopt technologies are relevant. Resistance to change is perceived as a mismatch between the new Information System (IS) implementation and existing business patterns (Taylor & Todd 1995; Venkatesh et al. 2003). There are numerous technology acceptance theories that could be applied to reduce these resistances. Generally, three basic theories represent the main directions in conducting the acceptance of new systems and technologies in business change, namely, Diffusion of Innovation theory (DOI), Technology Acceptance Model (TAM) and Sociotechnical Systems Theory (STS).

The three theories are purposefully selected which are related to different levels of technology adoption at different level of socio-technical fit. TAM is the foundation of System-determined theories (Taylor & Todd 1995). Moreover, DOI (Rogers 1995) provides a theoretical backbone for understanding the reasons behind the acceptance, adoption, and implementation of technologies at the organizational adoption level. Since e-collaboration technologies must be adopted by organizations, implemented within organizations and ultimately exercised by end users, it would be appropriate to target the Socio-technical Systems Theory (STS) at system implementation level (Clegg 2000). A brief comparison of multiple theories is displayed in Table 2-4 below.

Technology Acceptance Model（TAM）theory is one of the most commonly applied theories in the Information system (IS) (Taylor & Todd 1995). These system-determined theories give rise to the poor design or lack of user-friendly technical features as the cause of poor new system implementation (Davis et al. 1989; Vankatesh et al. 2003). For instance, TAM believes that when the system's efficiency and data entry processes have been improved, the problems would be fixed. It concerns individual users' intentions and predicts the level of new technology's acceptability into two technology-specific factors: the perceived usefulness factor and perceived ease of use (Venkatesh 1999; Venkatesh & Davis 2000). The system usefulness and the issue of usefulness are the fundamental purposes of the new system and emphasize the design

and contents, which are viewed as critical matters for improving business performances (Venkatesh 1999) as well as collaboration performance (Karsha et al. 2006). The perceived usefulness factor has been repeatedly demonstrated to predict technology acceptance. It requires an easy, time-efficient and effortless system to operate (Temte & Beasley 2001). These two factors are easy, trouble-free and specific to be understood and have been established as a generic model for technologies adoption in different settings.

However, TAM has been criticized for ignoring the distinction between individual acceptance of technology and implementation success at the organisational level (Venkatesh et al. 2003). Accumulated researches have released that, in the actual usage phase, TAM overlooks end users' intentions and behaviours throughout the system implementation life cycle (Straub &Burton-Jones 2007; Amany 2010).

Venkatesh & Davis (2000) and Lee et al. (2003) extended TAM to include new variables – social influences and cognitive instrumental processes, known as TAM2. TAM2 and expressed the importance of subjective norms and social pressures from potential inside or outside users, such as co-workers, trading partners and customers who may affect the adoption of new technologies (Weingart et al. 2001). After comparing the former prominent models in regarding to the acceptance of Information Technologies, Venkatesh et al. (2003) formulated the Unified Theory of Acceptance and Use of Technology (UTAUT) to explain user intentions and subsequent usage behaviour, which focuses the usefulness, easiness, subjective norm and quality of e-business systems (Karahanna et al. 1999; Vankatesh et al. 2003).

Afterward, researches revealed the people and social issue were the two main causes for the resistance of change, rather than the technical issue barely. People-determined theory emphasized the internal people, considered cognitive style and personality, etc. Tornatsky & Fleischer (1990) have developed Technology Organization Environment (TOE) theory, which is concerned with the quality of human purpose and human values in technological innovations. TOE suggests innovation adoption decisions via the influence of relevant technologies, organizational context and environmental context. It highlights the technology supporting infrastructure with skilled labours, as well as the competitive characteristics in their industries (Kuan & Chau 2001; Hong & Zhu 2006).

However, researchers found fixing technical problems have little effect on reducing the resistances of changing individual behaviours in technology adoption (Hong & Zhu 2006).

Moreover, this environment perspective started to consider the inside organizational relations between various departments, as well as the inter-organizational relations between outside partners as a whole. Human-Technology-Environment (HTE) Model clarifies that people would resist changes due to the interaction between specific system design features with the organizational context (Karsha et al. 2006). HTE provides guiding dimensions and a construct for the diffusion and implementation process of e-business systems.

In opposition to technology-driven design and implementation, Sociotechnical System Theory (STS) theory deals with all system components and their interaction with organization's social issues (Clegg 2000). Rather than thinking of the technology or individual users alone, STS deals with the culture inherent to organization's social system, and their influences on the user-technology interaction. It evaluates that a new technology design or implementation should concern the useful, uncomplicated, flexible, adjustable, and compatible elements (Hendrick & Kleiner 2001). An ongoing redesign of the technologies impalement emphasized in STS optimizes the interaction with organizations' environments (Karsha et al. 2006). Technologies should be tested and communicated with colleagues and partners promptly to reduce costs or remove barriers. And additionally, rewards and punishment should be aligned with the goals and practices of the organization (Karsha et al. 2006). However, HTE and STS fall short in effectively differentiating the influence from trade partners and consider less the interface among these partners' capabilities and technologies.

Currently, the Diffusion of Innovation (DOI) theory has been identified as one of the most leading theories relevant to implementation and changes from the perspective of organizational level (Stern 2004). E-business is a multifaceted innovation phenomenon and DOI is part of e-business (Dong 2009). DOI extensively addresses such issues of evaluating the technologies adoption and covers several components similar to those of TAM and other theories. For example, usefulness refers to the relative advantage attributes in DOI; ease of use construct and social norms refers to the complexity

attribute; visibility, social norms and organizational environment are also included in the compatibility.

Table 2-6: Comparison of multiple theories

Theory / Attributes	TAM	TAM2	STS	DOI
Usefulness	√		√	√
Ease Of Use	√			√
Social Norms		√		√
Visibility			√	
Demonstrability		√		
Human Values and Personality			√	
Organizational Environment			√	
Relative advantage				√
Compatibility			√	√
Complexity				√
Trialability			√	√
Observability				√

Overall, multiple theories could be used to describe information technology (e-business) acceptance, adoption, diffusion and use, but none of those theories could account for all the issues discussed, as shown in Table 2-6 above. The rate of diffusion for these e-business technologies innovations is affected by their perceived attributes, such as socio-economic and network effects, complexity or compatibility. However, researchers should intensely explore whether new technologies can be successfully adopted according to their different perceiving. Subsequent studies should be tested in relation to the different levels of technology adoption in different countries, or different organization sizes.

2.4.3.2 Interaction theory

No organization is an island (Pathak et al. 2007). Behaviours in interorganizational networked systems would be solidly affected by the action of these business partners

(Choi et al. 2001). When network size is increased (the number of members increased), the interaction among them would become complex, so as the gradually complicated systems (Wycisk et al. 2008). Augmented complexity proposes that adoption decisions related to collaboration and e-business technologies become subject to the influence of other partners' interaction in the network (Choi & Krause 2005; Pathak et al. 2007). In this case, in order to research the extent of the collaboration's influence on business performance, the interaction theory is valuable in providing the network-related perspectives considered in analyzing the organizational technology adoptions theories as that related to network of collaboration. .

Moving away from individualized business with local or regional competitors and customers, the organizations are increasingly taking innovations to cope with globalized competition (Thorgren, Wincent & Ortqvist 2009). Among the activities of purchasing, outsourcing or R&D, interactions between business partners would be the essentially economic activities within a broader value chain network (Collins & Hitt 2006). From an economic perspective, e-business technologies are designed to be shared by a community of users. Organizations would enjoy greater benefits from an adoption and diffusion of collaboration network (Markas et al. 2006). However, as mentioned above, the e-business adoption capability may be affected by a diverse set of factors such as the characteristics of the technology, the adopting users, its trading partners or business network relationship (Iskandar et al. 2001). Therefore, Network Effects Theory (NET) started to consider the exchange and sharing of information from an increased number of users, which would result in a more amplified benefit than a user gained individually (Katz &Shapiro 1985).

Network Effects Theory has emphasized three basic attributes influencing the technology adoption decision: the expectations of the system components (about the availability and quality), the coordination among consumers-communication networks, and the compatibility among systems and sub-systems. The cases from Damsgaard & Lyytinen (2001) and Hong & Zhu (2006) suggested the role of such network effects in the diffusion of e-business applications, and Wu et al. (2007) explained the need for conformity in applying these technologies in order to combat competition by similar suppliers' networks.

Interaction Theory is established on the basis of Network Effects Theory (Wycisk et al. 2008). Because the close interorganizational relationships acquire more opportunities for resources collaboration, the enlarged size of the network becomes more attractive (Wu et al. 2007). The increased size in the interactive networks leads to additional demands and imitations by others (regarded as 'network externalities'), which has implied the extent of the adoption is not only influenced by the technologies readiness but also the perception of their success (Soares-Aguiar & Palma-Dos-Reis 2008).

Interaction Theory emphasizes the social environment factors' interaction with those human and technological factors (Pathak et al. 2007). Examples of network factors include the level of collaboration among network members, the level of technological infrastructure, and environmental factors cover the economic cycles and government regulations. This theory considers a new system would alter the balance of intraorganizational power, and the departments and partners whose powers are defeated in the new environment will resist the process of change.

Especially in the context of collaboration, collaborating partnerships are settled among a network of other organizations and the extent of collaboration adoption is subject to other members in the network and surrounded with their specific business environment (Teo & Benbasat 2003). Given that e-business technologies are a medium for these interactions, the advocate for a specific adoption of e-business technology towards certain organizational collaboration would be leveraged by its organizational and inter-organizational powers (Soares-Aguiar & Palma-Dos-Reis 2008). The partners' infrastructure support and readiness in accepting the technology would be more likely as another influencing factor (Soares-Aguiar & Palma-Dos-Reis 2008). Whereas organizations are not within direct contact or strategic alliances, actions from other members in industrial districts are still influential (Soares-Aguiar & Palma-Dos-Reis 2008).

Consequently, based on above justifications, under the global competitive pressures, organizations are required to explore potential capabilities to support the collaborations among their business trading partners and then enhance their performance in innovation diffusion (Thomas 2005). In this case, researches on the capacities taking care of interorganizational relationships would be valuable. Hsu et al. (2006) demonstrated the

collaboration partner's characteristics, pressures and powers toward adopting a technology or a new business model would also have a notable influence on the adoption. For that reason, interaction theory can be utilized to provide holistic approach in which different theories will interact. As emphasised above, interactions are encouraged by long-term mutual reciprocity in performing innovation to enhance competitiveness for each individual organization and the networks.

2.4.4 Conclusion

Given the interaction theory, the interorganizational collaboration for overall business performance improvement is the result of the dynamic balance between the perceived attributes of the technology, motivation and interactive interorganizational relationships. Considering the perception-based characteristics of innovation rather than the inherent characteristics does not differ across organisations from their collaboration settings (Stern 2004). This innovation research helps the organization identify which theories are fit or not for organizations' engagement in interorganizational collaboration.

The business partners' interactions within the interrogational network could be regarded as the determinant to the adoption of collaboration and e-business technologies. TAM indicates the supported technology infrastructure in the industry influences adoptions as a technical factor in the network. DOI also represents the importance of the communication intensity and operates norms among the social network. Particularly, the interactions involved in interorganizational relationships are ubiquity at a given moment in the era of globalization. Their considerations are explained in full detail in these adoption models. As a reasonable and practical conclusion for this project's research, DOI theory is chosen for this study for the following reasons:

- The adoption of an e-business in business collaboration (e-collaboration) initiative can be an issue of technology diffusion and adoption of innovation.
- The current evaluation of collaboration adoption can be interpreted in different ways, but DOI is more concerned with the organization-wide adoption of technological innovations as well as the personalities and attitudes of individuals

within the organization, which covers the principle of interaction theory.

- As representing the considerations from each of these influential factors incorporated in theories, DOI provides the empirical framework base in terms of perceived benefits (relative advantage), consistency with the existing values and past experiences (compatibility), inhibitors (complexities), adopters' expectation of precursory experiments (trialability) and visibility of theses outcomes (observability).
- DOI pinpoints corrective action for future improvement.

2.4.5 The selection of diffusion of innovation theory and attributes

Current literatures on success of e-business systems address the trend to utilise the Diffusion of Innovation Theory (DOI) to identify the successful assimilation of innovation. The research of DOI investigates the influences from information communication channels, as well as the nature of the social system the innovation is involved in (Al-Hakim & Chen 2005).

Innovation is an essential element in business to remain competitive (Damanpour et al. 2006). Innovation, by definition, indicates something is new or considerably improved, and done by enterprises to create added values either directly for the enterprise or indirectly for its customers (BCA 1993). There are marketing innovation (Atuahene-Gima 1996), technological innovation diffusion (Bradford & Florin 2003; Rogers 2003), process innovation (Davenport 1993), e-business systems innovation (Allen 2000; Kim & Galliers 2004) and e-business adoption innovation (Amit & Zott 2001). Diffusion is defined as the process by which an innovation is accepted by members of a certain community. It is also described as a type of information seeking process and activities via inter-personal or mass media communication.

A multitude of factors or attributes are interacted to facilitate or obstruct the adoption of a new technology or other specific practices among members of a particular innovation adoption group. Rogers extended the diffusion theory by introducing these perceived attributes. He defined the Diffusion of Innovation (DOI) theory that the members of a social system participate in and communicate with the ideas, practices or technologies,

through certain communication channels and cultures over time (Rogers 2003). DOI also addressed corrective action and facilitates an aggregation of evaluation (Dong 2006).

Based on potential adopters' perceptions on an innovation, five attributes of technology innovation are presented to determine the rate of innovation adoption and the performance of business. Relative advantage has been widely and consistently reported to have a positive impact on the adoption (Dong 2006). Specifically, 'relative advantage' is defined as the perceived tangible or intangible benefits and outcomes associated with the innovation adoption (Rogers 1995). Organizations always prefer innovation which can result in positive outcome. It implies the rate of adoption will be more rapid if a new innovation is anticipated to bring more relative advantages, such as economic profitability, scalability, flexibility, social reputation, time and effort saving, cost or risk reduction (Rogers 2003; Minhan 2005; Dong 2006).

The adoption of e-collaboration must be asserted of the relative advantage and the risk or uncertainty caused from this innovation (Dong 2006). For implementing the e-business in collaboration, an electronic channels' relative advantage can be characterized as a multidimensional construct involving a cumulative assessment of the efficacy and convenience from the adoption of different technological innovations (Al-Gahtani 2003; Choudhury & Karahanna 2008). Organisations tend to allocate the financial and managerial resources, improve technical infrastructure and upgrade technical knowledge when they are confident of the relative advantages, which in turn motivates the adoption (Croom & Brandon-Jones 2003).

Secondly, innovation will also be adopted more rapidly when innovation is perceived as more compatible or consistent with existing values of a social system, cultural values, past experiences and the needs of potential adopters (Rogers 2003). New construction of collaboration should be compatible with prior experience, existing work practices and values in those collaborating participants (Karahanna, Agarwal & Angst 2006).

Compatibility includes two features: technological and organizational compatibility (Dong 2006). Technological compatibility can be thought of as the appropriateness and fitness between the new e-collaboration techniques requirements and the organizations'

existing information communication systems. Organizational compatibility refers to these systems and requirements fit for the organizational values, beliefs and cultures. Moreover, prior experience of similar innovation adoption related to compatibility is also related to its rate of adoption (Wu & Wang2003). There is no doubt that the internet-based collaboration needs to be compatible to manage the greatest possible extent with the existing strategy, process, technologies and practices for better innovation assimilation.

Thirdly, if an innovation or new idea is perceived to be too complex or difficult to comprehend or utilize, potential adopters will fail to accept it (Rogers 2003). Further researches also support Roger's view on the negative influence of the complexity on technology and innovation adoption (e.g. Teo et al. 2003; Dong 2006). In the context of e-collaboration adoption, perceived barriers or negative influences would be derived out from the technology and integration processes. It implies that, although some e-collaboration technological innovations are clearly valuable, potential adopters will still not accept them because of the operational difficulties, deficient skills and inadequate knowledge (Al-Gahtani 2003; Batz, Janssen & Peters 2003). Since the adoption of e-collaboration as an innovation generates risks and complexity, organisations must be aware of the barriers as mentioned above (Teo et al. 2003).

Fourthly, it is believed that potential adopters normally hold wariness to an innovation; therefore, they hope to clarify the risks and uncertainty associated with it (Dong 2006). When the technology or innovation process can be visibly communicated and broken up on a partial basis for experiment (regarded as trialability), generally, an innovation can be implemented more quickly (Rogers 2003). The fifth technology attribute is observability. Observability is the degree to which the results of an innovation are visible to others (Rogers 2003). It means these accomplishment processes and benefits of innovation should be easily observed and communicated. The issue of trialability and observability in this study refers to both partners involved in the collaboration relationship which are able to experience the e-business technologies in advance of implementation.

A variety of technology adoption and diffusion studies on technology adoption have applied these five attributes from Rogers as the theoretical basis. Causal relationship

between technology attributes and process performance were taken in foreign language schools (Martins, Steil & Todesco 2004), online commercial groups (Dolen, Dabholkar & Ruyter 2007), as well as manufacturing organizations (Wen-Chin 2006). Therefore, the appropriateness of using this theory is evident (Al-Gahtani 2003). However, for example, Grover's (1997) observed compatibility and complexity is a strong predictor of adoption decision on customer-based inter-organizational systems, not relative advantage. Dong (2006) pointed out the positive outcome from innovation is the essential attribute. In this case, a further research on the adoption of the collaboration and e-collaboration is required to test these attributes in the target industry.

In conclusion, it appears there has been a limited utilization study of DOI theory to evaluate e-business systems assimilation in interorganizational collaboration (Azadegan & Teich 2010). Additionally, the collaboration success research should be relies on the influencing factors analyse from collaborating environments. For example, a more inclusive, multi-level trust theory is valuable in creating a more comprehensive theoretical framework for understanding collaboration performance (Verdechoa et al. 2009). However, few relative studies have shown the influences of the trust relationship in collaboration. Further research is required on explaining how these dimensions of trust can strategically reconcile with a favourable relationship in promoting successful collaboration.

2.5 The collaborative environment: trust

In the collaboration analysis, most pervious research has focused on the elements of the organized collaboration, but in the recent past, how to facilitate interactions within a reliable interorganizational environment has received considerable attention in the literature (Verdechoa et al. 2009). Since trust is regarded as an essential ingredient in a long lasting business relationship for innovation diffusion, trust theory would be undeniable in facilitating innovation networks and inter-organizational collaboration (Goo & Huang 2008).

Especially, Chen et al. (2010) in particular revealed the successful activities in virtual organizations are relying on a trust-based relationship, although previous researches

have mostly focused on fostering information technological infrastructure and other technologies environments (such as Lin, Wang & Tserng 2006).The online information distributing environment requires a higher level of trust than face-to-face communication (Riegelsberger, Sasse & McCarthy 2003). The utilisation of websites, the interactive web technologies, and other e-business technologies cannot bring innovation with business partners or customers without a trusted collaboration environment.

The development of an environment-friendly culture would assist social identities to obtain fast access to the synthesis of knowledge and information, and contract quick solutions for specific problems (Chiffoleau 2005). Chen et al. (2010) pointed out that virtual organization success relies on the effective integration and sharing of related resources between various organizations or workers who perform related activities online.

The theory of trust could be appropriate to guide information sharing in collaboration, and details will be covered by the following section. Following the definition and dimensions of trust, an overview of the impact of trust on collaboration is presented.

2.5.1 Definition of trust

In generic terms, there is a wide array of complex definitions of trust, which are multi-dimensional and have shifted with environmental changes over time, as shown in the following Table 2-7. In essence, an antecedent research on trust theories has the same theoretical perceptions in developing a strategic view of actions with others. Early definitions such as from Erikson (1950) proposed trust should be an implicit belief of goodness. Deutsch (1958) stated trust is a positive motivational consequence from expectation. Similar to these definitions, Rotter (1967) and Zucker (1986) conceptualized trust as the expectancy depending on the characteristics of the target (individual or group), written statement, promise, verbal or the forces.

Table 2-7: Brief identification of trust

Year	Principal Author/ Authors	Description
1950-2000	Erikson; Rotter; Zucker	implicit belief of goodness, written statement, promise, verbal or the forces
	Gambetta; Dasgupta	Uncertainty control
	Lewicki et al.	commitment-trust theory
	Hosmer	shared values, communication and opportunistic behaviours
2002	Blomqvist	belief in others' competence and reliability
2004	Zolin et al.	psychological state to control the behaviours of other party
2005	MacMillan et al.	reliability, dependability and faith
2006	Gefen et al.	formal trust building mechanism as the foundation
2007	Massey & Dawes	positive willingness to take a risk in the process of diffusing innovation
2008	Goo & Huang	interactions between the formal control mechanism and relational governance
2010	Chen et al.	satisfaction of sharing of more sensitive knowledge and interaction, partner trustworthiness, cultural diversity
2011	Al-Hakim	level of responsiveness, information accessibility, information accuracy and information timely as agreed
2012	O'Hara K	Trustworthiness, context-dependent

Prior research proposed that formal control mechanism and relational governance can contribute to building sophisticated interorganizational relationships to ensure their success. The object of trust is that the trustor perceives the trustee's behavior as being undertaken in a predetermined manner when uncertainty occurs (Dasgupta 1988; Gambetta 1988). The interactions between the formal control mechanism (regarded as the written contracts and other contractual elements) and relational governance (driven by unwritten, practice-based mechanisms) engaged in these interorganizational

behaviours are related to trust theory (Goo & Huang 2008).

In interpersonal relationships, Morgan and Hunt (1994) view trust as a confidence or positive expectation on a partner's reliability and integrity. Hosmer (1995) pointed out trust should be placed at the heart of any successful interpersonal relationship, which would be affected by three variables: shared values, communication and opportunistic behaviours. Subsequently, Lewicki et al. (1998) introduced the commitment-trust theory to relationship marketing.

From the perspective of economics, the literature distinguishes trust in a different context of corporate sociality where the relationship is embedded, and it is normally described as the relationship development process (Parkhe 1998). Developed from the conception of reliability, trust is also related to the positive willingness to take a risk with another party in the process of diffusing innovation (Zineldin & Jonsson 2000; Massey & Dawes 2007). It is a psychological state that accepts vulnerability without the power to control the behaviours of another party (Zolin et al. 2004).

In the context of business organizations, trust has been depicted as the center for all transactions (Ammeter et al. 2004). Currall & Inkpen (2002) developed trust as an expectation that the partner will act according to a common agreement based on the reliability of other partners. Derived from the conception of commitment, trust is also regarded as cognitive trust which concentrates on the faith or belief in others' competence and reliability (McAllister 1995; Blomqvist 2002). However, having expectancies does not necessarily result in trustworthiness. Trustworthiness suggests the displayed reputation, knowledge, familiarity of culture or values, competence and prior experiences in collaboration would affect the relationships (Ryan et al. 2004).

In a dynamically changing business environment, organizations increasingly rely on outsourcing, and for strategic decisions, a high level of trust and commitments needs emphasizing (Kern, Willcocks & Heck 2002; Goo & Huang 2008). In the legalistic society, the formal accountability mechanisms build the entry-level trust to control value congruence issues and ensure standards of performance (Ammetera et al. 2004).

2.5.2 Dimensions of trust

Basically, trust relationship in the interorganizational relationship could start with legal recourse, such as promises and contracts (Shapiro 1987; McKnight, Cummings &Chervany 1998). Complex contractual and commitment elements, such as service level agreements (SLAs), are the formal trust building mechanism which is regarded as the foundation of a trusted relationship among the partners (Gefen et al. 2006; Hwang & Kim 2007). Activities through contracts can positively influence relational outcomes, such as reducing outsourcing risks and uncertainty by restricting the behaviours of individual and organizations (Fitzgerald & Willcocks 1994; Kern, Willcocks & Heck 2002; Chen et al. 2008). Formal and relational governance is complementary, not substitutive (Poppo & Zenger 2002).

Related researchers have discovered extra various dimensions that construct trust dimensions. Many scholars have tried to categorize these dimensions. Mayer et al. (1995) suggested them to be a party's ability (competencies, skills and characteristics), benevolence (trustee is believed to do good to the trustor), and integrity (the acceptable set principles between trustor and trustee). Mishra (1996) claimed that trust consists of reliability, competence, and openness. Developed from the conceptualisation of trust, the measures of trust are based on reliability (a consistent commitment), dependability (the extent of the truth), and faith (predictable actions in partners' interests) (Molm, Takahashi & Peterson 2000; Ammeter et al. 2004; MacMillan et al. 2005).

Table 2-8: Dimensions of trust

	Swan, Trawick & Silva (1985)	Sako (1992)	Mayer et al. (1995)	Martin (2002)	Ryan et al. (2004)	Walker (2004)	Ratnasingam (2005)
Competence	√			√		√	√
Contractual				√	√	√	
Goodwill		√		√	√	√	
Benevolence		√	√		√		√
Friendliness	√	√					
Reliability							√
Predictability							√
Dependability	√						
Customer oriented	√						
Ability			√				
Integrity			√				

Trust is a multi-dimensional construction and its various dimensions would be varied to different application domains (Mayer et al. 1995). Trust in these so-called knowledge-based systemic behaviours along the innovation processes involving each department of each organization is not created in a short time. Some of the trust dimensions seem to be closely or identically related to another, as listed in Table 2-8 above. To objectively evaluate trust's dimensions has become an important issue affecting the performance of interorganizational collaboration.

Different relationships from dissimilar levels of trust play varied roles in the innovation process, which results in altered collaboration performance and then business performance (Ahuja 2000). As the measures or indicators of trust, these dimensions of trust tend to be correlated for validity, rather than theoretically grounded. Because trust always engages in subjectivity and ambiguity, the grouped number of attributes can be used as predictors of trust. The selection of these dimensions will be coming from the pilot study as shown in Chapter 5.

2.5.3 The value of trust on collaboration performance

The effectiveness, efficiency and productivity of trust would be influenced by the benefits and termination costs from the relationship, communication, shared values, opportunistic behaviours and so on (Mohr & Nevin1990). Therefore, better understanding of managing collaborative environments is highly desired to create and sustain strategic value, particularly for collaboration engaged organizations.

Recently, extensive researches have begun to identify the importance and benefits of trust in organizational technology adoption and implementation. Extrinsic and intrinsic benefits are the most important (MacMillan et al. 2005). Extrinsic benefits mean the faster exchange of material due to the higher trust and intrinsic benefits refer to the intangible benefits inherent in the relationship, such as the efficiency in management as the concept of operational competence (Sirdeshmukh et al. 2002). A deteriorating relationship excluding partners' wishes and wellness causes operational disruption, higher costs, and even lost business opportunities (Goo & Huang 2008).

Additionally, more studies have focused on the rising role of trust in collaborative work relationships. In an early stage, these investigations were primarily on the interpersonal level (commonly peer–supervisor behaviours and relationship) or the individual–organizational level (Fulk, Brief & Barr 1985; Moussavi 1992; Deluga 1994; Ammeter et al. 2004). Subsequently, management studies show the role of trust and relationship commitment in posing a crucial position in the process of relationship development and relationship performance (Morgan & Hunt 1994), especially in establishing organizations' interorganizational relationships, collaborations, alliances and long-term stability (Svensson 2001; Martinez et al. 2004).

Researches into the globally distributed e-business work teams from David & Chand (2007) and Lin (2008) have revealed that a trusting person or organization is more willing to share useful knowledge with others. In such interorganizational relationship engagements, two or more organizations exchange tangible assets and invisible assets. In the context of business-to-business relationship between partners, confident expectations from trust reduce the monitoring of a contract and transaction costs(Gulati 1995).

Moreover, trust raises organizations' willingness to accept change and innovation. It is

augured that a trusted relationship can enable the business partners to not need continual legitimate proof (Ammeter et al. 2004). When the business partners are highly mutually trusted, the tolerance level of perceived uncertainty or risks during the interaction will be elevated, especially the consideration on the cost of information exchange, response time in long distance (Goo & Huang 2008). Accordingly, the degree of information richness would decrease due to the well-understood information communication channels (Ratnasingam 2005). Trust also involves the consideration of the risk which helps to ensure that the spirit of e-business adoption is assigned to appropriate group productivity thereby facilitating business performance (Walker 2004). Because trust is associated with the uncontrolled or unmonitored behaviour of others in e-business technologies, risk is perceived through a variety of behaviours (Simatupang & Sridharan 2004).

Although organizations do not easily change their values, the utilization of communication technologies presents a lever to increase trust (Martinez et al. 2004; MacMillan et al. 2005; Spekman & Carraway 2006; Archer et al. 2008). However, Ryssel et al. (2004) established that information technology is an enabler, but alone cannot guarantee the creation of additional value. Simatupang & Sridharan (2004) argued how trust should be applied to influence e-business adoption. For example, trust has a substantial positive influence on behaviours in applying Customer Relationship Management (CRM) software (Lee, Sohn & Lee's 2008), e-commerce and EDI technologies (Ratnasingam 2005), e-logistics systems (Tung, Chang & Chou 2008), online financial system (Mukherjee & Nath 2003), and the marketing in the electronic marketplace (Ba & Paul 2002).

In summary, the literature discussion of trust is primarily in terms of how to build trust or evaluate trust in a business relationship. One essential element for building information sharing in the adoption of e-business technologies in collaboration is heavily dependent on whether the trust can be ultimately extended to trade partners (Tse & Soufani 2003; Ik-Whan & Taewon 2005). However, simple interorganizational communication and interaction does not guarantee the development of trust, specifically in the context of globalization (Newell & Swan 2000). Mistrust is regarded as a catastrophic characteristic in the trading partnership and in innovation diffusion. Finding significant differences under different scenarios would provide a better and

further understanding of the factors affecting the adoption of e-business technologies, and prove valuable with a rationale to the success of e-collaboration as well.

2.6 Organization capacity in interorganizational relationship

The organizations involved in collaboration should start self-reflective thinking to identify a clear strategic vision that aligns with the missions and organizational capacities of partners (Wilson 1995; Barratt 2004; Bititci et al. 2005; Westphal et al. 2007). Particularly, in the context of technological changes, cost-economizing and strategic motives are intertwined (Lorenzoni & Lipparini 1999; Hagedoorn 2002). For this purpose, it is necessary to firstly integrate an organization's internal organizational capacity and then reciprocally integrate the capabilities of external partners (Kodama 2005). The organizational capacities refer to the outside collaboration management within interorganizational relationships which are regarded as the interorganizational capacities in this research.

Moreover, there has been a trend to classify the organizational factors for successful collaboration utilization (Motwani et al. 2008). To identify which features of the interorganizational organization capacities affect the achievement of collaborative performance would allow a comprehensive understanding of collaboration dynamics.

It is out of the scope of this research to review all these organizational capacities. A selection has been performed with the aim of identifying the required capacities present in collaboration relationships. In this study, the main subgroup of organization capacity would be related to the management of the interorganizational relationships. This is related to the 'soft' elements of the collaboration (Verdechoa et al. 2009).

2.6.1 Definitions of organizational capacities

There are numerous works in literature that deal with the organization capacity. Capacity is an abstract term covering a wide variety of knowledge, resources and capabilities (GEO 2012). Organizational capacities are continually evolving and

multi-faceted capacities, with the purpose to make a ‘rededication’ to achieve effective results in the organization (Kogut & Zander 1992; Rycroft & Kash 2004).

Spekman et al. (1998) mentioned that different maturity levels of collaboration relationship would reflect the required organizational capacities. An intensive relationship could rely on strategic value integration, Information and Communication Technology (ICT), duration of the relationships, information shared in the joint activities, trust and commitment (Szulanski 1996; Sabath & Fontanella 2002; Danese 2006; Gruat La Forme et al. 2007).

The strength of the organization depends upon the degree to which different participants of the collaboration regard themselves as taking a role in supporting innovation as a whole (Zedtwitz & Gassmann 2002; Chen & Xu 2010). In this case, the corresponding issues would be about the changes in organizational structure, processes and procedures, and complementarity of roles and functions (Bartle 2007). The research from Hsu (2005) displayed that an innovation collaboration network by integrating universities, research institutes, industrial organizations, the government and even global organizations has highly contributed to the fast development of the high technology industry in Taiwan.

Thanks to those e-business technologies, small and medium-sized organizations are able to join in internal collaborating (such as tele working, mobile workforce and office, virtual teams) and external collaborating virtual teams (outsourcing, networking, virtual organisation) to become more reactive to external changes (Lau et al. 2001; Riemer & Klein 2006). As a consequence of increases in mobile devices, broadband and these e-business software technologies, these provide advanced mobility and flexibility. The increasing knowledge and information intensity of products and processes mean organizations are not able to achieve all required knowledge or resources on their own. Therefore, they team up with external partners via appropriate capacities for designing, marketing, and manufacturing products or services efficiently and effectively (Ebers 1999). In order to further characterise collaborative relationships, the role of the different attributes of organizational capacities are reviewed in the following section.

2.6.2 Attributes of organizational capacities and their contribution to collaboration

The performances of an organization may be enhanced when it is able to sustain strengthens in an uncertain environment, which requires flexible and responsible organizational capacities with suitable attitudes, knowledge, skills and technologies (Hafeez et al. 2006; Bartle 2007). When the partners have the willingness, power, skills and influences in the organization or the collaboration program, the organization would effectively establish adaptability and responsiveness (Powell et al. 1996; Handfield & Bechtel 2004; Romero, Galeano & Molina 2009). Organizational capacities are required to identify the flexibility (Westphal et al. 2007) and responsibility (Chan & Qi 2003) of the collaboration behaviours of the partners (participation and quality) (Westphal et al. 2007) to control the extent of uncertainty (Birnbirg 1998; Gulati & Gargiulo 1999; Matopoulos et al. 2007).

Some studies have also showed the performance of innovation networks would depend on the organizational capacity to learn from previous experience. Collaboration requires improvement in the learning abilities from organizational capacities (Kogut & Zander 1992). The successful performance of Japanese organizations such as Toyota emphasizes the learning abilities in building strategic alliances, which allows organizations to create, capture and integrate relevant information, knowledge and skills (knowledge-spillover benefits of collaboration), as well as physical assets (resource-sharing benefits) (Kogut & Zander 1992; Rycroft & Kash 2004). Learning abilities are very important, for fast solutions to specific problems, new insights, developing complex technologies and accessing diversified markets (Chiffoleau 2005; Kodama 2005).

Sustained interactions among business partners are characterized by frequent communication (Rogers & Kincaid 1981, Holsapple 2004; Powell et al. 1996). The communication capability, with inside organization itself and outside, takes account of the languages and literacy, as well as willingness (e.g. Rogers & Kincaid 1981; Westphal et al. 2007). When more communication equipment, methods and practices (via speaking, printed media, electronic methods or networks within the organization

and with others outside it) are available to staff and partners, an organization would achieve strong collaboration (Bartle 2007).

Intense communication and interaction in the sophisticated collaborative network indicates that the partners have both a great incentive and opportunity to share information (Rogers & Kincaid 1981; Krackhardt 1992; Brown, Dennis & Venkatesh 2010). An enlarged knowledge base would facilitate innovation as well as innovation partnerships and alliances and, additionally, smoothed market acceptance for the innovation (Gaiardelli et al. 2007; Romero, Galeano & Molina 2009; Chen & Xu 2010).

Thus, an effective and sustainable partner and relationship management takes an enabling and facilitating role that strengthens the organization and collaboration capacity (e.g. Hagedoorn 2002; Poltrock & Handel 2010). Handfield and Bechtel (2004) also expose the relationships between the success of the collaboration and their different powers in the network. The attributes of reliability, flexibility, responsiveness and traceability also should be the foundation in the partner and relationship management (Folan & Browne 2005; Poltrock & Handel 2010; Siw 2012). Table 2-9 summarises the references with respect to the key attributes of organizational capacities identified.

Table 2-9: Attributes of interorganizational organization capacity

Attributers	**Key references**
Reliability	Westphal et al. (2007), Chen and Xu (2010); Hocevar, Jansen & Thomas (2011)
Flexibility	Westphal et al. (2007)
Responsiveness	Scheff & Kotler (1996), Westphal et al. (2007)
Responsibility	Chan & Qi (2003)
Traceability	Alfaro et al. (2007)
Readiness	Romero, Galeano & Molina (2009)
Power	Handfield & Bechtel (2004) , Narula (2004)
Partner Development	Lorenzoni & Lipparini (1999), Hagedoorn 2002; Kaplan & Norton (2004) , Siw (2012)
Relationship Management	Fiske (1990), Wilson (1995), Singh & Mitchell (1996), Spekman et al. (1998), Kaplan & Norton (2004), Hsu (2005), Folan & Browne

	(2005), Chalmeta & Grangel (2005), Poltrock & Handel (2010)
Learning Capability	Krackhardt (1992), Kogut & Zander (1992); Powell-Koput & Smith-Doerr (1996), Hill & Hellriegel (1994); Powell et al. (1996); Hartono & Holsapple (2004), Romero, Galeano & Molina (2009); Hocevar et al. (2011)
Communication Capability	Rogers & Kincaid (1981), Krackhardt (1992), Scheff & Kotler (1996), Phillips, Lawrance & Hardy (2000), Handfield & Bechtel (2004), Westphal et al. (2007), Brown, Dennis & Venkatesh (2010)
Problem Solving Capability	Gray (1989), Gunasekaran et al. (2001), O'Neil (2009), Siw (2012)
Innovation Capability	Zedtwitz & Gassmann (2002),Wang & Archer (2004), Burgess & Singh (2006), Gaiardelli et al. (2007), Romero, Galeano & Molina (2009), Chen & Xu (2010), Siw (2012)

In conclusion, a review of collaboration literature reveals that organization capacity is a vital cited antecedent of collaboration success in the analysis of interorganizational collaboration environment. An organization which has more of the elements of capacities mentioned above would bring more empowerment and strength, but on the other side, an organization does not become stronger simply by adding more facilities (Bartle 2007). The building of the attributes of capacities above would be changed and developed with social changes. In this research, these attributes will be further selected by the pilot study according to the context of the electrical industry as outlined in Chapter 5. Participatory methods to measure the changes in these elements would strengthen the practices.

2.7 Business performance measures for collaboration

In the recent past, collaboration within interorganizational environments has received considerable attention in the literature (e.g. Chapman & Corso 2005; Verdechoa et al. 2009). Among the main benefits of collaboration are: increased product availability, cost reductions, increased inventory turnover, enlarged revenues, etc. (Fawcett et al.

2008; Verdechoa et al. 2009). Therefore, it is not surprising that collaboration is identified as the driving force for business performance enhancement (Horvath 2001; Fugate, Sahin & Mentzer 2006). In order to effectively manage collaboration, meaningful business performance measurement (BPM) is a multi-disciplinary means for collaboration management.

2.7.1 Definition and attributes of business performance

When collaboration performance is characterized by interorganizational activities, organizations are required to use certain execution and business performance measurements to ensure that these collaborative partners actively work together toward common objectives (Anthony 2000). Business performance generally is an organization's outcomes, which would be assessed on the attainment of organizational objectives, goals, growth, human resource effectiveness, product and services quality, supplier performance, customer and markets and other key factors such as profitability (Fielden et al. 2003).

Business performance measurement is a multi-disciplinary field, covering the operations management, marketing, human resource management, accounting, economics, psychology and sociology (Neely 2002). These performance indicators are required to address some concerns in managing collaboration.

To clarify the question of how to measure innovation output, business performance measures are used as a tool to evaluate actual results with pre-determined overall organizational goals and customer expectation (Chen & Cheng 2007). A comprehensive set of performance indicators should reflect these internal and external key factors, which can tell what has happened (regarded as lagging measures) and what will happen (regarded as leading measures) (Evans & Lindsay 2008).

Traditionally, performance is measured using accounting or cost-related approaches which emphasize selective financial indicators such as return on investments, profit margin and cash flow (Tangen 2003; Gomes, Yasin & Lisboa 2007). Art Schneiderman at Analog devices first established the 'quarterly performance audit' and the 'balanced

scorecard', which developed four perspectives including financial perspective, internal perspective, customer perspective and innovation and learning perspectives (Evans & Lindsay 2008).

Furthermore, the effective use of appropriate performance measures not only ensures control and monitoring of an organization's operation (Simmons 2000; Bititci, Carrie &Turner 2002), but also should consider a long-term perspective via assigning necessary resources to improve the core competitive business activities (Tangen 2003). Traditional approaches for addressing financial aspects of performance have received considerable criticism as they deal with only short-term instead of supporting long-term versions, such as promoting the overall system optimisation and addressing customer requirements (Kaplan & Copper 1998; Chen & Cheng 2007).

The progressive business performance measurement should cover a number of output proxies for different stages of the innovation, including not only the financial support (Portes, Haller & Guarnizo 2002), but also effectiveness of communication, the difficulties of culture and language (Hofstede 1991), computing competency (Chui 2009), gender and management (Danes, Stafford, & Loy 2007), training and empowerment of employees (Trkman 2010), customer and supply chain relationships (Duarte & Davies 2003), and government and other environmental supports (Kariva et al. 2009). Additionally, these comparable data and information can support organizations to advance an enjoyable level of cooperation among management and trading partners (Evans & Lindsay 2008). Nevertheless, effective performance measures should be aligned with business strategy and should be driven by factors determining competitiveness (Dempsey et al. 1997; Frigo 2002).

Evans & Lindsay (2008) provided a comprehensive list of quantifiable non-financial and financial performance measures and related these measures to quality criteria used to evaluate performance for Malcolm Baldrige National Quality Award (Baldrige 2009). The seven sets of criteria for performance excellence results category are:

- Organisational effectiveness
- Products and services measures
- Financial and market
- Market Performance

- Customer-focused measures
- Human resources measures
- Governance and social responsibilities

Financial and market measures take account of the return on equity and investment, operating profit and market share; customer-focused measures directly relate to the customer satisfaction and dissatisfaction. This includes customer retention, customer complains, customer awards or recognitions; product and service indicators include the field of performance of products, defect rate, response time and service performance; organisational effectiveness category relates to organisational goals, such as design, production, delivery and support process performance; human resource measures involve turnover, employee satisfaction, training effectiveness and grievance; governance and social responsibilities consist of environmental and regulatory compliance, community service, and financial and ethics audit results (Evans & Lindsay 2008).

There is no single measure that captures all elements of innovation output (Sambasivan Mohamed & Nandan 2009). Thus, in this study, it is recognized that successful organizations have to understand the importance of reliable and appropriate measurement in driving quality excellence and improving operational and competitive performance. The appropriateness of these different measurements in this research field would be tested by the pilot study in following Chapter 5. A good business performance measure could drive the organization to successfully accomplish changes and improve its competitive position (Kariva et al. 2009).

2.7.2 The impact of collaboration on business performance

Trust theory and interaction theory are relevant in the discussion of DOI theory. These interactions among inter-relate variables in e-collaboration (such as technology, trust, etc.) would evolve. Proximate studies have explored the positive relationship between a firm's network position (or network structure) and innovation output (Shan, Walker & Kogut 1994). Powell, Koput, and Smith-Doerr (1996) also provided good predictors of linkage between an organization' interorganizational learning networks and its faster

subsequent growth. Individual organizations can pursue only a limited number of technologies and lines of research, but the network can increase an organization's catchment area for information and provide win-win benefits among its business partners (Karsha et al. 2006). Shan et al. (1994) explored the positive nexus between the number of collaborative relationships and that organization’s innovation output.

Global competition has massively accelerated the use of e-business technologies and online communication to improve business performance. It could be said that one fundamental aspect of collaboration is e-business adoption (Trienekens et al. 2008). Many organizations have made huge investments in electronic collaboration (e-collaboration) to link intraorganizational and intraorganizational networks and develop a variety of collaboration infrastructure to improve productivity and efficiency (Turban et al. 2000; Hung et al. 2006). E-collaboration has obtained increased prominence in the last few years, which has rapidly developed into the dramatic engine for the strategic management, competitive advantage, business growth and capacity in the new currency of competition (Chaffey 2006; Turban et al. 2006; Trienekens et al. 2008).

However, the drivers and barriers of e-business technologies would affect the decision of e-business adoption in the collaboration. Some issues that remain unexplored, such as low levels of technology acceptance and adoption would continue to be viewed as problems with collaboration. Moreover, innovation via the adoption of e-business cannot be accomplished in isolation from the e-business adoption capability (McAdam, McConvery & Armstrong 2004). The work should be further extended, including e-enabled collaborative elements and its relationship with business performance measurements. This issue would be considered and discussed in research model as main research question in following chapter.

In summary, there is an increasing interest in enhancing the collaboration performance measurement (e.g. Brewer & Speh 2000; Alfaro et al. 2007; Westphal et al. 2007). However, business performance covers a wide variety of issues such as operations management, human resource management, accounting, sociology and so on. If business performance measurement has to manage collaboration, some concerns should be addressed in this interorganizational context (Verdechoa et al. 2009). Possibly due to

the lack of understanding of collaboration's interaction with the elements of a collaborative environment, the general business performance measurement does not present a sufficiently integrated structure for managing collaboration performance. For this reason, it is necessary to understand further what the main elements of collaboration are, how they interact and how they can be integrated within a performance measurement system.

2.8 Gaps in the literature

In executing e-business technologies, experts and researchers are not only motivated by the goal of practical application but also by their theoretical interest in systematizing integrative mechanisms of collaboration as argued above. The more deterministic the paradigm of the related theories is, the better the administration of collaboration would be. For reasons of simplicity and focus, this review excludes consideration of the variables from the impact of information technology on collaboration (related to DOI theory), the impact of information sharing in collaboration under a trust relationship (related to the Trust theory) and the required supporting organizational capacities for interorganizational management. There are four gaps in the literature that this study attempts to fill.

Firstly, previous studies on e-business adoption generally focused on perceptions of the adoption of technologies to assist the business process inside the organization or within the supply chain. The increased use of e-collaboration with trading partners via adopting e-business for designing a new product or accessing a new market creates the worth of this research. Manufacturers might also use the e-business to facilitate collaboration beyond manufacturers and suppliers. According to Chaffey (2006), Subramaniam and Shaw (2002) and Croom & Brandon-Jones (2004), the extent to which the current frameworks can be used to investigate e-collaboration systems is not clear. This project proposes the model or e-business adoption decisions in collaboration, because the influencing factors on e-collaboration could be different from the factors that influence other e-business adoption decisions. Therefore, this research will fill a gap in the literature by ascertaining the effect of the diffusion of e-business on collaboration performance.

Secondly,since DOI Theory and Trust theory are specific to the culture from which it was derived (North America), the guidance is less relevant and less strong in accelerating the rate of adoption in differing industries in different countries as time goes on (Dong 2009). For that reason, a study is required to go beyond the importance of DOI and Trust in making a decision to enter a collaboration relationship, which has been of prime interest to previous researchers. The trust and DOI will be validated and tested in different contexts, especially in e-collaboration contexts. This project provides a new perspective, as the impact of both factors may differ or play a different role to what existed before the relationship is formed.

Thirdly, the gap relates to the attributes from the organization context. Many researchers have attempted to add other organizational factors that influence collaboration performance (Eastin 2002). This study will extend the knowledge on these effects by examining the importance of organizational capacities in dealing with interorganizational collaboration. Some studies overlook only at the interaction of organizational capacities and interorganizational collaboration, without including technology attributes (Svensson 2001) and organizational factor (Eastin 2002). Lack of supports from organizational capacities is detrimental and inevitably leads to the difficulties for organizations in their ability to quickly and effectively improve the collaboration performance (Patterson, Grimm & Corsi 2003).

Last but not least, any significant influences from trust, organizational capacities and e-business diffusion in facilitating collaboration will contribute to the literature in a way that three dimensions could be interacted in the list of influencing factors. At present, much of the existing e-business literature relies exclusively on pilot study and conceptual frameworks (Hafeez et al. 2006). It appears that there has been limited use of DOI to evaluate interorganizational collaboration assimilation (Azadegan & Teich 2010). A more inclusive, multi-level theory is needed to create a more comprehensive theoretical framework for understanding. Only a few studies use empirical data to characterize the internet-based collaboration or gauge the scale of their impact on firm performance (Zhu et al. 2003). It is hoped this proposed research will serve as starting point for further research in evaluating the critical success factors for organizations to engage successfully in collaboration.

2.9 Conclusion

The objective of this study is to investigate collaboration, as well as business performance. This literature review can contribute to further understanding of the significance of collaboration by examining the role of collaboration in business performance.

This chapter investigates the interaction between collaboration and business performance in the area of Wenzhou. In the era of globalization, the collaboration could occur between partners from different locations worldwide and thus the effect of e-business on collaboration cannot be ignored. To build an efficient and effective interorganizational communication and collaborative environment, information and communication technologies (ICT) and related e-business technologies are essentially involved in the collaborative activities in this industry. To diffuse the adoption of these e-business technologies in gaining their benefits and eliminating barriers, the theory of Diffusion of Innovation (DOI) could be appropriate to facilitate the diffusion of the e-enabled collaboration.

This chapter also reviews the current literature in the fields of collaboration, organization capacity in interorganizational collaboration relationships, business performance and business performance measures. It cannot be denied that a vital element in information sharing and Internet-based interorganizational collaboration relationships is supported form organizational capacities, which has a significant effect on the collaborative performance. However, further understanding is needed to identify the interactions among collaboration elements and how they can be integrated within a business performance measurement for collaboration. The chapter concludes that there is a gap in the literature dealing with the effect of collaboration on business performance, taking e-business diffusion and trust into consideration.

Mainly, the organization of the literature review consists of four dimensions:

- collaboration and the elements; business performance measures;
- attributions of e-business diffusion and the relationships with the integration of

collaboration;

- dimensions of trust and the relationships with the integration of collaboration; and
- relationships among the attributes of organization capacities within the interorganizational relationship.

Consequently, to establish strong business relationships with other business partners, theories for smoothing the collaboration process should be imitated for future reference. Literature has afforded remarkable research on the importance of the network effect theory and interorganizational interactions theory on businesses' success. The analysis of these relationships (as shown in the following research framework) would perform a comparative understanding the differing business performances in the adoption of e-business technologies in collaboration.

CHAPTER 3: THE RESEARCH MODEL

3.1 Introduction

The purpose of this chapter is to draw upon the findings of the literature review on collaboration and e-business diffusion, together with the theories of Trust and organizational capacities. As discussed in the literature review, the conceptual model of this research is based on the synthesis of the two theories: Trust Theory and Diffusion of Innovation Theory (DOI). The interactions between the collaboration and business performance outcomes, as well as the links to the qualified organizational capacities and trusted interorganizational relationships and e-business innovation are analyzed.

This chapter is organized into five sections. Section 3.2 and section 3.3 introduce the factors of trust and organizational capacities as well as the justification for their being included in the integrated framework, their structural relationship with their downstream influencing factors (collaboration and e-business diffusion) and the associated research hypotheses. Section 3.4 displays the relationship of downstream influencing factors' – collaboration and e-business diffusion – and their relationships with business performance. Section 3.5 presents the complete proposed research model in a diagram. Based on the analysis from the literature and theories, the research model begins with an analysis of trust and organizational capacities, and then proceeds on the mediating variable (e-business diffusion) between collaboration and business performance.

Six variables are prominent in the collaboration literature (displayed in Section 3.5) and six hypotheses are tested with respect to this model. The arrows in Figure 3.2 indicate the hypothesized relationships. The focus of the conceptual model is on the role of collaboration in the performance of interorganizational relationships. Specifically, the model evaluates: (1) the impact of two antecedents (trust and organizational capacities) on collaboration, (2) the impact of collaboration on overall business performance, and (3) the mediating effect from e-business diffusion. The hypothesized relationships derived from the conceptual model are discussed below.

3.2 Trust and collaboration: factors and hypothesis

In addition to the importance attached to adoption of the nonstop technological innovation of new technology, behaviors subsequent to adoption are worth discussing as well (Loa & Lieb 2008). Proliferating e-business technologies support human interaction behaviors via various e-technologies with high information richness, especially for organizations in a long-distance business collaborative situation. While DOI deals with the process in collaboration, trust is regarded as a fundamental communication pattern of an innovative organization engaged in collaboration, joint venture, strategic alliances and any other inter-organizational networks (Sako 1998; Yacine 2002).

In the circumstance of globalization, as Triston (1992) stated, in the digital economy, the critical challenge for any organization is to create a climate in which innovation is encouraged. One essential element for building information sharing in collaboration is heavily dependent on whether the trust can be ultimately extended to trade partners (Ik-Whan & Taewon 2005; Tse & Soufani 2003). Ryssel, Ritter and Gemunden (2004) demonstrated that information technology is an enabler but alone cannot guarantee the creation of additional value. Trust is an essential ingredient which leads to a longer-term perspective, and ultimately greater value is built in the relationship.

Although the end users of e-business technologies have to interact with complex systems in performing complicated tasks of work, unfortunately, the higher level of difficulty in accomplishing multiple collaboration tasks creates high attention to human behavior and dependence, which is directly affected by trust (Rice & Geels 2010). With high trusted relationships, the expanded business and online trades provide another channel for the purposes of marketing, potential customers connecting, brand building and so on (Dransfeld, Jacobs & Dowsland 1999; Turban et al. 2000). Especially in adopting e-business technologies in collaboration, robust trust is essential to support the sharing of more sensitive knowledge over time, to enhance the security of online transactions, and to maximize the satisfaction of collaboration among collaborating business partners (Bharadwaj & Al-Shamri 2009; Mun et al. 2009; Chen et al. 2010). In this case, the impact of trust on e-business would be covered by the relationship tests

between trust and collaboration since e-technologies are regarded as a critical element in collaboration (see the discussion in Chapter 2.3.1 and Chapter 5.4.3).

Close trust encourages organizations to explore new mutual-beneficial collaboration, raises organizational and relationship effectiveness, facilitates learning and knowledge transfer, and ultimately improves competitive advantage (Warrington, Abgrab & Caldwell 2000; Paterson, Maguire & Al-Hakim 2008). With trust, collaboration via internet and relative e-business technologies is uniquely poised to deliver, ease and promote the process of collaboration (Zinkhan 2002a). The ability of organizations to develop trusted relationships with trading partners via the internet affords greater trading efficiency and improved collaboration performance (Kaplan & Sawheny 2000), particularly for small and medium size businesses (Amit & Zott 2001). Thus, trust is crucial in maintaining interorganizational collaboration control and support (Ammeter et al. 2004).

Clearly, organizations involved in these intraorganizational relationships must engage in behaviours that will develop the trust in their partners in order to obtain these benefits (as mentioned in Chapter 2.5). Given the fact the effects of trust, to the best knowledge of the researcher, have not yet been empirically studied in terms of collaboration. Nevertheless, the influences from the different dimensions of trust should be specifically tested in the contexts and cultures. Four dimensions of trust as compared above, such as contractual trust, competence trust, goodwill and benevolence, are chosen for their valuable connect to organizations' collaborative environments. As Zahra & George (2002) mentioned, it is more effective for business-to-business (B2B) to invest in long-term customer interactions and collaboration than to rely on one-time exchanges. Trust should be regarded as an essential ingredient in the collaboration relationship, and an ultimately greater value could lead to longer-term business performance improvement.

Trust is regarded as a fundamental ingredient of an innovative organization engaged in joint ventures, strategic alliances and any other inter-organizational collaboration (Sako 1998). However, these interaction experiences, partner trustworthiness, worker propensity to trust, or cultural diversity will influence the degree of trust (Chen et al. 2010). After presenting the multi-level dramatic concepts and multi-dimensions of trust,

the effect from the trust on business performance as well as on the collaboration performance will be analyzed. Accordingly, this research proposes the following hypothesis:

Hypothesis 1: There is a positive relationship between trust and collaboration.

3.3 Organizational capacities, collaboration and e-business diffusion: factors and hypothesises

Facing the decentralized work and diversified management challenges brought from globalization, the Chinese manufacturing industry recognizes the significance of the value in improving organizational capacities for collaboration and collaborative relationships (Lau et al. 2001; Wong 2008). Collaboration studies have shown that a competitive interorganizational collaboration requires fundamental changes in organizational capacities to handle the trends of globalization, diversity, differentiation, and so on (Bleecker 1994; Lau et al. 2001; Newell et al. 2009). These collaboration relationships required qualified organizational capacities in different levels, such as in logistic, manufacturing or marketing, with domestic and overseas organizations. Organizational capacities are regarded as a critical success factor for collaboration success.

As Zheng (2006) pointed out, a competitive advantage should occur from developing a synergy with trading partners. Collaboration is not only enterprise-wide, but also value-chain wide and a resource-intensive project that has a significant impact on organization's organizational capacities and long-term strategy. Corresponding business networks with well recognized organizational capacities would play an undeniable role in business value adding (Riemer et al. 2009). Therefore, identified and sustained processes, competencies and capabilities to plan, control and integrate the interaction among the different organizations (partners) in the value chain can effectively support cross-enterprise collaborative performance (Brown et al. 2010).

In fact, these elements or attributes are not really isolated but interrelated. Qualified organizational capacities would help organizations to develop flexible internal structures

(e.g. Ciborra 1992; Ireland et al. 2002) to sustain reliable, responsive and flexible participation (Riemer et al. 2009), facilitate enterprise-wide communication among the partners involved in the collaboration (e.g. Handfield & Bechtel 2004), improve innovative ability (e.g. Wong 2008; Riemer et al. 2009) and problem solving capability (e.g. Gunasekaran et al. 2001) by quick access to global innovative networks and resources (Gerybadaze & Roger 1999; Barratt & Oliveira 2001), and enhance revenue, reduce cost, and improve operational flexibility to cope with high demand uncertainties (e.g. Callioni & Billington 2001).

Lack of support from organizational capacities is detrimental and inevitably leads to inadequate resources — which would make it more difficult for collaboration to quickly and effectively improve collaboration performance (Simatupang & Sridharan 2005). If there is no equity of organizational capacities for all the partners, the collaboration is not sustainable. Accordingly, this research proposes the following hypothesis:

Hypothesis 2: There is a positive relationship between organizational capacities and collaboration.

In the context of this research, it is assumed that visibility and reliability of organizational capacities perceived by collaborating partners would be positively related to its rate of innovation adoption and then enhances business performance. In the era of globalization, thanks to the innovation of computers, Internet, e-mail, telecommunication and share-database and other web-based Internet-based technologies and applications, multinational projects can be effectively and efficiently carried out without the limitation of space and time (Zedtwitz & Gassmann 2002). As displayed in the Table 2-4, innovation is an important element in organizational capacities, as well as, for example, the adoptability capacity of e-business for example.

Theses interorganizationally interactive systems are becoming a part of the vital organizational capacities in processing a modern business, which improves transparency, efficiency, quality and accountability via the access to partners inside and these trade partners outside (Halaris et al. 2007; Boateng et al. 2008). The innovation ability is also greatly enhanced by e-enabled organizational capacities, because innovation is always in terms of both information collection and information processing and is often an

information-intensive activity, highlighted by Chaffey (2006),

Because collaboration frequently occurs in projects based on groups of two or more organizations, these participating member organizations can join, interact, or exit collaboration within the interorganizational network. For instance, a strategic network is becoming a distinct form of globalized collaboration. It is a competitive alternative to tight collaboration by sharing common trademark and reputation but with high flexibility. Therefore, through the interorganizational exchanges of strengths, organizational capacities provide networked organizations with extensive qualification to access resources and opportunities, gain legitimacy and improve business power in the international marketplace (Wu et al. 2007)

Particularly, for the manufacturing industry, consideration of interactively working with outside and inside participants is increasing. Organizational capacities support e-business to establish distinctive strategic positions than older generations of IT (Porter 2001). These organizational capacities include communication, risk management, learning capacity, facilitate the creating and sharing information visibility and capturing the moments of information. In this case, the enhanced organizational capacities in interorganizational relationships enable collaborative participants to manage their business processes better via the adoption of e-business, which is also an important part in the process of enabling supply chain integration on a worldwide scale (Lummus &Vokkurka 1999; Rudberg et al. 2002).

Accordingly, this research proposes the following hypothesis:

Hypothesis 3: There is a positive relationship between organizational capacities and e-business diffusion.

3.4 Downstream influencing factors and hypothesises

There are three downstream factors, namely collaboration, e-business diffusion and business performance. The hypotheses about the relationships between them are discussed below.

3.4.1 Collaboration and e-business diffusion

An organization has many motivations to cooperate in forging a true partnership with their business customers, offer items such as profit sharing or customization and expect a truly customized service and loyalty (Zinkhan 2002b). As Premkumar & Ramamurthy (1995) pointed out, the technology-based revenue-generating transactions performed by two or more organizations can be regarded as an inter-organizational collaboration system. More recently researchers are interested in how the network conditions influence the development of the B2B relationships, but the emerging relationship can also shape the network — sometimes dramatically (Alajoutsijärvi & Rosenbröijer 1999).

Literature stated to investigate dependency among trading partners in the decisions on adopting online links and other e-business technologies which are significant to the success of collaboration (Archer et al. 2008). E-business literature reflecting a successful globalized collaboration cannot be separated from the inter-organizational information systems (McAdam et al. 2004). Chapter 2.4.1 as well as the summary in Table 2-5 (The chief benefits and drawbacks of online communication technologies) shows that, via the application of e-business technologies, a synchronous work environment among interorganizational or intra-organizational partners can facilitate collaborative work. E-collaboration system also can be traditional EDI-based or innovative web-based (Premkumar & Ramamurthy 1995). The focus of the collaboration activities equipped with the e-business adoption capability generally is on the latter infrastructure, which is regarded as sophisticated collaboration (see Figure 2-1).

The rich-media interface from web-based electronic networks enhances collaboration between business partners by handling the exchange of complex drawings and images (Vaidya et al. 2006). Those benefits from the synergistic efforts in planning, designing, developing and managing products and services collaboration among supply chain partners in the B2B e-marketplace would be extremely facilitated, such as information and risks sharing, cost reduction, efficiency improvement, and even gaining competitive advantage (Zedtwitz & Gassmann 2002; Moenaert et al. 2000; Ratnasingam 2004).

Via the digitization and virtualization, e-business technologies support globalized collaboration by overcoming the disadvantages of decentralized locations and widespread communication (Vrijhoef & Koskela 1999; Smallbone et al. 2002). E-business technologies enable collaborative work among interorganizational or intra-organizational partners in a synchronous work environment (refer to the details in Figure 2-2 General benefits from e-business).

For example, the electronic data interchange (EDI), as one kind of important e-business technology is applied with the intention of facilitating data integration on different partners' systems in collaboration. Dooley and Purchase (2006) and Alsac (2007) found that suppliers' participation, internal managerial support, and the perceived benefits gaining through e-enabled collaboration would influence these e-business intentions. This implies e-business adoption and collaboration are two positive reciprocal effects.

With the help of computers, Internet and Internet-based technology, globalized collaboration platforms pose a significant effect on manufacturers' value chain, particularly for multinational organizations (Worthington & Boyes 2001). It is mentioned that few organizations have e-business innovation capabilities to manage a sustainable collaboration process and communication mechanism (Loewe & Dominiquini 2006). However, surprisingly little research effort has been put into issues about how and to what extent e-business technologies support performance improvement in globalized collaboration levels. These discussions lead to the following hypothesis:

Hypothesis 4: There is a positive relationship between the diffusion of e-business and collaboration.

3.4.2 E-business diffusion and overall business performance

For the manufacturing industry, e-business innovation generally brings tangible and intangible benefits to business performance which poses influences on performance improvement directly or implicitly (Ward & Daniel 2006). E-business technologies

support organizations to perform their roles and relationships in optimizing business resources (Currie 2004). The potential benefits of e-business involve the increased diversification and improved productivity within the marketplace (Leatherman 2000). Ward and Daniel (2006) believed the digitalized information exchange would reduce cost of data storage and retrieval, information collecting and sharing and direct–responded online research, and consequently support the organization's short-term and long-term development with good visibility. The benefits of a relatively low cost also come from broadcasting effective messages, varying the marketing mix, collecting customer perceptions and feedback, and magnetizing buyers into becoming loyal customers (Albert & Sanders 2003; Ian et al. 2004). E-business adoption also can improve e-customer services, e-learning and data mining (Turban et al. 2006). For accessing the global market, much more detailed benefits from the operational, management, strategic and functional and support sectors for an organization are as shown in Figure 2-5 (General benefits from e-business).

Being engaged with Internet-type technology does not necessarily mean the organization has an e-business adoption capability (Currie 2004). Looking straightforward at the conception of e-business, which is employees, allies, suppliers and customers use the Internet and information communication technology to run their businesses (Chaffey 2006). A sound e-business adoption capability involves relative knowledge, positive attitudes, competitive strategies, qualified techniques and skills to fulfill its roles and relationships and optimize resources allocation via collaborating (Turban et al. 2006). In addition, e-business capability supports the organization to fulfill its roles and relationships in managing and optimizing resources in material flow, information flow and capital flow which, in turn, enhances business performance (Chaffey 2006).

However, the main barriers of e-business adoption in the B2B e-marketplace are the poor telecommunications infrastructure (Huggins & Izushi 2002) and a comparatively inadequate understanding of the potential benefits of the e-business infrastructure such as information and communication technology skills and expertise (Ramsay et al. 2003; Chaffey 2006).

From the literature, considering the relationships between e-business diffusion and

business performance, investigating the remarkable effect of DOI attributes on the performance in electric industries in China is valuable. In addition, such investigations will help this research benchmark the electrical Chinese industries with Western industries about the adoption of innovation in e-business. As a common focus found in literature, more relevant e-business diffusion should result in better information synergy and better responses to changes in the environment. Ultimately, the e-business diffusion issues should broadly facilitate business performance.

Hence, the following hypothesis is offered as:

Hypothesis 5: There is a positive relationship between the diffusion of e-business and business performance.

3.4.3 Collaboration and overall business performance

As Zheng (2006) pointed out, the way toward an innovative enterprise is a total synergy among all trading partners in all domains at all times and takes the total involvement of organizations' strategy, organization, technology, institution, market and culture. As discussed in Section 2.3 and Section 2.6 in Chapter 2, a number of B2B relationship types exist in the collaboration. Buyer and sellers have different comfort levels and seek varying degrees of collaboration (Wang & Archer 2004; Spekman & Carraway 2006). The new practice in business is aiming to organize organizations in a form of global innovative networks in wide areas (Gerybadaze & Roger 1999).

In the collaboration relationship, the highly interdependent participants will enjoy the innovations and the benefits of shared resources from those synergistic efforts, such as marketing assets, brand name sharing or technological component (a new technology developing or sharing) (Zedtwitz & Gassmann 2002). This implies that independent organizations can create greater value to end customers and stakeholders via aligning their business processes or modules than acting alone (Simatupang et al. 2004).

Other viral driving forces and outcomes of collaboration will be the information and risks sharing, synergies achieving, competitive advantage seeking (Wang & Archer

2004); Simatupang & Sridharan 2004). Collaborations provide a win-win solution for almost all the functional needs of an organization, including procurement and manufacturing, new products/service design and developments, R&D in services, human resource management (such as training) , accounts and finance, information technology, products and services, logistics and distributions, and sales and marketing. With the goal of interdependent success, these external organizations involve business processes or modules required strategic joint decision-making, as well as problem-solving techniques, to ensure external partnerships and network design aligned with internal collaboration (Spekman et al. 1998; McLaren et al. 2002; Barrat 2004).

The organizational management and collaboration literature is consistent in the assessment that interorganizational collaborative linkages provide the benefit of knowledge-spillover and resource-sharing (Kogut &Zander 1992; Powell-Koput & Smith-Doerr 1996). These researchers argued that these collaboration networks are key vehicles through which organizations obtain access to knowledge, and use these connections to quickly access specific information and control advantages over others. Especially via the en-enabled collaboration, information transmitted and shared through communication technologies can relatively complete without loss of integrity (Szulanski 1996).

Moreover, collaboration, via the diffusion of e-business, is positively associated with increased communication structurability and long-term inter-organization relationships for participants (Wang & Norm 2004; Wang & Archer 2004). Ultimately, this new type of work can enhance business performance through cost reduction, quick responsibility, efficient management control, and communication and creativity enhancement (Richtner & Rognes 2008). As such, it is hypothesized that:

Hypothesis 6: There is a positive relationship between the collaboration and business performance.

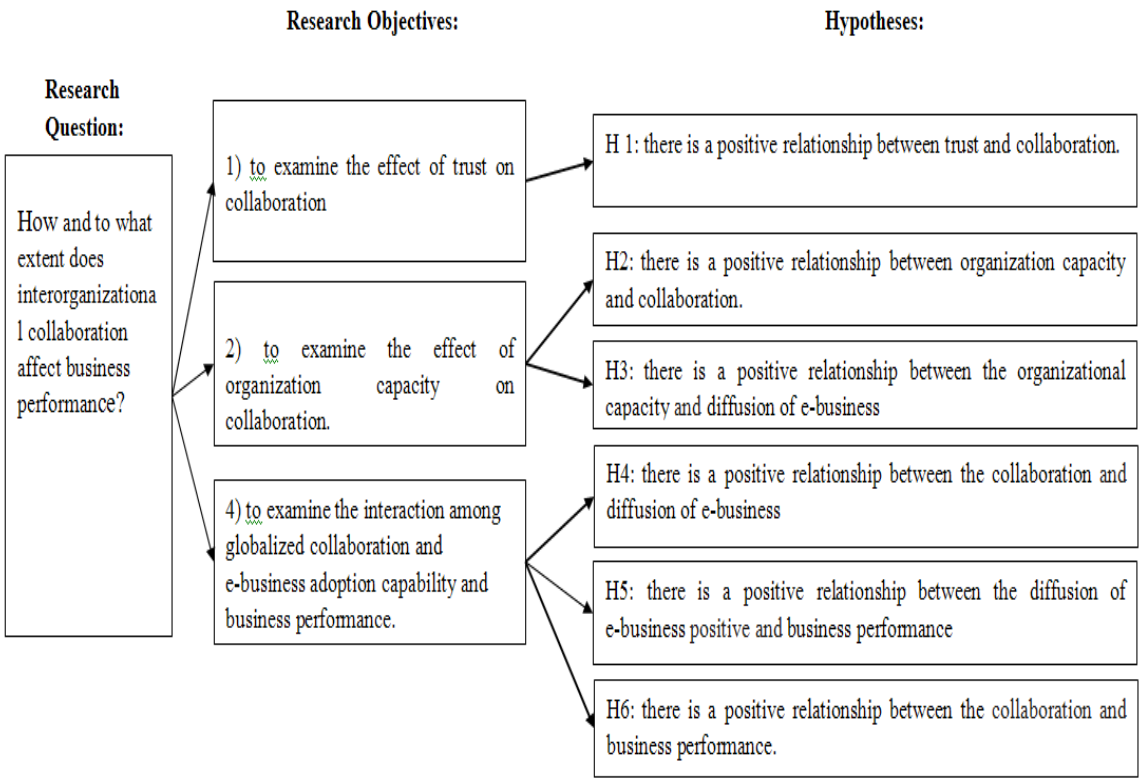
3.5 The research model

The discussion above establishes the research theoretical framework, which consists of

six hypotheses emerging from the interrelationships (Figure 3.2). The related theories are DOI theory and Trust theory, while trust, organizational capacity, collaboration, diffusion of e-business and business performance are regarded as the five ‘constructs’ of the theoretical framework. This research model can contribute to the theories in analyzing and evaluating performance measures emerging from collaboration, as well as globalized collaboration that each organization must cope with in order to enhance its performance.

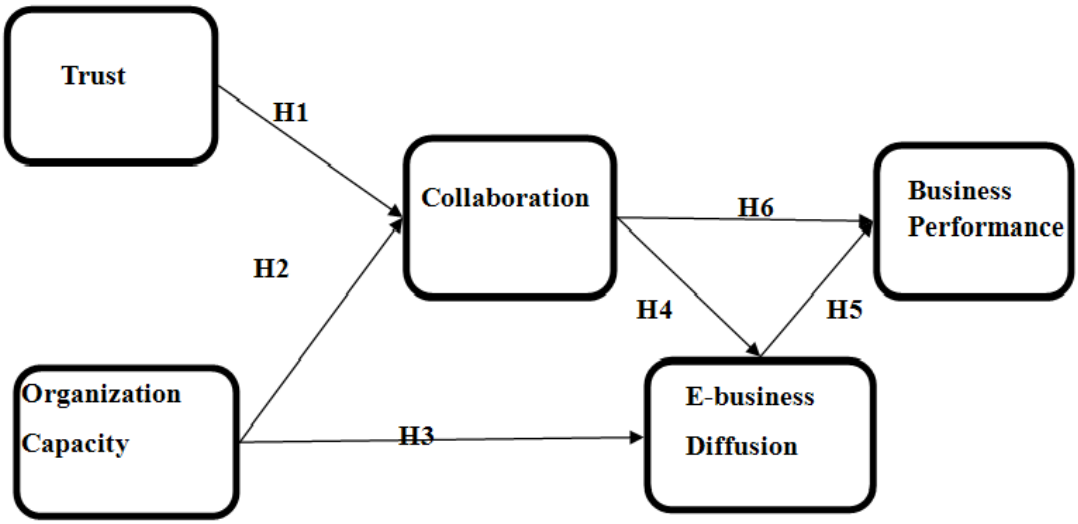
Figure 3-1 establishes the relationships between various hypotheses, research objectives and the research question. Figure 3-2 provides an opportunity to configure the relationships between trust, organizational capacities, collaboration, e-business diffusion, and business performance. Such relationships answer the hypotheses which relate the theories to the research constructs.

Figure 3-1: Relationships between research question, research objectives and hypotheses



This research attempts to develop a framework for collaboration success. To answer the proposal research question: 'how and to what extent does interorganizational collaboration affect business performance', the relationship between collaboration and business performance (Hypothesis 6) is assumed to be affected by the following relationships: the relationship between collaboration and e-business adoption (Hypothesis 4); and the relationship between e-business adoption capability and business performance (Hypothesis 5). The relationships above are directly linked with other relationships discussed above (Hypothesis 1 to Hypothesis 6). Accordingly, the research questions can be answered by answering hypotheses Hypothesis 1 to Hypothesis 6 (as shown in the Figure 3.2 below). Key factors impacting the business performance of collaboration implementation are identified from the literature review as shown in Chapter 2. These factors are then differentiated according to their contribution to the success of collaboration and to the impact on business performance. The final model is then cast in a structural equation modelling framework in the following chapter.

Figure 3-2: The research model with hypotheses



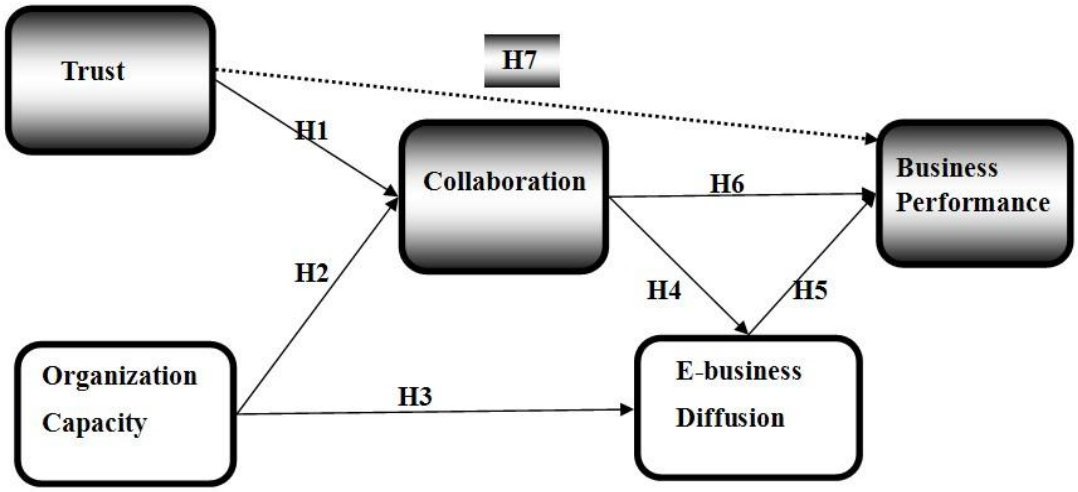
Furthermore, three hypotheses are established to investigate the mediating variable. Mediation testing is used to recognize the effect of collaboration and e-business diffusion that intervene between input and output (Baron & Kenny 1986). Mediator explains the extent of a given variable taken on the relation between the predictor and the criterion. A path diagram as a model for depicting the causal chain of each mediator is introduced in Figure 3-3, Figure 3-4 and Figure 3-5. Two mediators are going to be tested in this research, which are collaboration and e-business diffusion. The mediation effect of e-business diffusion between the relationship of collaboration and business performance has been examined as the main research question as tested by Hypothesis 4, Hypothesis 5 and Hypothesis 6.

The model assumes a three-variable system with two causal paths feeding into the outcome variable. A variable function will be regarded as a full mediator when it meets the four conditions as discussed in section 4.5.6.

As depicted in the Figure 3-3, there is a path from the independent variable to the mediator (Trust – Collaboration), the direct impact of the independent variable (Trust – Business performance), and the impact of the mediator (Collaboration – Business performance). It is assumed that trust cannot directly influence the performance of business and require an implementation of collaboration to realize the encouraging outcome of high trust. In this case, the following hypothesis is estimated:

Hypothesis 7: Collaboration plays a full mediator between Trust and Business performance.

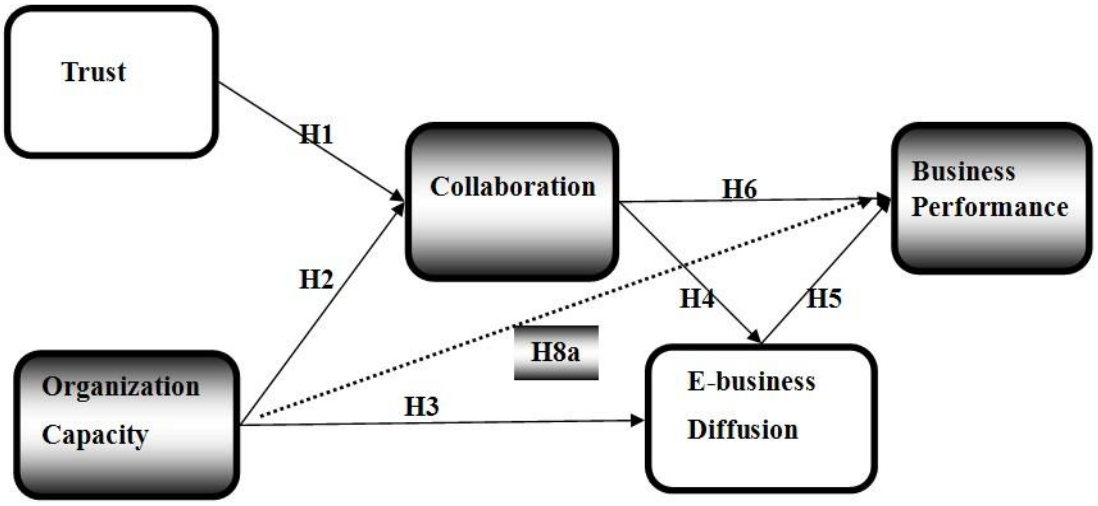
Figure 3-3: Mediation hypothesis of collaboration between trust and business performance



Furthermore, Figure 3-4 assumes a path from the independent variable to the mediator (Organizational capacity – Collaboration), the direct impact of the independent variable (Organizational capacity – Business performance), and the impact of the mediator (Collaboration – Business performance). It is assumed that the improvement of organizational capacity cannot directly influence the performance of business and compels an accomplishment of collaboration to achieve the positive outcome of high organizational capacity. In this case, the following hypothesis is estimated that:

Hypothesis 8a: Collaboration plays a full mediator between Organizational Capacity and Business Performance.

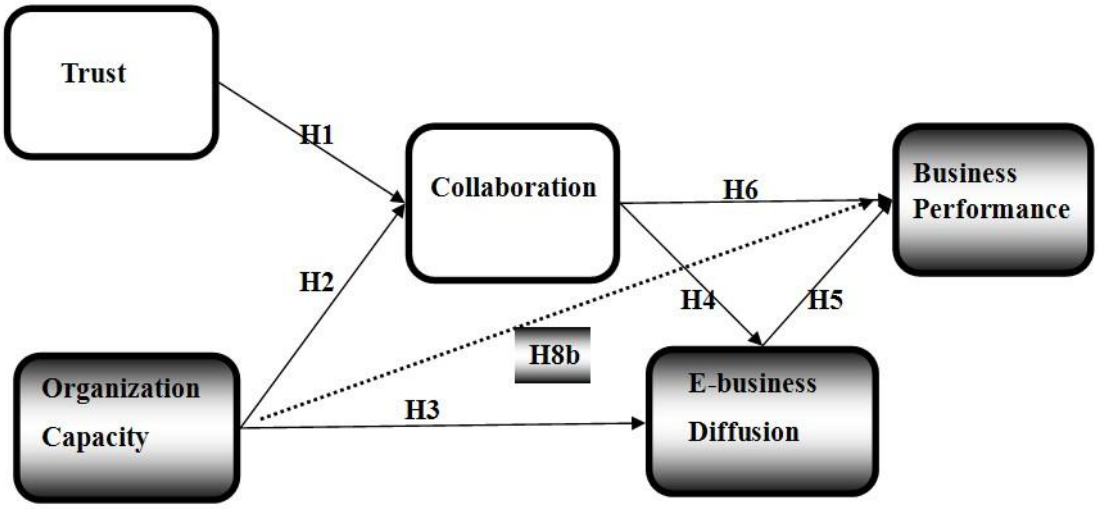
Figure 3-4: Mediation hypothesis of collaboration between organizational capacity and business performance



Moreover, as shown in the Figure 3-5, a path is assumed from the independent variable to the mediator (Organizational capacity – E-business diffusion), the direct impact of the independent variable (Organizational capacity – Business performance), and the impact of the mediator (E-business diffusion – Business performance). It is assumed that organizational capacity cannot directly influence the performance of business and requires an adoption of e-business diffusion to reach the positive outcome of high organizational capacity. In this case, the following hypothesis is estimated:

Hypothesis 8b: E-business diffusion plays a full mediator between Organizational capacity and Business performance.

Figure 3-5: Mediation hypothesis of e-business diffusion between organizational capacities and business performance



CHAPTER 4: RESEARCH METHODOLOGY

4.1 Introduction

Research methodology refers to the specific techniques of data collection and analysis in order to solve a research problem (Dube & Pare 2003). It draws on conceptual essence and systematically acquitted new insights to procure knowledge of a phenomenon within the parameters of inquiry. Both qualitative (face-to-face interview and pilot study techniques) and quantitative (online and mail survey) data collection will be examined.

This chapter will describe the philosophical assumptions and research methods for assessing the hypotheses and structural model discussed in Chapter 3. Section 4.2 will discuss the selection of a positivist approach for the research paradigm. Section 4.3 clarifies the research design of this study. Section 4.4 reports the qualitative research design and the pilot study procedure. Section 4.5 displays the quantitative research design. Detailed sample size, measurement instruments, data collection procedure and data analysis techniques will be provided in this section. A conclusion will summarize the content of the chapter.

4.2 Research paradigms

Research paradigms display a basic system with certain philosophical assumption to guide researchers in selecting appropriate research methods to investigate the perceived reality and possible relationships among various constructs (Sale et al. 2002; Neumann 2003). Normally, there are three paradigms which have been classified according to their differed approaches in phenomenon interpretation in studies: positivist approach, interpretive and critical (Cecez-Kecmanovic et al. 2002)). The criterion of selecting a research paradigm and subsequent research approach is suitability in the context of the research questions (Neumann 2003).

Positivist approach is the most desirable approach to argue on the existence of a fixed relationship within phenomena. Reality is viewed as a truth that already exists 'independent of human perception and his or her tools' (Chen & Hirschheim 2004). The investigator and the phenomenon are regarded as independent entities so the investigator may study the phenomenon without being affected by it or having any effect on it (Sale et al. 2002). The quantitative approach is generally the most commonly used data collection method. Verification and the search for generalizable results is the primary focus. The positivist approach aims to understand the causal relationship among the variables being studied. Researchers using this approach should use objective measures when gathering data. It is scientifically oriented and quantitative in nature, with survey being the most common tool of data collection.

According to the interpretive approach, reality does not exist prior to the undertaking of a research activity and may end when it is no longer acknowledged (Sale et al. 2002). It also differs from the positivist approach in that it assumes the existence of multiple realities, constructed according to each person's perception of reality (Chen & Hirschheim 2004). Whereas the positivist approach treats the investigator and the phenomenon as independent entities, the interpretive approach treats them as dependent on each other. The main intent is to understand the deeper meaning of a phenomenon.

The critical approach operates through the formation of theories and development of normative knowledge (Cecez-Kecmanovic, Janson & Brown 2002), aiming to critique the status quo by exposing deep-rooted, structural contradictions within social systems (Orlikowski & Baroudi 1991). Very few collaboration studies have used a critical approach.

Although the interpretive and critical approaches are valuable alternatives, it is less appropriate for this research. According to a careful evaluation of the appropriateness of the three approaches, there are a number of reasons why the positivist approach is most appropriate for this research. Firstly, the primary purpose of this research is to test hypothetical relationships and identify factors (variables) that affect real life collaboration projects, as well as extending these theories (such as trust, e-business diffusion). The emphasis is on exploring and understanding the proposed relationships

and the way they interrelate to influence the outcome of collaboration via adoption of e-business, and ultimately enhancing the performance of organizations. The relationships among these well-developed variables would be deduced within the sample of electrical industry in China that could be generalised to the relevant population. However, interpretivist research approach in the form of qualitative data collection via pilot study or focus groups is considered unsuitable for seeking generalisation of results (Neumann 2003). Hence, an interpretivist approach is not compatible with the objectives of this research due to its deficiency on deductibility, repeatability, generalisability and difficulty in making quantitative predications (Jonhson & Onwuegbuzie 2004; Yin 2011).

Moreover, positivism is the fundamental basis of natural science (Lee 1991), an objective approach to the pursuit of knowledge. Scientific methods and numerical analysis are principle to illustrating and testing the relationship among variables (Chen & Hirschheim 2004). Underlying philosophical assumptions generally have a heavy influence on the methodology chosen for research. Historically, collaboration research has taken an objective or subjective view, utilizing quantitative or qualitative studies with surveys, pilot study and interviews for data collection. In the context of the research interest of this research, it seems that positivism (a quantitative research method) is appropriate to address the research question and achieve the research objectives (as shown in Figure 3-1).

Moreover, under a positivist approach, the hypothetical and causal relationships among variables are presented in a logical fashion; the hypothesis is either empirically validated or invalidated. When combination with the objects of this research, the positivist approach offers a rigorous approach for testing the validity of the research model and extends theories of trust and innovation diffusion. As such, inferences can be drawn, extending the results from the sample to the larger population. Reliability, validity and statistical significance of the data focused in a positivist approach are processed and carry great importance when analyzing the results.

Furthermore, positivism adopts a quantitative approach in the inquiry process, which grants the researcher generalization and replication of the results (Gable 1994). Common relationships may be discovered among similar organizations, helping to

establish a theory about a given phenomenon. A theory or a general statement about the phenomenon established from the researcher's endeavours to examine and identify relationships across organizations via the positivist approaches is valuable in studying other similar contexts. Collaboration, especially in the spread of e-business diffusion, is generally characterised by lack of consistent and generalisable research (e.g. Turban et al. 2006; Bartle 2007; Chen & Xu 2010). To this end, considering the purpose, research question and context of this research, it is quire clear that a well accomplished positivist research plan is best suited to address the research question of this study, and would significantly contribute new knowledge about the observable reality with a certain degree of confidence.

4.3 Research design

Research methods are vital in the selection procedure for sampling, data collection and data analysis (Tashakkori & Teddlie 2009). Patton (1987) cites four methods of triangulation that can be used: by data source (data triangulation), by different investigators (investigator triangulation), by employing different theories on the same data (theory triangulation), and by changing methodology (methodology triangulation). Methodology triangulation is used in this study to improve the clarity of results and provide greater validity and credibility. The significant disadvantage of methodology triangulation is that it is more costly because it uses more than one data collection method.

The three most common methods used in information systems research are quantitative, qualitative, and mixed methods (Chen & Hirschheim 2004). Quantitative methods are highly generalizable, have high replication and rigor in data analysis, but they are poor in discoverability and relatively inflexible (Gable 1994). It is thought of as an inappropriate and unhelpful means of understanding the social context of information systems and the social and political impact of IS (Cecez-Kecmanovic et al. 2002). Qualitative methods facilitate in-depth understanding of a problem and tend to have high discoverability. However, they are unable to manipulate independent variables, may be wrongly interpreted, and are poorly randomized (Gable 1994). Mixed methods are conducive to triangulation and improve the usefulness of the results.

Qualitative methodology can be implemented via multiple pilot studies and semi-structured interviews in order to explore critical insights and understanding (Neumann 2003). It generally uses words to understand social or human problems from reporting detailed views of informants (Liebscher 1998; Irani et al. 1999). Validity of the research can be enhanced through the quantitative approach as it uses numbers through counts or measurements to obtain precision to a set of observations (Remenyi & Williams 1996). Interviews can also contribute to the quantitative approach by generalizing the insights to a population (Hair et al. 2009). In order to determine whether the predictive generalizations of these theories hold true, quantitative research methods can be applied. This will serve to analyze natural phenomena with statistical procedures where quantifiable measures of variables of interest are possible (Zikmund 1997; Punch 2006).

Combining the advantages from both the qualitative and quantitative methods can provide additional discovery, verification, predictability, validity and reliability within the research design (Denzin 1989; Strauss & Corbin 1990; Flick 1998). This is also known as triangulation. Using both methods together will provide a more complete picture than using either method individually. Using triangulation will enhance the validity through such means as usage of multiple methods, data sources, and researchers (Flick 1998).

Pilot study for six cases interview as the main qualitative research method and surveys as the main quantitative method are used. A pilot study is conducted in Phase 1 because this method is more exploratory in nature and helpful in gathering more in-depth information on individuals, group, organizations, or communities involved in the research. They can also help the researcher formulate a hypothesis and come up with survey questions for the empirical study (Cavana, Delahaye & Sekaran 2001). A survey is used in Phase 2 to help identify if a relationship exists between the variables and the hypothesis. This structured questionnaire is advantageous because it can reach more geographically dispersed subjects, is low in cost, and is more convenient for the subject (Zikmund 1991). Furthermore, it can assess the attitudes, thoughts, and behaviors of a large sample size, adding to the generalization of the results (Cavana, Delahaye & Sekaran 2001). The various stages of the research are depicted in Table 4-1.

Table 4-1: Research methodologies

PHASE 1: Pilot study	Methods: Semi-structured interviews (n (pilot study) =6). Outcome: Investigate in greater depth of the phenomenon, cross-sectional research, and operationalize instruments refining; suitability of questions for the questionnaires
PHASE 2: Survey	Method: Questionnaires to large electric organizations and SMEs (n(survey) =500) Outcome: quantitative data, correlational research, groups comparison (large & SMEs; different types of collaboration, etc.);
PHASE 3: Data analysis	Method: structural equation modelling (SEM) Outcome: hypothesises testing, mediation test, fitness of the research model

4.4 Qualitative research design

4.4.1 Introduction

This research aimed to provide a systematic data analysis on samples drawn from the population of the electrical industry in Wenzhou, China. Interviews for pilot study are the priority in the qualitative research. To start with, sound pilot study objectives should be clarified, as well as the research questions. The number of sample in the pilot study is six, and the interviewees are from top-level managers. The sample selection procedure and administration of the interviews also is also designed for the validation of this research.

4.4.2 Pilot study objectives and questions

The research focuses on the relationships of collaboration and business performance in order to answer the research question: How and to what extent does collaboration affect business performance? The primary objective of the pilot study is to determine the best set of questions for data collection. Specifically, the pilot study investigates the importance of factors influencing collaborative decisions related to business performance. Moreover, the influences from the attributes of trust, organizational capacities and e-business diffusion that exist in electrical manufacturers and their collaborating partners from the industry value chain are examined.

The following research objectives of the pilot study are examined：

1) To explore the importance of attributes of collaboration in the electrical industry;
2) To explore the relevancy of attributes of business performance measures when an organization is involved in collaboration in the electrical industry;
3) To explore the relevancy of attributes of the e-business diffusion in the electrical industry;
4) To explore the relevancy of the attributes of trust in the electrical industry; and
5) To explore the relevancy of attributes of organizational capacities in the electrical industry.

To achieve the five research objectives of the pilot study, a list of questions were pre-prepared as the guideline for the case interviews. As shown in Appendix 6, 55 items were tested: 13 items of collaborative elements (as shown in Table 2-3), 12 items of e-business diffusion (as shown in section 2.4.4), 10 items of trust (as shown in Table 2-5), 13 items of organization capacity (as shown in Table 2-6), 7 items of measurements of business performance (as mentioned by Evans & Lindsay (2008) in section 2.7.1). The feedback collected from the pilot study lead to considerable changes and revision for improving the questionnaires format, enhancing the understandability and conciseness of the survey questions, compressing the length of the questionnaire, and finally reducing the required time and effort from respondents in filling the questionnaire and increasing the response rate.

4.4.3 Sample selection procedure and administration of the interview

Interview sessions were set up with representatives (e.g., general managers, CEOs, marketing managers, operation managers, R&D managers) of SEMs Association members to inquire about their organizations' use of collaboration and e-business technology. Such managers are deemed to be appropriate informants due to their in-depth knowledge about their organizations' interorganizational collaboration activities.

According to different organization size, six Wenzhou electrical industry SEMs Association organizations were selected from the WSMEA database, and the appropriate manager contacted to schedule time for an interview. The measures were developed after successive stages which included theoretical specification, statistic testing and refinement, as indicated by Straub (1989). Preliminary measures of the relative items were developed in the Chinese language based on the literature review. Then, a draft questionnaire with 55 items was distributed to two Chinese GMs, four CEOs and two Chinese experienced officers from the Wenzhou electrical industry SEMs Association who contributed to the review of the measures and provided feedback on the wording, content, precision, length, format and completeness of the survey questionnaire. Potential respondents at the management level were initially notified by phone or email, asking if they would be willing to participate in the pilot study. Those who consented were selected and the questionnaires subsequently sent out. Face - to - face interviews were subsequently carried out.

The format of the interview was semi-structured, allowing the interviewer to come up with and ask new questions on the spot, based on the answers the respondent provided. Questions were purposely broad, allowing the subjects freedom with their answers. Interviews were recorded if the subject consented to it. The six organizations were also used as pilot studies in this research (this aspect is discussed more fully in the following chapter 5). Mostly importantly, basing on the feedback and results from these six case interviews, respondents' perceptions on these 55 items were finally revised and the selection of these attributes for the next development of the research sample and a new survey questionnaire were drafted.

4.5 Quantitative research design

4.5.1 Population and sample

The population of the study consisted of electrical manufacturers located in Wenzhou. The consideration in choosing the Wenzhou electrical industry for this research is according to the unique value of the Wenzhou area as discussed in section 2.2.3. Their long developing history, leading position in this industry sector, opportunities and threats from its highly relied export-oriented economy drives the Wenzhou electrical industry to approach business innovations via a wide collaboration with domestic or overseas organizations. The China Market Yearbook put the figure the electrical manufacturers is located in the Wenzhou area at 80%, so it is expected that the results of this research could benefit this industry, as well as other manufacturing industries in China.

The sampling frame includes 3000 organizations and informants (includes the business size over designated size and below designated size) identified in cooperation with the Wenzhou SEMs Association's (WSMEA) database (a Chinese non-profit organization with an active membership of approximately 3000 Wenzhou electrical organizations). The presence of a well-established network in WSMEA is considered to be a cost-effective and helpful medium in reaching out to organizations across Wenzhou, and this could help in data collection. Furthermore, the existence of a strong research capability in Zhejiang University City College and Wenzhou University (due to the friendly support from college colleagues and students) greatly contributed towards the process of data collection. The WSMEA agreed to help distribute the questionnaires among its members, with the confidence that a sufficient number of questionnaires would be completed and submitted. The WSMEA database provides the size, product segments and contact information. Furthermore, the present awareness of the importance of academic research in transferring knowledge to help resolve industry problems in the Wenzhou area creates a more conductive environment for data collection.

The sampling strategy of this research was aimed to help the selection of the sample from the 3000 Wenzhou electrical organizations. There are various sampling strategies such as purposive sampling, probability sampling, convenience sampling and mixed method sampling. This research use mixed method sampling. For qualitative research, the organizations are selected based on the purpose of answering research question (purposive sampling). All of these managers or CEOs were found to be reputable members of the Wenzhou electrical industry SEMs Association. Therefore, the sample should be representative and comparable.

For quantitative research, a stratified random sampling method is used to select relatively large numbers of potential subjects from the population (one of the frequently used probability sampling techniques). Initially, the population of all 3000 organizations is specified into six subgroups, according to the organization size (large, medium or small organization). Each size of the organization will be covered with an equal probability. Then, these organizations would be further selected which should have already been involved in interorganizational collaboration relationship and implemented certain e-business technologies. Although it meant the selection of the sample would not be completely random, it is expected to be the best strategy to enhance the richness and applicability of the finding. Representatives for the selected organizations were decided based on their in-depth knowledge of their organizations' interrogational collaboration activities. Consequently, in the final analysis the sample for this research is 500 organizations at the data collection stage.

Data analysis techniques are generally sensitive to sample size and can influence the estimation and interpretation of the results. However, there is no consensus about the adequacy of the sample. According to Chin (1998), a minimum of 30 cases are required for linear regression. Hair et al. (1998) estimated that 200 cases are sufficient for the minimal sample size. Schumacker and Lomax (2004) determined 250-500 cases to be appropriate for SEM assessment. For model estimation with multivariate normal data using maximum likelihood bases SEM assessment, the minimum sample size should be equal to five times the total number of indicator item, or ten times the number of the multivariate non-normal data set. In this case, a survey sample of 500 cases is expected to be appropriate for this research.

4.5.2 Research design for the quantitative method

A questionnaire was developed for the purpose of quantitative methodology. There was a tangible concern that the preferable research sample for factor analysis and regression models would require a large number of respondents. Survey data were collected from Wenzhou electrical organizations.

The questionnaire was designed in five sections to measure the perceptions of the subject, as shown in Appendix 7. The five sections tested the influences from trust, organizational capacities, diffusion of innovation, collaboration and corporate business performance. Respondents were asked to rate the expectation and perceptions for importance of factors and for performance of them. A 7-point Likert scale was used to rate the importance and performance, because of its convenience in measuring attitudes via a multivariate analysis of the data (Yin 2003). The selection of a 7-point Likert scale can more accurately display the subjects' attitudes and perceptions key issues than a 5-point scale, and can also provide the researcher with a numeric quantifiable database (Zimund 1997).

This research chose survey as the primary source of data collection. Survey is commonly distributed by mail or web-based questionnaires, telephone interviews, self-administered surveys, and published statistics. Mail questionnaire is the most popular method of quantitative data collection (Tashakkori & Teddlie 2009). Advantages include low cost, ability to administer according to probability samples, fast collection of data, anonymity of participants, low researcher bias, and ease of data analysis. Disadvantages include receiving responses with missing data, the need to keep the survey short, low response rates, non-response to certain items, and response- and non-response bias to open ended questions.

Face-to-face interviews allow the researcher to explain the objectives and clarify any questions of the respondents, correct misunderstandings, and probe for additional information from the respondent, while obtaining high quality data with in-depth information (Tashakkori & Teddlie 2009). However, such interviews can be very costly, time-consuming, and be full of investigator or respondent bias. They are considered impractical for high-volume data collection.

Web-based surveys have become increasingly common in recent years due to their convenience, flexibility, and ability to reach a wide population at a relatively low cost (Neuman 2009). This convenience can lead to higher response rates. Disadvantages include the difficulty in determining representativeness of the sample (coverage error), non-response errors, internet accessibility issues, and the possibility someone other than the intended respondent is completing the survey (Neuman 2009).

Self-administered questionnaires are surveys that are hand-delivered to the intended respondents (Neuman 2009). Data can be collected from a large number of respondents simultaneously, it is a less expensive and time consuming method of administration and the researcher can answer any questions the respondent has. This is not a suitable method if data collection is done at an organizational level because it is unlikely that all organizations from the representative sample would respond.

Mail and web-survey are determined to be the most appropriate methods of collecting data for this study. Yin (2011) provided a guideline to selecting a strategy that is most useful in answering a particular research question. If the researcher asks a ‘what’ question, a survey or archival analysis is most appropriate. This study utilized mostly questions of the ‘what’ variety. After surveying was selected, it was decided that a combined mail and web-based survey would be administered. With this route of administration, response rate would be higher, an online survey is thought to be more appealing to IT-savvy respondents, and the integrative approach would be better supported from an ontological and epistemological philosophical perspective.

In this study, there were two contacts with the potential respondents. Firstly, the survey package included a cover letter (see Appendix 7) would be sent to the potential respondents by facsimile or e-mail to chief executives of organizations using the WSMEA database. The cover letter briefly highlighted the objectives and importance of

the research, explained the benefits for respondents and promised confidence in the data collection. The benefits of mailing questionnaires include cost savings, convenience for respondents, minimal time constraints, anonymity and reduced interviewer bias (Chow & Luk 2005). There is a perception that some organizations' owners or executive manager may not wish to answer the questionnaire or do not comprehend some questions fully in an e-mail questionnaire.

Therefore, in the initial facsimile or email, the requirements about arranging a face-to-face survey with the respondents in the condition of non-response in two weeks were stated. Considering that the Wenzhou electrical industry is located in a relatively concentrated area, there is a reasonable expectation that the majority of responses could be collected via personal contact. This initial contact was also expected to help in follow-ups with the non-response. In addition, the WSMEA posted a letter urging the chief executives to arrange a short meeting with interviewers to answer the questionnaire.

To limit interviewer bias, care was taken to paraphrase the questions with the words used by the subjects (Carson et al. 2000). The WSMEA followed up on the progress of responses as they promised. As discussed with WSMEA, 500 samples were selected randomly with expected response rate of 50%. The required number of responses was achieved. This approach proved to be very useful in clarifying the questionnaires and yielded a considerable increase in responses.

4.5.3 Ethics approval

The confidentiality of proprietary data, privacy and accuracy of reporting was ensured and explained to all respondents (Davis 2000). Privacy rights were respected when the survey was conducted under anonymity. Research purpose and undertakings were properly displayed in the form of an introductory letter. The research questionnaire also contained the name and contact information of an ethics committee representative if the respondent had any questions related to policies, conduct of the study, or their rights as a participant.

4.5.4 Measurement instrument

Construct validation is a vital process in evaluating the prosperities measurement model. It covers four dimensions: content validity, construct reliability, convergent validity and discriminate validity (Rong 2010). Content validity exams the item measurements; and sampling should be deducted and designed appropriately and systematically (Straub 1989). Often in research, a pilot testing of the survey instruments or measurements items is carried out to access the content validity.

Construct reliability is another major criterion to access the consistency or stability of a measure across different samples in evaluation of the measurement model (Cavana, Delahaye & Sekaran 2001). Reliability can be measured by the indicator inter-correlation (Cronbach's alpha is taken into account that all indicators are equally reliable) or composite reliability co-efficient (assumes that indicators have different loading) (Henseler, Ringle & Sinkovics 2009). Mostly, reliability is tested for using the Cronbach's alpha value (Cavana et al. 2001). The alpha value can range from 0.00 to 1.00. A smaller value indicates less reliability, whereas a larger value indicates high reliability. The recommended threshold for assessment of reliability is 0.7 (Rong 2010). A Cronbach's alpha value of 0.7 or higher is considered acceptable, so several items with lower alpha values are omitted from the study. This reduction process is necessary because sometimes respondents will not answer a question if it is too long or too difficult to answer (Hair et al. 2009). They may also superficially scan for an answer they think will help them complete the questionnaire faster (Folz 1996).

The quality of the measurement model is also established by the construct validity, which contains two-fold validation procedures which are convergent validity and discriminant validity. Convergent validity provide an estimate of the degree to which multiple items of a construct are in agreement with one another and measure one and the same construct (Henseler et al. 2009). Item loadings for individual item (indicator) for each latent variable (construct) help determine the convergent validity. It is normally evaluated by the AVE (average variance extracted) values of 0.5 or above to demonstrate a high convergent validity (Diamantoupoulos & Winklhofer 2001). It means that underling latent variable is able to explain at least 50% variance in its

assigned indicator items.

Discriminant validity accesses the distinctness of the construct components (Henseler et al. 2009). The adequacy of discriminant validity is accessed by the square root value of AVE of a latent variable should be more than the correlation of the latent variable to other latent variables and the loading values of the assigned indicator items is more than all its cross-loading (Henseler et al. 2009). A further discussion and assessment of the validity and reliability of the measurement model of this research is provided in Chapter 6.

Table 4-2: Quality of the research design

Quality Test	Definition
Content validity	● Appropriately and systematically designed item measurements and sampling
Internal validity	● Establish phenomenon in a credible way.
External validity	● Establish the domain to which the research findings can be generalized.
Construct validity	● Study operational measures for concepts ● Cover the content reliability, construct reliability, convergent validity and discriminant validity
Convergent validity	● An estimate of the degree to which multiple items of a construct are in agreement with one another, and measure one and the same construct
Discriminant validity	● An assessment of the distinctness of the construct component
Reliability	● Demonstrate operations of the research can be repeated with the same results.

4.5.5 Methods of data analysis techniques – the selection of Structural Equation Modelling

This study carefully considered which data analysis tools could be used to process the data to achieve its research objectives. The chosen methods of analysis also should match well with the underlying positivist paradigm and quantitative approach taken by this research as discussed early in section 4.2. The process of data preparation and analysis is carried in three key phases as shown in the Table 4-3. All the data will be entered into SPSS and variables coded, as shown in Appendix 2 (Abbreviation in the research model). It presents the study variables and their coding schemes as used in data analysis presented in Chapter 6.

Table 4-3: A brief process of data preparation and analysis

Data entry	1. Coding the data in SPSS 2. Entering the data in SPSS
Data preparation	3. Descriptive statistics and frequency distribution analysis by SPSS 4. Handling missing data by SPSS
Data analysis	5. Analysis of reliability and validity by SPSS 6. Structural equal modelling by AMOS 7. Mediation testing by AMOS

Researchers commonly employ multiple dependent and independent variables in a single study, test relationships among latent variables that cannot be directly measured, and try to avoid measurement errors in the variables being studied. Multiple regression, factor analysis, and principle component analysis – all first generation analysis techniques – are limited in satisfying the aforementioned needs of researchers (Chin 1998). The partial least square (PLS) approach to SEM, a variance-based technique, is a component-based tool that employs a least-squares estimation procedure. It offers different assumptions on measurement scales, sample size, and residual distribution (Chin 1998). Co-variance and structural equation modelling (SEM) have become more prominent in recent years (Byrne 2001). These techniques are more suited to analysing a complex set of relationships that involve a number of regression equations than the first generation techniques. As a result, SEM is selected as an analytical tool for this study.

A structural equation modelling (SEM) technique is selected in this study in order to

determine the influence of trust and dependency and their interaction on collaboration adoption decisions. There are varieties of software available for SEM analysis, most notably LISREL, AMOS and PRELIS (Garson 2008). For this study, AMOS software version 7 is used. SEM is chosen rather than multiple regression analysis for a number of reasons. SEM has greater flexibility in allowing interpretation in the face of multi-collinearity (Garson 2008). It uses confirmatory factor analysis to reduce measurement error by having multiple indicators per latent variable. Overall desirability of testing models is used rather than coefficients individually and SEM also permits the testing of models with multiple dependents. Finally, it is supported with a graphical modelling interface. This study involved an estimation of a series of simultaneous equations with multiple indicator constructs, so SEM is used to improve the statistical estimation between dependent and independent variables (Bollen & Long 1993).

Additionally, a mediation test is another important perspective in assessing the research model. To test the mediation effect, this research adopted the AMOS technologies and four conditions from Baton & Kenny (1984). Firstly, a mediating variable on the independent variable is regressing, and the regression coefficient is significant. Secondly, a dependent variable on the independent variable is regressing, and the regression coefficient is significant. Thirdly, an independent variable on the mediating variable is regressing, and the regression coefficient is significant. Fourth, an independent variable on both the mediating and dependent variables is regressing, and the regression coefficient of the mediating variable is significant, whereas the regression coefficient of the dependent variable is decreased. When the regression coefficient of the dependent variable is still significant, it implies the mediating play as a partial effect, and when the regression coefficient of dependent variable is insignificant, it implies the mediating play as a complete effect. When the four conditions are met the mediator is considered as the full mediator (Baron & Kenny 1986; Osborne & Costello 2005). In this case, four tests are designed for each potential mediator (collaboration and business performance), and the results of the mediation test are displayed in Section 6.3.4.

The fitting of the SEM is a recursive process that typically involves five steps (Fenlon & Sherriff 2008): specification of the model; identification of the model; estimation; testing the fit of the model; and re-specification of the model. The measurement model fit includes the Incremental fit indices (GFI, NFI, CFI, IFI) and absolute fit indices

(such as RMSEA), and the acceptable threshold level are indexed below.

The drawback of SEM is that a large sample size is recommended. The accuracy and stability of SEM results decline with a smaller sample size, as well as with an increasing number of variables (Norusis 2006,). Much has been discussed on the ideal sample size to obtain the best results. Stevens (2002) conjectured that 15 cases per measured variable in SEM are reasonable. This is because SEM is closely related to multiple regression analysis, which has a rule of thumb of 15 cases per predictor. If the data is normally distributed with no evidence of missing data or outlying cases, Bentler and Kano (1990) stated that five cases per parameter estimate would be sufficient. According to Loehlin (1992), in a model with two to four factors, the researcher should collect at least 100 cases, but 200 would be more ideal. When data is not normally distributed or is flawed, larger samples are required. Using smaller samples will lead to more convergence failures (the software does not arrive at a satisfactory solution), improper solutions (including negative error variance estimates for measured variables), lowered accuracy of parameter estimates, and a large volume of standard errors (Byrne 2001). This is because SEM program standard errors are computed under the assumption of large sample sizes.

Table 4-4: Acceptable threshold levels of the main model fit index

Fit Index	Description	Acceptable Threshold Levels
Absolute Fit Indices Chi-Square	Indicates the differences between expected and observed covariance matrices	Low Chi-Square relative to degrees of freedom with an insignificant ρ value ($\rho > 0.05$)
CMIN/DF	Assesses the fit of a model in confirmatory factor analysis and modelling in which the minimum discrepancy is divided by its degrees of freedom	Values less than≤ 3.0
RMSEA	Analyzes the discrepancy between the hypothesized model, with optimally	Values less than 0.07

	chosen parameter estimates, and the population covariance matrix	
GFI	Analyzes how well a statistical model fits a set of observations	Values greater than 0.9, with higher values indicating better model fit.
AGFI	Adjusts the GFI for sample size	Values greater than 0.9, with higher values indicating better model fit.
NFI	Analyzes the discrepancy between the chi-squared value of the hypothesized model and the chi-squared value of the null mode	Values greater than 0.9, with higher values indicating better model fit.
CFI	Analyzes the model fit by examining the discrepancy between the data and the hypothesized model, while adjusting for issues of sample size in the chi-squared test of model fit, and the NFI	Values greater than 0.9, with higher values indicating better model fit.

Source: Hu & Bentler (1999); Steiger (2007)

4.6 Conclusion

This chapter has provided a detailed description of the methodology employed in this study. The justification for positivist approach has been covered. Triangulation of data collection methods is used to increase the clarity of results and provide greater validity and credibility. In this case, this study on collaboration within business performance involves both qualitative and quantitative approaches, specially using pilot study and questionnaires. The pilot study is carried out to maximize validity and reliability from responses. The detailed pilot study objectives, research questions, sample selection procedure and administration of the interview are discussed. Moreover, the population and sample of the survey and the sampling, the research design, the distribution of the survey and collection of data procedure, measurement instrument and main methods of data analysis techniques are described. SEM technique is primarily used to analyze the data. Based on the justifications, the data is collected through a combination of an e-mail and face-to-face survey, which yielded a high response rate of 80% as discussed in Chapter 6.

CHAPTER 5: PILOT STUDY FINDINGS

5.1 Introduction

This chapter discusses the findings from the pilot study interview conducted with six organizations in the Wenzhou area. The main purpose of the pilot study is to combine those attributes which perceived to have similar meaning and compact the questions for the following survey. The interview questions are displayed in Appendix 6. Detailed information and the key findings are summarised according to the content of interviews from the pilot study.

Perceptions extracted from the electrical organizations are valuable in validating the questionnaire according to the context of the Wenzhou electrical industry. They are HG, DG, JEA, ZG, ZE and QE, which are recommended by the WSMEA according to its reputation and achievements in the globalization, interorganizational collaboration and e-business adoption. The face-to-face interviews with organizations' managers were conducted with the period of March 2010 to January 2011. The discussion will focus on three perspectives: challenges from the innovation inside the organizational capacities for collaboration, the drivers and barriers to trust in the industry, as well as from e-business diffusion.

5.2 Brief background of the cases

This pilot study presents a brief background introduction of six organizations from the Wenzhou area with the focus on how the mission and vision of this organization is keeping pace with the times via collaboration. According to the turnover, the selected organizations are three large organizations (HG, DG, and JEA, with turnover larger than 50 million dollars), two medium sized organizations (ZG and ZE, with turnover between 10 million – 50 million dollars) and one small sized organization (QE with turnover of less than 10 million dollars).

These six organizations are suggested by the secretary-general of WSMEA Mr. Lu.

They are experts in their particular electrical products field, and all have a long history of exporting businesses and an excellent reputation within their global collaboration relationships. It is understood that it is a worthy perspective to adopt collaboration as well as a virtual collaboration in the organization, as shown in Table 5-1. It is evident that collaboration always exists between manufacturers and wholesalers. The main reason would be these electrical manufacturers are limited in their resources and try to focus on specialization, and the wholesalers are their main customers rather than retailers. The involvement from suppliers and customers enhance the business performance on products and services R&D, marketing strategy and IT system integration, etc.

Table 5-1: Brief description of the cases and collaboration situation

Org. Name	Sales in 2010 (Million)	No. of Employee	No. of the Partners Involved In the Collaboration					
			Manufacturer	Distributor	Wholesaler	Retailer	Agent	Financial
DG	22000	14000	>300	50	300	68	5	5
HG	10000	8000	>300	100	250	20	10	2
JEA	8000	2000	>200	4	80	/	5	3
ZG	350	1500	150	10	18	8	3	3
ZE	185	400	32	4	7	5	2	2
QE	70	48	40	9	4	6	1	/
Total			>1022	177	659	107	26	15

5.2.1 Case background of DG

The first case is DG, located in Liushi Technology Development Zone, Yueqing, Wenzhou. It was established in 1984 and headquartered in Wenzhou. DG is the first and the largest private-owned electrical enterprise in China. DG specializes in the manufacturing of electric power transmission and distribution appliances. It products cover the full range of high and low voltage switchgear sets, along with about 300 series of components in about 30,000 specifications. Currently, DG has more than 14,000 employees, and its sales revenue in 2005 was euro 1.25 billion.

Through outstanding performance, DG has earned an excellent reputation and received

many national awards. As shown in Table 5-1, the majority type of the partners involved in the collaboration is the wholesalers and then the manufacturers. The specialisation of those wholesalers from the worldwide market leads to more efficient and effective distribution of the organization's products. As mentioned by the Director of International Collaboration and Development Departmentm Mr. Zhang, 'a wide collaboration with Germany's SCHNEIDER is very important in providing the market information and market contact efficiency, and reducing market transaction costs when access to the global markets'.

Additionally, collaboration with other manufacturers, no matter the size of these organizations, means DG can always benefit from their innovation in material, production, and even R&D of their products. With China's WTO entry, DG plays an active role in the electrical industry by exploring new opportunities in doing business with people all over the world on the basis of equality and mutual benefit. Now DG has expanded its business into more than 40 countries and has established a major technology innovation base in Germany, called Frankfurt R&D center. DG has also put a great effort into promoting their products to global customers. In order to create a good brand image, DG chose retailers with a global reputation, such as Wal-Mart. The types of collaboration with those retailers are varied, such as co-branding, OEM, license, and co-Shoppe.

A principle of 'human resource is the core' is regarded as the key organization value to continually promote the competitive strength in DG, emphasized by Mr. Zhang. DG not only established effective measures and favourable treatments for the management of human resources to maintain a relatively low flow rate of employees (only 8~10%), but also adopt the policy of keeping advanced talents and favourable enterprises by emotion. This multi-beneficial principle in managing a trusted relationship with employees inside and business partners outside the organization promotes DG to a faster and better developing track, which is valuable to be investigated.

5.2.2 Case background of HG

The second case is HG, located in Yueqing Central Industrial Park. It is a large-scale Private Enterprise Group in Wenzhou, regarded as China's Top 100 Growth Enterprises.

HG was founded in 1986. HG is the first listed electrical organization on the Shanghai Stock Exchange (SSE) from the Wenzhou area. After 20 years of developing, HG is currently the leading manufacturer in the High-voltage Electric Apparatus Industry and Wind Power Generation Industry in China. There are more than 8,000 employees working in its 7 subsidiary organizations and 6 joint-venture organizations.

The developing history of HG represents the evolution progress in Wenzhou's electrical industry. From a small family factory of electrical circuit changers to an international electrical manufacturer, HG diversified its products arranged from high, medium and low voltage switchgear products, whole set of power automation system, to the integration device of wind engines. In this case, a sound collaboration with different qualified distributors is vital for meeting special packing and transportation requirements in HG's global sales network, as shown in the Table 5-1.

HG's business model in international business is on-demand production. HG pays much attention to its customers, suppliers and employees based on e-business technologies. Collaboration, and being equipped with advanced management and operation techniques, did help HG catch the opportunities for growth. HG also benefits from collaboration with agents such as IT vendors (e.g. Jindie Software, Ruizheng Technology Services), marketing research (e.g. Iresearch.com), human resource and training (e.g. Huabao HR, Ruizheng Consultancy). These outsourcing activities greatly improve organizational efficiency and product performance, as mentioned by Mr. Tang.

However, as mentioned by the vice-director Mr. Chen, 'the key secret of success is the collaboration with sophisticated partners with advanced techniques' (such as the ABB from Switzerland), market resource (such as B&Q supermarket), and R&D capability (such as ALNODI from German). Compared to other cases, HG has a tight collaboration with these agents especially the marketing and R&D side. Moreover, because HG is a listed organization, collaboration with financial institutions such as the China Commercial Bank, China Mingtai Bank and certified public Accountants and Laws has resulted in a financial soundness.

5.2.3 Case background of JEA

JEA is one of the largest manufacturers and exporters of low-voltage electrical equipment in China and is located in the Liushi Technology Development Zone, Yueqing, Wenzhou, China. Founded in 1985, JEA has rich experience in the production of circuit breakers, pushbutton switches, pushbutton switch boxes, counter series, electrical accessories, contactors, cable & wire, terminal connectors, instruments meters and so on. JEA has developed to a large electrical organization with more outstanding and higher technology-content products. It has gained ISO9001 certification for international qualified quality system, CB, CCC & CE approval.

Mr. Zhao, the director of Administration and Management Department, regarded 'the success of JEA as the outcome of the efforts on the technology innovation and the interorganizational collaboration'. Over 120 engineers and technicians assure the high standard production line and checking instruments in the organization guarantee the superior quality and the lowest cost of the products. Moreover, JEA has established long term business connections with clients from all over the world. It successively set up nine trading offices and marketing branches in Europe, North America, South America and Middle East to enhance excellent quality and first-class services for customers in more than 30 countries and areas. In the era of globalization, as Mr. Zhao mentioned, 'JEA is standing in the forefront of development of internationalization strategy and making great efforts to realize the global marketing strategy'.

Additionally, JEA adopted e-business technologies in 2003. From the beginning of using email, e-fax system and websites, newdays, JEA has spend more than seven million RMB in developing their online conferences system and relative hardware to manage a synchronic discussion, e-customer relationship management (J-CRM system) to handle feedback from customer in real time, and ERP system in distribution and logistics management. 'These innovations from e-business technologies enable JEA to keep up with the fast changing global market', as stated by Mr. Zhao.

5.2.4 Case background of ZG

ZG was founded in March 1985 and located in the Qingjiang Industrial Park, Yandang

Shan National Scenic Area in Wenzhou. Due to the developed transport facilities of the highway, ZG is the earliest joint-stock enterprise in Wenzhou, as well as in Zhejiang province. The products class of ZG is simple, but its expertise on the production of electrical drills and related accessories brings large orders from overseas. The products are exported to the United States, Canada, Australia, Germany, Southeast Asia, the Middle East and other countries and regions.

'With the purpose of gaining competitive advantage, GZ has won the 100 national patents due to the wide collaboration with other manufacturers to advance the technology content of the product and reduce the producing cost', emphasized by Mr. Ji, the director from the Administrative Department. For example, it directly invests in coal and metal mines in Sichuan China to reduce the cost of raw materials; build Shanghai Jiading base (42,000 square meters) for seat chassis series, Zhejiang Anji production base (4,000 square meters) for drill movement, Shanghai Songjiang base (30,000 square meters) for auto parts. Now, ZG owns 40 computers model injection machines, 50 automatic press machines, 9 automated assembly lines, one plasma surface treatment production line and two advanced mode processing center and new product trial R&D centers.

With the value of 'heavy contract, keep promise', GZ's comprehensive strength has resulted in numerous rewards over the years as the Top Ten Export Enterprises in Yueqing City, the Key Private Township Enterprises in Zhejiang Province, Wenzhou City Civilized Unit, Yueqing City Star Enterprise, Bank credit AAA enterprises, and so on. 'These reputations create positive feedbacks of a growing sales year by year', as stated by Mr. Ji. ZG has established five sales organizations in Beijing, Shanghai, Guangdong, Zhejiang, and three sales branches in United States, Australia, and Germany. Facing the tide of economic globalization, ZG tightly follows the strategy of 'Professional, Technology, Internationalization', and the cooperate value of 'Unity, Practicality, Innovation and Dedication'. ZG believes these spirits would encourage people in ZG to work toward a world class electrical drill manufacturing enterprise.

5.2.5 Case background of ZE

WE is a one of the most professional high-tech enterprise which merges researching,

manufacturing and selling of electromotor products, such as permanent magnetism DC planet gears shifting electric machinery, gear speed-down electric machinery, micro-electric machinery small modulus column involutes gears, etc. The products of ZE have been exported to countries such as South-east Asia and American. By focusing on building a good reputation over the years, ZE has increased its customer base in the increasing international market.

ZE adheres to corporate value of 'quality first, customer first, pioneering and innovation, honest business' in managing the customership and partnership. It greatly concentrates on the quality of its products, and strictly adheres to the National Electric Machinery Standard, ISO9001-2000 Quality Management System and CE Safety Standard of Europe Union. Furthermore, in order to produce satisfactory and secure products, ZE set up a professional exam laboratory to test the electric machinery products and check the performance according to these quality criteria. As mentioned by Mrs. Huang from the International Trading Department, 'ZE needs partners from home and abroad market to help the customization of the products' design, assembling and marketing'. In dealing with these partnerships, mutual benefit and collaborative development is the main value retained by ZE.

One of the big innovations in ZE is access to the online e-marketplace in 2010. ZE has spent 4 million RMB on adoption of e-business since 2005. These techniques include the organization webmail system, OA system, TU inventory and logistics management and control system. The launching of the online real-time ordering system in 2010 implies the success of the integration of the front-desk service and back-up supporting systems, which is enough to make ZE proud as a developing electrical organization. As mentioned by Mrs. Huang, 'this system enables the wholesalers and retailers in worldwide place the orders online with no cost and the real time information can be shared by the suppliers, associated manufacturers and distributors'. The advantages are noticeable in the reduced communication costs and efficiency in process management.

5.2.6 Case background of QE

QE was founded in 1984 as a small factory. Through more than 20 years of continuous

efforts. QE has developed into a normative enterprise with the size of their building covering 21000 square meters in Yueqing Central Industrial Park and includes, for example, 10 sets of injection machines, 6 sets of the auto production lines, 2 sets of electricity pulses, 2 groups of engines (150 kilowatts and 30 kilowatts), 2 sets of milling machines, etc. Mrs. Zhou, the CEO, is very proud of the self- developed semi-auto and auto assembly machines used producing the electrical optical jack, socket and socket board. All the products are extensively applied to home appliance equipments such as DVD, TV set, set-top box, etc.

QE also focuses on establishing a solid supply and demand relationship with numerous manufacturers, such as KonKa, AlCO, Hisense, Panasonic, Thomson, Samsung, Bose etc. These brand enterprises provided updated information about the rapidly-changing market requirements. To match the requirements from collaborating partners, QE is forced to improve organizational management capacities and continuously brings in talents and advanced equipment. QE has passed the certificates of ISO 14001:2004 and ISO 9001:2000. ‘In turn, the collaboration brings a more valid modern enterprise management system and clear development plan’, as Mrs. Zhou mentioned.

Owning to the strong techniques of strength, professional production experience, superior quality and excellent after-sales service, the enhanced better corporate image of QE has successfully extended to the sell network in domestic and international markets. QE also has three branches in Guangzhou, Xiamen and Shenzhen of China. Moreover, as Mrs. Zhou pointed out, ‘although the products of QE is very focused, the increasing corporate size and complexities from expanded collaboration relationships sometimes create conflicts, such as the costly model re-production, redundant materials, cycle time, response time, etc’. Even though there are certain e-business systems installed in the business, Mrs. Zhou deeply welcomed any research on how to improve the organizational capacities in managing these collaboration conflicts.

5.3 Discussion

5.3.1 The importance of trust in the electrical industry

Under the premise of constant resource allocation optimization and improvement of core businesses, electrical organizations are working hard to make full use of all possible resources and opportunities to create more value for leading in the electric industry. As mentioned by Mr. Wu from DG, 'a good relationship is very important, and in many times, we will invite some trade partners participate on the discussion of new product series. They always bring constructive comments and sound advice.'

From a good relationship with domestic and international trade partners, all of these six electrical organizations actively take advantage of the opportunity presented by the fast development of the global economy and the seeking of new economical growth points. In this case, it implied that the need to maintain sound goodwill and reputation is vital in this industry cluster, as shown in Table 5-2. The six electrical organizations stated that they have a high level of goodwill to their partners— not only the large manufacturers but also the small and medium firms. As cited by Mr. Wu, 'the trademark of DG is evaluated as China National Well-known Trademark supports goodwill and trusted image in the market expansion'.

A summary of the six pilot studies on the perspective of trust in collaboration is available in Table 5-2. The reviewed dimensions in Table 5-2 are developed from Table 3-1 (dimensions of trust) in the literature review. Based on this table, the majority of organizations perceived that they have a high level of contractual trust because each of the organizations has systematic contractual and legal criteria, processes and a team to maintain continuous audit of the legal issues to guide their business relationship during collaboration. Since the prices of the raw materials such as steel, copper, aluminium, silicon steel, pipe, and insulation materials have been largely fluctuated since 2007; the relationship in the supply chain is swinging accordingly. 'These organizations always see the short-term interest', said by Mr. Tang from HG. Organizations need to enhance their competitive competence in order to persuade suppliers to give priority in supplying,

as mentioned by Mr. Zhao from JEA. In this circumstance, contractual trust is essential in the interorganizational relationship. Companies such as DG, HG, JEA and ZE all consider contractual trust and competence trust as its competitive advantage.

Manufacturers such as DG, HG and JEA believe if they can help steer their collaborating organizations forward, especially through IT system developments and vendor developments programs, the relationship would be tighter. At the same time, QE, as a small manufacturer, also think that help from or to partners would upgrade the trusted relationship and bring mutual benefits. It also proves these large manufacturers contribute more commitment towards sustaining their collaboration relationships.

However, according to the rapid expansion of production capacity of wind power units in the domestic market, some parts and components will soon be in short supply, and it also will bring about an increase in the price of parts and components. It has forced DG have to adjust the prices of its products and that increase competition. These experiences have resulted in DG reflecting on closer ties among its collaborating partners with the perspective of benevolence and win-win friendliness. But the effect is not remarkable.

Table 5-2: Important trust dimensions of each organization

Organization Name	Contractual	Competence	Goodwill	Benevolence	Friendliness	Reliability	Predictability	Dependability	Customer Oriented	Ability	Integrity
DG	√	√	√	√		√				√	
HG	√	√	√	√	√				√	√	
JEA	√	√	√	√	√	√					√
ZG	√	√	√		√			√			
ZE	√	√	√		√		√		√		
QE	√		√	√			√				
Total	6	5	6	4	4	2	2	1	2	2	1

5.3.2 The importance of developing organizational capacities for collaboration

In order to keep other competitors from encroaching on its market share, these electrical organizations try to display sensitivity in collaboration when dealing with market. For example, through a continuously technical cooperation with these international famous enterprises, DG carries out its development strategy – 'Brand Marketing together with Network Marketing'. The shared information and knowledge not only increases the technological content of products and their quality, but also extensively establishes good relationships within the domestic and international market from its commitments of high organizational capacities. Table 5-3 summarizes the pilot study findings on how organizational capacities of all six organizations impact on their collaboration.

The organizational capacities are especially regarded as the capacities directed the outside collaboration management and then reciprocally integrated into the capabilities of external partners in this research. Therefore, the interviewed organizations see the attributes of reliability, responsibility and power (Table 5-3) as the attributes related to the trust; and traceability and readiness as the attributes of DOI (discussed in the following section). Therefore, these attributes were removed from further testing in the survey questionnaire.

DG, HG, JEA, ZG and ZE believe innovation is the key source for competitive advantage. HG did measure its competition in one market by its ability to leverage market information and a faster reaction to the external environment than their competitors. DG takes 'Science and Technology for Support, Quality for Assurance, Market for Orientation' as its mission to visualize a mission 'to be an international famous excellent managed enterprise'. This mission forced DG to allocate a great effort to improving the level of R&D capability — the innovation capabilities necessary to improve the technological content of products. Most of these six electrical organizations commit themselves to building up their technological competitive advantage through interorganizational collaboration with institutions, universities, government, suppliers and even customers over time, as shown in Table 5-3. At the same time, large organizations doing business tend to have a higher requirement on the organizational

capacities than the smaller organizations, especially in the partnership management. In QE, for example, whose majority of business is with a large manufacturer from Germany, the learning and communication capacities would be more important than innovation capacities.

Table 5-3: Important attributes of organizational capacities

Attributes	Organization Name						
	DG	HG	JEA	ZG	ZE	QE	**Total**
Reliability	√		√				**2**
Flexibility	√	√		√			**3**
Responsiveness		√	√			√	**3**
Responsibility	√	√				√	**3**
Traceability		√				√	**2**
Readiness	√				√		**2**
Power			√				**1**
Partner Development	√	√		√			**3**
Relationship Management	√	√	√	√	√	√	**6**
Learning Capability	√	√	√	√	√	√	**6**
Communication Capability	√	√	√	√	√	√	**6**
Problem Solving Capability	√	√		√			**3**
Innovation Capability	√	√	√	√	√		**5**

Moreover, the increasing intensity of knowledge and information means organizations cannot obtain all the knowledge or resources on their own. To improve their learning capacities is critical to fast solutions for specific problems and access to new insights, as mentioned by Mr. Wu from DG and Mrs. Huang from ZE. In this case, problem solving capability can be included in learning capacities, as indicated in Table 5-3. Additionally, as revealed in the six interviews, a sound communication capability not only means the language, but also includes the knowledge base to deal with the conflicts arising from difference of cultures, performance measures (such as response time), power, roles, strategy, values, goals and so on.

One interesting thing is that these electrical organizations perceive international

certificates as the basis of partner development and relationship management. In order to establish an effective brand image and successfully export to overseas markets, the majority gained international certifications such as Management System Certificates (ISO14001:2004 and ISO 9001-2000), as well as specified KEMA certification for the European electrical market, CPI test in India, etc. 'We learn a lot from the process of getting these certificates, and the benefits rewarded the efficiency and effectiveness', pointed out by Mr. Zhao from JEA.

5.3.3 The important attributes of collaboration

Collaboration takes place in organizations' trading channels (such as with suppliers) and also with other industries (such as Audit and other service industries). Collaboration involves strategy, organization, products, technology, institution, market and culture. Manufacturers would have different comfort levels with different partners and seek varying degrees of collaboration. Table 5-4 summarizes the different types of collaboration the six organizations engaged in and the main perceived attributes of collaboration.

Table 5-4 summarizes the pilot study findings on how the six organizations collaborate with their partners. Firstly, the study found that all organizations, regardless of their size or products, state that they have promoted their products to the global market with the assistance of partners by adjusting their products to match market preferences. This is regarded as the first collaboration stage in globalization. The main purpose of organizations carrying out collaboration in the field of manufacturing, marketing and logistics is partners contribute to the market performance and cost-efficiency, as detailed in Table 5-4.

Table 5-4: Perceptions of collaboration

Organization Name	**The types of collaboration**	**Selected collaboration attributes**
DG	• Manufacturing force – cost and efficiency • Marketing/promoting force – market contact, market coverage and market share; customer retention, customer relationship building, customer satisfaction • Technical force –technical assistance; transfer of new knowledge and new techniques • Logistic force –delivery time and distribution efficiency; procurement cost-saving • Innovation force – flexible, responsive and open structures; R&D network • Strategy force – goal congruence with partners for excellence	• Goal Congruence • Coordination • Resources Sharing • E-Technologies • Knowledge and Information Sharing
HG	• Manufacturing force – cost and efficiency • Marketing/promoting force – Market contact, market coverage and market share; ventures for risk control • Technical force –transfer of new knowledge and new techniques • Training – professional • IT support – technical assistance; system development • Logistic force – delivery time and distribution efficiency; procurement cost-saving • Innovation force – shorter product life-cycles; R&D network; customization • Strategy force –congruence of goal and strategic value	• Strategic Value • Processes control; leadership • Commitment • Trust • Resources Sharing • E-Technologies • Knowledge and Information Sharing • Risk Management

JEA	• Manufacturing force – cost and efficiency • Marketing/promoting force – Market contact, market coverage and market share; market information; customer relationship building; • Technical force –transfer of new knowledge and new techniques; procurement cost-saving • Training – professional • Services – professional • IT support – technical assistance; system development • Logistic force – delivery time and distribution efficiency • Innovation force – shorter product life-cycles; R&D network; customization	• Processes governance • Commitment • Coordination • Trust • Resources Sharing • E-Technologies • Knowledge and Information Sharing • Risk Management
ZG	• Manufacturing force – cost • Marketing/promoting force – Market contact, market coverage and market share; customer relationship building • Training – professional ; gaining new knowledge and new techniques • IT support – technical assistance; system development • Logistic force – delivery time and distribution efficiency; procurement cost-saving	• Structure • Trust • Resources Sharing • E-Technologies • Knowledge and Information Sharing

ZE	• Manufacturing force – cost and efficiency • Marketing/promoting force – Market contact, market coverage and market share; information; risk control; warranty providing; • Logistic force – delivery time and distribution efficiency • Innovation force –product development	• Governance • Interdependence • Resources Sharing • E-Technologies • Knowledge and Information Sharing • Risk Management
QE	• Manufacturing force – cost • Marketing/promoting force – Market contact, market coverage and market share; information; risk control • IT support – technical assistance • Logistic force – delivery time and distribution efficiency • Innovation force – shorter product life-cycles; customization	• Trust • Resources Sharing • E-Technologies • Knowledge and Information Sharing • Risk Management

Furthermore, the organizations DG, HG, JEA and QE have also undertaken collaboration to develop new product series with local or overseas organizations. This is the second stage of globalized collaboration espoused by Ciborra (1992) and Ireland et al. (2002). To maintain product competitiveness, these four organizations established international departments (such as DG) or outside relationship managements department (such as ZE). It seems the size of the organization does not affect the processing of collaboration in product R&D.

However, only the large organizations, DG and HG, progressed to the third stage of collaboration that concentrates on long-term development strategy. To maintain their leading position in the electrical industry, organizations need to concentrate on integrating the high-tech achievements from these research institutes and strategic partners nationwide and worldwide. However, 'if an organization wants to keep their core competitive advantage by collaborating with excellent organizations, it requires a high level of organizational capacities, flexible internal structures, IT systems, diversified strategy to spurs the emergence of multi-national alliances', as pointed out by Mr. Wu from DG.

Similar to the whole industry, HG fails to repeat technology innovation in its product portfolio. HG sends employees in managing roles to other organizations and countries to study the advanced management mode for reference annually, and they bring technologies and equipment from other international organizations to make faster and greater strides. But this straightforward 'import' did not change the fact that new product development is proceeding at a slow pace and there are too few distinguished products with differentiated technical content to gain a competitive advantage as a product set. Therefore, 'we are looking for a strategic collaboration with more qualified business partners, particularly these international organizations with first-class innovation capability and management expertise; they can help us to be a excellent organization', mentioned Mr. Chen. In the other side, Mrs. Zhou from QE also supports Mr. Wu's statement that 'the smaller organization does not have such human and technologies resource to support or control an innovative network in the globalized supply chain'.

Table 5-5 shows that the most important attribute mentioned by all six persons

interviewed is the transfer of new knowledge and Information sharing. All organizations value their partners in increasing the level of performance of products and organizational efficiency (such as logistic efficiency). However, the collaboration might cost an organization significantly because the connection and communication efficiency require a long time for 'grinding-in', as mentioned by Mr. Wu from DG and Mr. Tang from HG. It is difficult for an organization to change their partners and breach the contract since it can incur some demands of compensation. This comes as no surprise, as revealed in the findings of previous literature. In this case, risk management has become another important aspect in today's manufacturing environment. Organizations require the commitment of resources to build and maintain new or more competitive collaboration models with controlled risks. Trust, again, is viewed as an extremely important factor in collaboration. Another important attribute is e-technologies. All these six organizations believe accurate and on-time e-business systems would support lean thinking in collaboration management. In this case, as expressed by Mr. Tang, the manager of the wind power sector, 'all course, we cannot afford the fast changed market barely depending on own technological development'. In this case, collaboration in the field of e-technologies development also is popular in this industry.

Table 5-5: Important attributes of collaboration

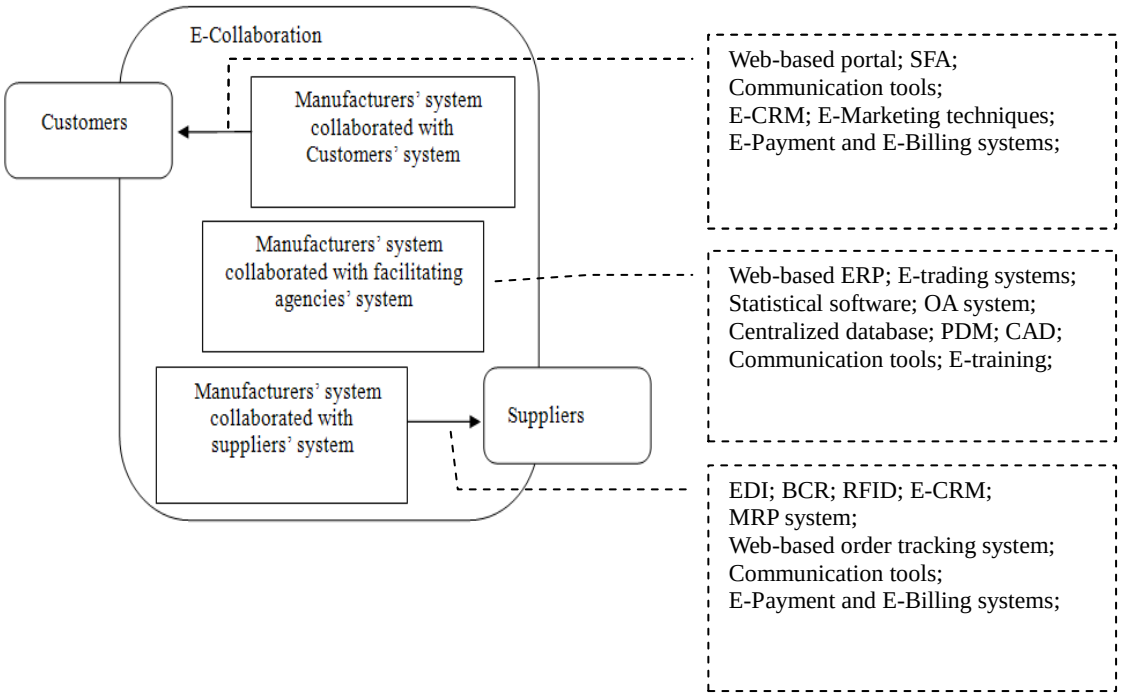
Attributes	Organization Name						
	DG	HG	JEA	ZG	ZE	QE	**Total**
Goal Congruence	√						**1**
Coordination	√						**1**
Strategic Value		√					**1**
Processes control		√	√				**2**
Leadership		√					**1**
Commitment		√					**1**
Trust		√	√	√		√	**4**
Governance			√		√		**2**
Commitment			√				**1**
Coordination			√				**1**
Interdependence					√		**1**

Structure				√			**1**
Resources Sharing	√	√	√	√	√	√	**6**
E-Technologies	√	√	√	√	√	√	**6**
Knowledge and Information Sharing	√	√	√	√	√	√	**6**
Risk Management		√	√		√	√	**4**

5.3.4 The important attributes of e-business diffusion

The pilot study of six organizations indicates that e-business technologies are widely used by the Wenzhou electrical industry, but in different ways. Based on the interviews, Figure 5-1 displays the current e-business adoption configuration in collaboration. E-business can be fully adopted in both sides of their supply chain, such as DG, HG, JEA and QE, or partial adopted either using e-business during distribution to customers activities only or in supplying from suppliers' activities only, or at inter functions only, but not at 100 percent capacity. Especially when these organizations have huge partners from manufacturing or marketing channels, it requires all business activities to be undertaken electronically. The main barriers to the wide diffusion of e-business is the lack of expertise and inadequate support and capacities form organizations' partners, which supports the requirement for research on organizational capacities for interorganizational collaboration.

Figure 5-1: E-business configuration for collaboration



As presented in Figure 5-1, similar to other industries, these asynchronous communication tools and synchronous communication tools are the mostly utilized e-business technologies in electrical organizations. These technologies include e-conferencing and VoIP (voice and video), virtual white boarding, instant messaging, e-mail, forum, Wikis Group and other Shared Office solutions. For example, one real-time collaboration office solution is called EW (electronic whiteboards) and its standard application in DG allows each collaborating participant to create or edit a joint document in real-time. In order to seize the potential core value of R&D in the globalized market, HG is planning to launch PDM (Product Data Management) to manage collaboration in product design. JEA, ZE and QE have adopted an OA system (operation automatic and human resource management system) to manage their business operations and facilitate a faster, easier, and cheaper workflow.

In collaborating with suppliers, Bar-coding Reading (BCR) and Radio Frequency Identification (RFID) are also usually utilized as essential tools in an e-enabled supply chain, not only in the large organizations such as DG and HG, but also the smaller ones, such as ZG and QE. However, Electronic data interchange (EDI) requires more powerful and stronger organizations to integrate the diversified systems from different

suppliers, such as HG. Enterprise Resource Planning (ERP) is also only adopted by HG, whereas the other organizations prefer a Material resource planning (MRP) system or Supply Chain Management (SCM) for ease of use and cost in adoption. For instance, a system called K3 system (one sort of MRP2 system (Material Requirements Planning)) has been used in HG for nearly 10 years. It contributed to the organization becoming capable of adapting to the changing environment.

Another problem revealed in the pilot study was that, although all the organizations did adopt certain e-business systems internally to support trading and collaboration, employees still not use the systems frequently. For example, in ZG and ZE, actions such as using the OA system to arrange schedules or an approval, the information is updated in a long-period, and the data did not link to its other systems, such as the MRP system or CRM system. Currently, most of these originations are not good at setting a sound series of internal measures and management governance to constantly improve the e-business innovation ability and management efficiency. In this case, it is more vital for this research to discuss how to facilitate the adoption of these e-business innovations and the perceived attributes of the diffusion of e-business innovation in these six electrical organizations.

Table 5-6 summarizes the main attributes of the e-business diffusion of each organization. For a case in point, since 2000 DG, HG, JEA, ZG and QE have paid close attention to the latest high-tech developments. An interesting viewpoint in the innovation culture is that DG, HG and JEA value the relative advantage of the innovation and regard it as more important than the other four attributes. Usefulness is also considered a relative advantage. For a case in point, HG realized the potential value of the wind power generator in 2007. But it is a new product line for HG, and the pre-investment and risks are exceptionally high. Finally, HG made the decision, launched a new business unit (HeWind Co., Ltd. under HG) and collaborated on the R&D with ALNODI (a scientific research institute from German). In 2008, d780kW wind turbines were exported to Chile and HG became the first Chinese enterprise to export complete sets of wind power generators. The rapidly development in the output of products with high content of technology is representing a new economic growing point for HG. As Mr. Chen mentioned, the core values of about the technical innovation capability could help HG to face any environmental changes and competition

confidently, and hit new growth and sales volume breakthroughs time and time again.

Table 5-6: Important attributes of e-business diffusion

Attributes	Organization Name						
	DG	HG	JEA	ZG	ZE	QE	**Total**
Usefulness	√	√	√	√		√	**5**
Ease of use		√			√	√	**3**
Social norms	√	√					**2**
Visibility	√			√		√	**3**
Demonstrability	√	√				√	**3**
Human values and personality	√						**1**
Organizational environment	√						**1**
Relative advantage	√	√	√	√		√	**5**
Compatibility					√	√	**2**
Complexity	√		√	√	√	√	**5**
Trialability	√	√		√		√	**4**
Observability	√	√	√		√	√	**5**

Complexity and observability are the next most common attributes according to the six organizations. Only ZE and QE think the speed of e-business adoption would be affected when innovation is less compatible with the current business. The other four organizations are more open to innovation and invest huge efforts in innovation. ‘Incompatibility’ world be regarded as an improvement or upgrading in the innovation, as mentioned by Mr. Zhao from JEA. In this case, ‘incompatibility’ is not considered to reduce the rate of e-business diffusion. These five attributes will be further tested in the survey questionnaire.

5. 4 The selection of the revised attributes

According to the pilot study of six electrical manufacturers, the most important attributes of trust, organizational capacitates, collaboration, e-business diffusion and business performance can be selected. The following section provides a clear summary of the revised attributes of these five factors.

5.4.1 Revised attributes related to trust

As Goo & Huang (2008) mentioned, many interorganizational relationships are forged among partners who are unfamiliar with each other. Under this circumstance, initial trust (such as contract) is not enough in constructing a robust trust relationship. Effective collaboration not only necessitates the alignment of incentives and interests by administrative architecture (like a contract), but also requires a shared understanding of the task environment to align actions to ensure success of mutual adjustments in IT adoption and the collaboration relationship (Poppo & Zenger 2002; McEvily, Perrone & Zaheer 2003; Gulati, Lawrence & Puranam 2005).

As shown in Table 5.2, it is relatively easy to find overlap among the variable attributes. For example, competence and benevolence are similar with ability and dependability. Friendliness could be considered within the dimension of benevolence. Therefore, four attributes of trust are selected in this research according to the pilot study and five questions were selected in the final questionnaire, as shown in Appendix 1.

The four attributes are contractual trust, competence trust, goodwill trust and benevolence. From the definitions of Mayer et al. (1995), Martin (2002), Ryan et al. (2004) and Walker (2004), contractual trust is based on formalized relationships conditioned by agreements, commitment, obligation, rules or ethical standards, as part of society's natural moral order; Competence trust addresses the faith that other trading partners are capable of performaning their obligations effectively; Goodwill trust is the willingness or organizational friendship which goes beyond the obligation. It views the relationship according to parties' interests, shares a sense of equity and mutuality, and diminishes the threat of moral hazard; and Benevolence is the extent of organizational friendship to which a trusted individual is believed to do good to the trustor.

The four attributes of trust are selected in this research to present the different types of relationships. As also identified by previous researchers, they are particularly valuable as indicators of trust/trustworthiness for business-to-business relationships and technology adoptions. The reasons are: (1) attributes linked to perceptions in the upholding of written or oral agreements normally is a necessary precondition in establishing a relationship, (2) attributes related to cognitive trust, based on cognitive

competence, reliability, dependability, ability or skill in terms of task performance, would be viewed as competence trust, (3) attributes related to the moral integrity, ethics, respect, values, motives, or value of the target concern goodwill, and (4) affective trust based on emotional ties, such as friendliness, customer oriented, integrity, could be related to benevolence.

Specifically, contractual trust is based on the formalized relationships conditioned by agreements, commitment, obligation, rules or ethical standards (Walker 2004); competence trust addresses the faith that other trading partners' are capable of performing their obligations effectively (Ratnasingam 2005); goodwill trust is the willingness or organizational friendship that goes beyond the obligation, which views the relationship according to partners' interests, sharing a sense of equity and mutuality, and diminishing the threat of moral hazard (Sako 1992; Ryan et al. 2004); benevolence is the extent of organizational friendship, where a trusted individual is believed to do good to the trustor (Mayer et al. 1995; Ryan et al. 2004). Specifically, under high uncertainty, benevolence may be a stronger determinant of commitment (Ganesan & Hess 1997).

There are hierarchical levels of trusts, commencing from contractual; and benevolence is possibly the most difficult and challenging in globalized collaboration. The four may not affect the relationship between the trading partners or the business performance concurrently, but they will reinforce or deface each other (Martin 2002). For example, a failure in contractual trust or competence trust from a poor performance is expected to disrupt the attempts to build relationship and goodwill trust (Ryan et al. 2004). Above all, the different level of trust can affect the business performance in different degrees, and is contingent in social and moral order, supported by state structures and cultural values (Tomlinson, Lewicki & Gillespie 2006; Simatupang et al. 2004; Ik-Whan & Taewon 2005).

5.4.2 Revised attributes related to organizational capacities

Table 5-3 presents these main attributes in organizational capacities in managing the interorganizational relationships. All these works point out the need to tackle the attribute in the organizational capacities according to the business environment. To

identify which features of the organizational capacities affect the achievement of collaborative performance would allow a comprehensive understanding of collaboration dynamics. However, the connection among some of the elements is not explicit. For instance, the literature of organizational capacities considers the evaluation of behavioral aspects (such as communication, leadership, power, commitment), although how they are to be measured during the collaboration stage is not specified.

However, the analysis of value of the organization capacities for collaboration is complex. Therefore, it is interesting to provide an investigation in greater detail of the attributes of organizational capacities to assess collaboration. Some factors, via reasoning from the pilot study and further literature, such as traceability, reliability and readiness are also considered in the diffusion of innovation theory as discussed above. The discussions about the relationship management and partner capacity cannot be ignored when considering the innovation capability; and the problem solving capacity is also the outcome of the innovation and communication (Handfield & Bechtel 2004). The influences of power can also be found in the literature of learning capability and innovation (Chen & Xu 2010).

Consequently, with support from the pilot study, Relationship Management, Learning Capability, Communication Capability, Innovation Capability are selected as the main attributes of the organizational capacities in relation to interorganizational collaboration, as shown in Table 5-3. For more detailed description, relationship management is the reaction to environmental changes, which is marked by an ability to adjust fast and properly with emotion to people and events (Scheff & Kotler 1996); learning the ability to comprehend, understand and profit from experience to create new or modifying existing knowledge, behaviors, skills, values, or preferences (Powell et al. 1996); communication is the activity of conveying information, which requires the communicating parties to share an area of communicative commonality (Brown et al. 2010); and innovation capability is about using a new idea or method to create a better or more effective products, processes, services, technologies, or ideas (Zedtwitz & Gassmann 2002). The definition of the four attributes will contribute to the description of these questions on organizational capacities in the questionnaire.

5.4.3 Revised attributes related to collaboration

Table 2-4 (A review of Collaborative Elements) in Chapter 2.3.1 (Collaboration Elements) has clearly summarized the most vital elements in collaboration. This research mainly focuses on the competences for collaboration success, rather than the aspects related to the strategy, process or structure. As considered by McCarter et al. (2005) and Fawcett et al. (2008), and the 'soft' characteristics are more important for a successful collaboration. In those early pioneers' work, the 'soft' aspects are most liable to be competence elements.

On the other side of these competence elements, to what extent affects the relationships and integration within a collaboration network appears to be overlooked (Staughton & Johnston 2005). As referred to pilot study Table 5-4 and Table 5-5, the attributes of resource sharing, e-technologies, risk management and knowledge and information sharing are the most valuable elements of collaboration. More specifically, resource sharing refers to the commitment of human, financial or technical resources from partners in collaboration to build and sustain a new or more competitive business model (Brown et al. 2010); e-technologies include computer hardware and web-based software, which is used in the creation, conversion, or duplication of data or information (Wilson 1995; Chaffey 2006); risk management involves strategic joint decision-making on risk manipulation, requires the partners to adopt joint problem-solving techniques and make their success interdependent (Spekman et al. 1998; McLaren et al. 2002); and knowledge and information sharing is the transactions of knowledge and data across organizational boundaries via dozens of open and proprietary protocols, message and file formats, which provide controlled vocabularies, data harmonization, data stewardship policies and guidelines, standards for uniform data (Zedtwitz & Gassmann 2002). The description of the four attributes will be purified in the questionnaire, as shown in Appendix 1.

5.4.4 Revised attributes related to e-business diffusion

E-business is the outcome of innovation of technologies innovation (Roger 2003). To

diffuse the adoption of e-business technologies according to their benefits and barriers, Diffusion of Innovation (DOI) theory is one of the appropriate technology adoption theories to guide the e-business adoption, and the details are covered in Chapter 2.4 (The Need for Theoretical Support to E-Business Innovation). E-business diffusion is an application of DOI theory among the social system participates. Manufacturers should pass the e-business adoption capability to their suppliers and distributors to improve customers services, security issues, employees' and customers' learning and so on.

The attributes of e-business adoption are considered within the context of a business. As Ward and Daniel (2006) expressed, e-business adoption will be differentiated for distinctive roles, people or tasks in different structure levels of different organisations. Therefore, keeping a delicate insight over the environmental influences will allow organizations to hold the initiative in achieving business success (Phatak et al. 2005). The high value of inter-organizational e-enabled collaboration network highlights the analysis of different business performance. In particular, each of those attributes in adopting e-business in the collaboration processes affords success for different reasons, and these reasons could be understood in terms of many different theories. These theories afford conceptualization of the occurred phenomena, and construct the testable hypotheses for research.

However, different industries or sectors with different views would consider the characteristics of an innovation differently, as shown in Table 5-6. For instance, the two variables *relative advantage* and *compatibility* have been consistently found to be positively related and only one variable *complexity* has been consistently found to be negatively related in the adoption in the researches from Teo et al. (2003) and Vaidya, Sajeev and Callendar (2006). Therefore, there has been limited use of DOI to evaluate e-business diffusion in collaboration.

Within an effective collaboration, it is worthwhile to assume that a closely trading partnership will facilitate the adoption and use of innovative e-enabling technologies. The re-engineered relationships among e-enabled business partners require aggressive technological and adopting policy to protect the innovation from rejection by its users ultimately in implementation. The five typical attributes in the DOI theory from Rogers (2003) are selected for measuring e-business diffusion, which are: relative advantage,

compatibility, complexity, trialability and observability. Specially, relative advantage refers to the degree to which an innovation is perceived as better than the idea it supersedes; compatibility refers to the degree to which an innovation is perceived as being consistent with existing values, past experiences, and needs of potential adopters; complexity refers to the degree to which an innovation is perceived to be difficult to understand and use; trialability refers to the degree to which an innovation may be experimented with on a limited basis and observability refers to the degree to which an innovation is visible to others (Rogers 2003). The description of the five attributes in the questionnaire will be further modified according to ease of understanding in the context of the electrical industry in Wenzhou, as shown in Appendix 1.

5.4.5 Revised attributes related to business performance

This research adopts Evans and Lindsay's (2004) performance measures. According to the pilot study, the five business performance measures are mostly considered by six organizations. Organizational effectiveness includes these innovative measures to track business development and operational process (both value-creation and support performance), which is related to production flexibility, time to market, cost efficiency, delivery performance, cycle time, lead time and so on; product and service performance refers to the customer satisfaction for future purchasing and relationships, which includes field performance of products, defect level, response time, delivery time and so on; financial performance includes ratios, such as the sales, revenue, profit margin of the company; market performance indicators include market share, measures of business growth, percentage of new product sales; and customer satisfaction measures from the view of end users, which includes customer satisfaction, customer retention, warranty claims, loyalty, response times, information sharing, customer relationship building (Evans & Lindsay 2008).

These measures are purified according to the ease of understanding, as shown in Appendix 1. Organizational effectiveness as a measure is mainly perceived as response-time or cycle-time; product and service measure is viewed as performance of the production to specification; financial measures mainly refers to profit margin; market measure focuses on the percentage of the sales; and customer measure is mainly

about the satisfaction of service level.

However, as Meredith and Mantel (2008) suggested, these performance measures allow for performance comparison which could be used as indexes to support appraisement in e-business innovation adoption and continuous improvement of collaboration. Comparison between traditional and more collaborative performance measures will be required in further research.

5.5 Conclusion

The pilot study interviews were conducted with six organizations that adopted collaboration to help to answer the specific research questions for the qualitative stage of this research (refer to the details in Chapter 4). A summary of these selected attributes is concluded from the six cases presented in Table 5-7.

Table 5-7: Summary of the revised attributes

Factors	Revised Attributes	Organization Name						
		DG	HG	JEA	ZG	ZE	QE	**Total**
Trust	Contractual	√	√	√	√	√	√	**6**
	Contractual	√	√	√	√	√		**5**
	Contractual	√	√	√	√	√	√	**6**
	Contractual	√	√	√			√	**4**
Organizational Capacities	Relationship Management	√	√	√	√	√	√	**6**
	Learning Capability	√	√	√	√	√	√	**6**
	Communication Capability	√	√	√	√	√	√	**6**
	Innovation Capability	√	√	√	√	√		**5**
Collaboration	Resources Sharing	√	√	√	√	√	√	**6**
	E-Technologies	√	√	√	√	√	√	**6**
	Knowledge and Information Sharing	√	√	√	√	√	√	**6**
	Risk Management		√	√		√	√	**4**

E-Business Diffusion	Relative Advantage	√	√	√	√		√	**5**
	Complexity	√		√	√	√	√	**5**
	Trialability	√	√		√		√	**4**
	Observability	√	√	√		√	√	**5**
Business Performance	Organizational Effectiveness	√	√	√	√	√	√	**6**
	Product and Service Performance	√	√	√	√	√	√	**6**
	Financial Measures	√	√	√	√	√	√	**6**
	Market Performance	√	√	√	√	√	√	**6**
	Customer Satisfaction Measures	√	√	√	√	√	√	**6**

The level of trust varies among organizations, and the main attributes from contractual, competence, goodwill and benevolence. Among the organizational capacities preferred by the interorganizational collaboration, as mentioned during the interviews, are the relationship management, learning capability, communication capability, and innovation capability. The attributes of the resources sharing, e-technologies, knowledge and information sharing, risk management are identified as the most important reason why manufacturers adopt collaboration. Various types of e-business systems are being used by the organizations interviewed in the inbound or outbound collaboration activities, or even on both sides. The reasons for facilitating the diffusion of e-business most cited by the people interviewed include: relative advantage, compatibility, complexity, trialability and observability. In this report, five measures of business performance are selected for survey which are organizational effectiveness, product and service performance, financial performance, market performance and customer satisfaction performance.

CHAPTER 6 DATA ANALYSIS AND VALIDATION OF THE MODEL

6.1 Introduction

The purpose of this chapter is to present in detail the method and processes of the data analysis, and the results obtained from the analysis. Based on a sound design of the questionnaire (as shown in Appendix 7), survey and sample, this section will test the validation of hypotheses detailed in Section 4.

Firstly, a detailed analysis of the related analyse involving the test of validity, reliability and confirmatory factor analysis tests is carried out. Secondly, Structured Equation Modelling (SEM) is used to test the relationship between collaboration elements and business performance measures and the mediation effort on the diffusion of e-business. Finally, multiple regression analysis is used to test the antecedent influences from trust and organizational capacities when an organization establishes collaboration with its external business partners. The assessment of key assumption related to the use of AMOS-based structural equation modelling (SEM) for this study is discussed, and the statistical software tools used are PASW 18.0 and AMOS.

The chapter is organized into six sections. After an introduction, Section 6.2 presents the results of descriptive analysis of the demographic profile of the respondents and related data, such as the extent of collaboration, the different type of collaboration relationships, the duration of the collaboration relationship and the e-collaboration adoption (by the frequency of e-communication). It considers the data preparation such as the missing value treatment, assessment of non-responses bias and common-method bias test. The assessment of the key assumption related to use of Structural Equation Modelling (SEM) for this study has been addressed in Section 6.3. It provides a detailed analysis of content validity, convergent validity and discriminate validity reliability as properties of analysis of the measurement model. Followed by Maximum Likelihood based SEM analysis and summary, results of a detailed analysis of the hypotheses testing and

mediators testing are discussed in Section 6.3.3 and Section 6.3.4.

6.2 Descriptive analysis

Demographic data covers the key source of information for an understanding of the basic characteristics and features of respondents. The sample profile provides a decisive understanding of the general pattern of attitudes of respondents towards the collaboration in organizations. Therefore, descriptive analysis is taken to assess the characteristics of the respondent profiles and related data.

6.2.1 Descriptive analysis of data

This study seeks to understand the experiences of Chinese organizations that have already applied collaboration and e-business innovation in their business. Descriptive analysis of data is carried out on the usable sample. However, data collection through a survey cannot eliminate the ineffective data and missing values. In order to produce a quality research, missing values and other exceptions should be checked to make the analysis less affected by such inaccuracies. The data has been scrutinized in detail to check for exceptions and missing values on two aspects: for not completed responses on any of the 25 items in the questionnaire; and for responding organizations who have not collaborated with others. Originations that have not adopted collaboration or implemented any e-technologies do not fit the criteria for inclusion in the analysis and need to be excluded. Because questionnaires are conducted face-to-face or a call contact followed by emails (as discussed in the research methodology), most of the responses fit the research criteria excepting 6 organizations that reported to have not been involved in collaboration with others. Therefore, 400 responses (response rate of 80% from 500 questionnaires) leaving a usable dataset of 395 (98.5% of 400 response and response rate of 79%).

Furthermore, regarding the sample size via using maximum likelihood basesd SEM assessment, the minimum sample size should be ten times the number in multivariate non-normal data set. Hence, with twenty indicator items this study should deal with a minimum case of 200. Either way, a 395 case data set is sufficient and would well

support the data analysis using SEM.

To deal with missing data, several remedies could be considered, such as mean value replacement, pair-wise deletion, list-wise deletion, and maximum likelihood based estimation (Hair et al. 1998; Little& Rubin 2002). Mean value replacement procedure considers the overall average score for those missing values which is too rough in the data analysis. Pair-wise deletion generally calculates a sample covariance matrix to exclude the cases without particular values, but the risk fails to estimate the cases values of the constructs or the positive definiteness of the matrix with different standard errors. List-wise deletion excludes any cases with missing scores, which results in a substantially reduced number of usable cases. Maximum likelihood (ML) estimation technique is one of the most accurate data imputation procedures to deal with missing data and to make the most reasonable estimate possible, according to the Hair et al. (1998). The Expectation Maximization (EM) algorithm in SPSS is used to possibly estimate the missing data and the parameters (such as means, stand deviations or correlations) and, accordingly, the missing data would be replaced.

The analysis above leads to descriptive analysis of data, which is carried out on the usable sample of 395. As shown in Table 6-1, the analysis of mean, standard deviation, Skewness and Kurtosis values is presented. Although some of the variables' Skewness and Kurtosis values exceed the range of -1 and +1, the using of SEM in estimating the research model is popular to escape violation of the assumption of normality for its distribution-free characteristics. It would be reasonable not to be concerned about the normality of the data.

Table 6-1: Descriptive analysis of study variable

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
A1	395	2	7	5.80	1.020	1.040	-.495	.123	-.389	.245
A2	395	1	7	5.58	1.177	1.386	-1.238	.123	2.497	.245
A3	395	4	7	5.81	.997	.993	-.318	.123	-.997	.245
A4	395	1	7	5.72	1.101	1.212	-1.130	.123	1.965	.245
B1	395	3	7	5.83	1.126	1.268	-.820	.123	-.149	.245
B2	395	3	7	5.80	1.101	1.213	-.818	.123	.034	.245
B3	395	3	7	5.69	1.212	1.469	-.691	.123	-.486	.245
B4	395	3	7	5.68	1.169	1.366	-.704	.123	-.340	.245
C1	395	2	7	5.96	1.051	1.105	-.960	.123	.652	.245
C2	395	2	7	5.90	1.138	1.295	-1.160	.123	1.271	.245
C3	395	2	7	6.10	1.053	1.108	-1.376	.123	2.090	.245
C4	395	2	7	5.98	1.093	1.195	-1.044	.123	.704	.245
D1	395	2	7	5.54	1.339	1.792	-.715	.123	-.370	.245
D2	395	2	7	5.59	1.286	1.654	-.849	.123	.255	.245
D3	395	2	7	5.43	1.415	2.001	-.761	.123	-.329	.245
D4	395	2	7	5.54	1.164	1.356	-.419	.123	-.303	.245
E1	395	4	7	5.59	1.015	1.030	-.041	.123	-1.110	.245
E2	395	4	7	5.51	1.018	1.037	.013	.123	-1.109	.245
E3	395	3	7	5.48	1.016	1.032	.051	.123	-.982	.245
E4	395	3	7	5.50	.952	.905	.066	.123	-.842	.245
Valid N (listwise)	395									

6.2.2 Sample characteristics

The characteristics of the respondent organizations are carried out in three categories: the extent of collaboration (measured by the type and the number of collaboration partners), the stability of collaboration relationship (accessed by the year of collaboration), and the collaboration relationship and e-collaboration adoption (based on the frequency of communication via e-business technologies).

6.2.2.1 Respondent organizations

Due to the large category of products (21 major products identified in ZNNES 2010) in the Wenzhou electrical industry, many respondent organizations have more than one type of electrical product. In relation to the major revenue-contribution product, this research classifies respondent organizations' products into six types as one of the key statistics in the company's profiles. Based on the usable dataset of 395, Table 6-2 summarizes the main types of the products in respondent organizations, their number of employees and their annual turnover.

Table 6-2: Company profiles

	Frequency	Percentage		Frequency	Percentage
Category			**Annual turnover (Million Dollar)**		
Power Generators & Transmitters	37	9.4%	0—10	94	31.9%
			10— 50	241	81.7%
			> 50	60	20.3%
Dynamo & Electromotor	63	15.9%			
			No. of employees		
Electrical Components	127	32.2%			
			0-49	86	21.8%
Cables	31	7.8%	50-249	224	56.7%
			≧300	85	21.5%
Electrician Tools & Instruments	80	20.3%	**E-business adoption**		
			Yes	395	100%
			No	0	0%
Machinery & equipment	54	13.7%	**Collaboration implementation**		
			Yes	395	100%
Others	3	0.8%	No	0	0%

Source: developed for this research

The respondent organizations are divided according to Jones and Tilley's (2003) definition — those organizations whose headcount are between 0 — 49 employees and turnover normally between 0 — 10 million dollars for small organizations; a headcount of 50 — 249 employees and turnover normally between 10 million — 50 million dollars for medium organizations; and a headcount of more than 500 employees and turnover are normally larger than 50 million dollars are regarded as large organizations. Based on the usable data set of 395 respondents, Table 6-2 summarizes the key finding on the

company's profiles of the respondent organizations according to turnover in 2010 — 2011.

In line with the company profiles, the most frequent product types of the respondent organizations are electronic components, electrical instruments and electrical tools. This to a certain extent indicates that product structure of Wenzhou electrical industry is within low technology content. Moreover, because the survey sampling utilizes a stratified random sampling method (as shown in 4.5.1 Population and sample), all of these respondents have been involved in interorganizational collaboration relationships and implemented certain e-business technologies to enhance the richness and applicability of the finding.

6.2.2.2 The extent of collaboration

The researched organizations have cooperated with a number of outside organizations to achieve an optimized cost-efficiency in their business performance, as shown in Figure 6-1. Among the types of collaboration, see Figure 6-1, most of the collaboration activities are carried out in the manufacturing, marketing and product distribution sectors. Of the 395 respondents, 63.73% of organizations have established partnerships with other manufacturers (9969 manufacturers), which means one organization comes up with 25.24 partners for co-production (as shown in Table 6-3). Via so-called co-R&D, co-Engineering or sub-assembling, there are a number of organizations outsourcing parts of the products to other manufacturers with the purpose of increasing their production, productivity or services satisfaction in diversified markets.

Moreover, a large number of partners have assisted organizations' marketing performance such as wholesalers (56.61%), agents (38.64%) and retailers (34.58%) via organizations' marketing channels. The third main type of collaboration is with other partners who contribute the product flow and transportation efficiency, such as third-party logistics (52.54%) and distributer (42.71%). The other type covers financial institution and banks to assist the accounting and financial performance of organizations.

Figure 6-1: Type of collaboration partners

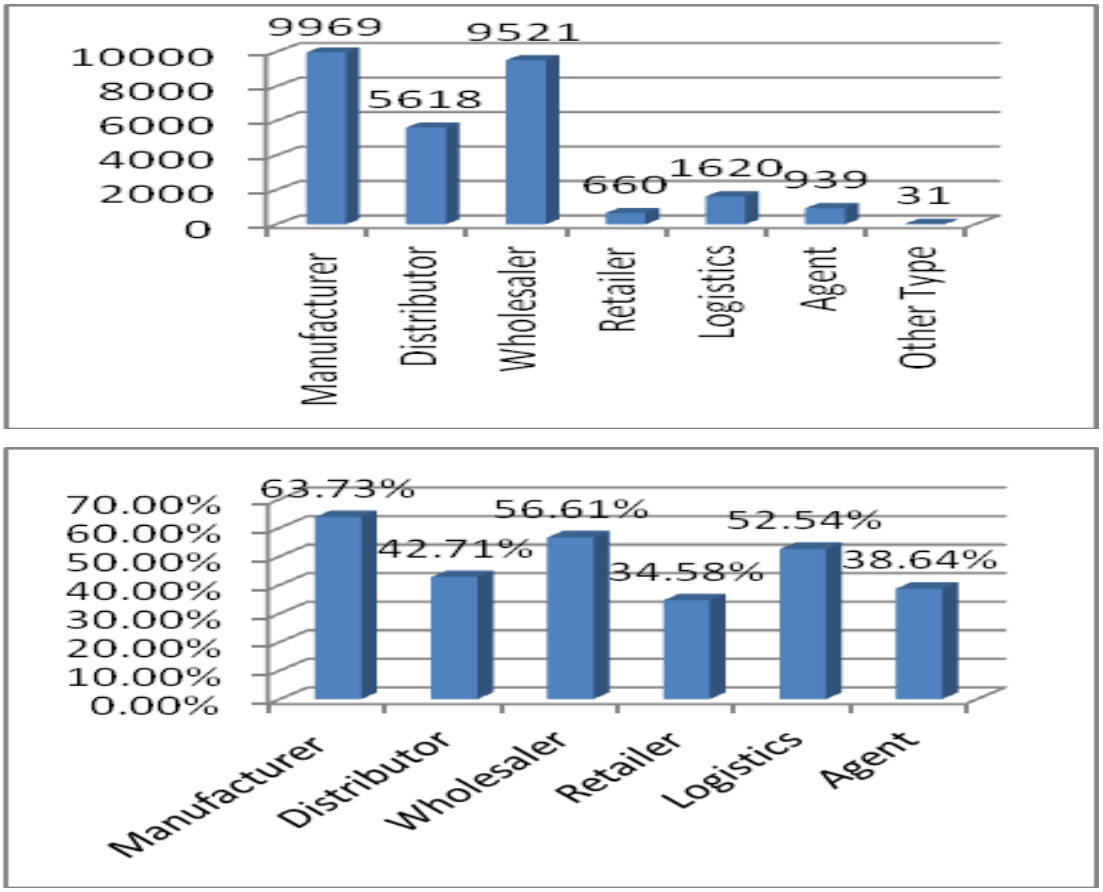


Table 6-3: The descriptive statistics of collaboration activities

Descriptive Statistics

	N	Range	Minimum	Maximum	Sum	Mean
Manufacturer	395	782	0	782	9969	25.24
Wholesaler	395	3542	0	3542	9521	24.10
Retailer	395	40	0	40	660	1.67
Agent	395	45	0	45	942	2.38
Distributor	395	1000	0	1000	5618	14.22
Logistics	395	85	0	85	1620	4.10
Valid N (listwise)	395					

6.2.2.3 Local and international collaboration relationship

In detail, when dividing the corporate collaboration into two types, there are collaborations with local partners and with international partners, as shown in Figure 6-2. A comparison of current collaboration with local or international partners is measured based on the number of partners in detailed collaboration activities, such as product marketing/promoting, product production, procurement, logistics, product design and development, new products, R&D in services (marketing, customer services, etc.), training, information technology or no collaboration.

Figure 6-3 indicates most corporate businesses performed with local partners. Most organizations would like to establish collaboration in marketing, procurement, and production with local partners. It means that for 295 respondents, almost every organization has three partners engaging in marketing activities, and approximately two partners in procurement and production. Other collaboration activities involve training staff from local education resources (5.87% of the total partners), logistics (5.81%), new products development (5.02%), product design and development (4.98), services research and design (4.93%), and information technology development (4.80%). But there are few organizations which cooperate with their partners' business strategy (0.15%).

Moreover, when launched into international collaboration, the majority of corporate businesses are also involved in the field of marketing (6.63%) and procurement (5.51%). It implies most of the globalized collaboration is in the early stage. 'No collaboration' with international partners (3.44%) is more than with local partners (0.02%). And for certain reasons, organizations do not trust the overseas organizations to participate in the internal core business, such as information technology development and strategy.

Figure 6-2: Number of local and international collaboration partners

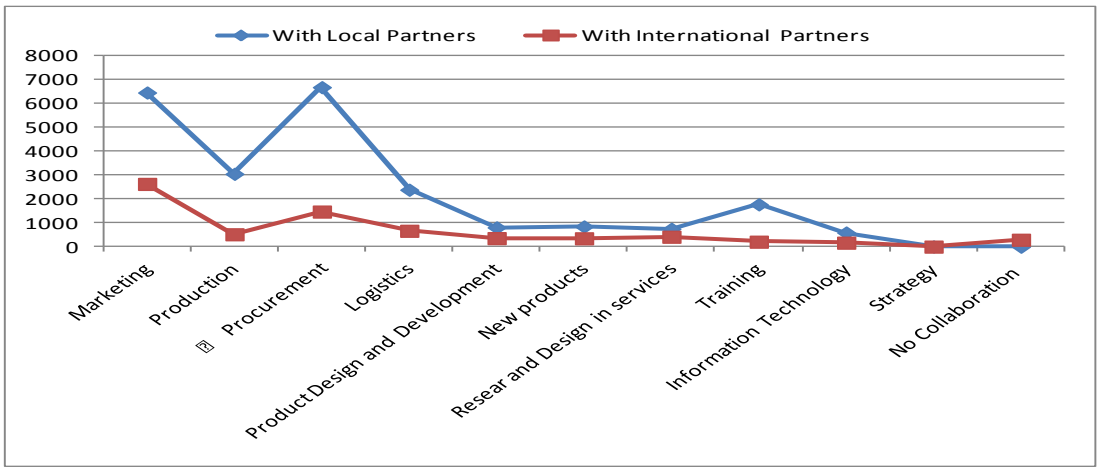
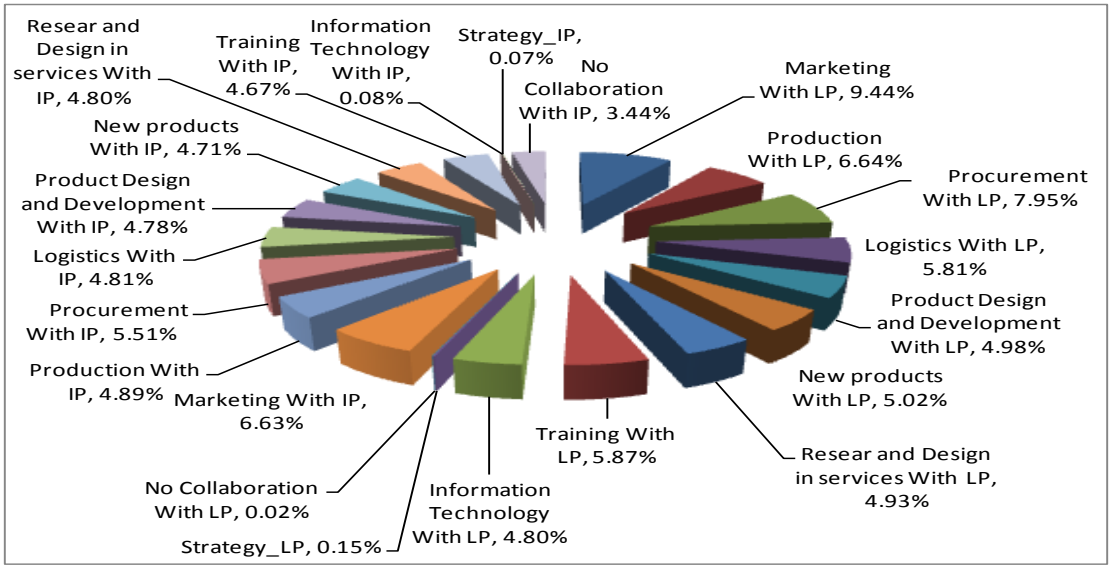


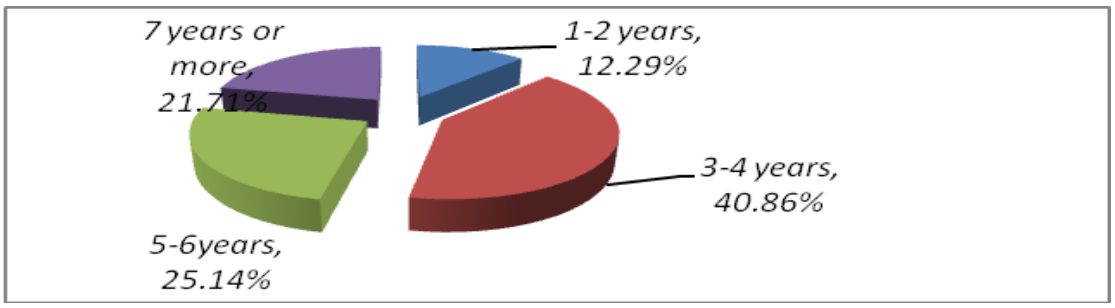
Figure 6-3: the percentage of local and international collaboration partners



6.2.2.4 The stability of the collaboration relationship

The stability of collaboration relationship is accessed by the year of collaboration. As shown in Figure 6-4, 87.71% of the responding organizations have established a relatively long relationship with partners. The majority of collaboration duration is 3-4 years, which occupies 40.86%. These data indicate that the collaboration relationship in the electrical industry in Wenzhou is reasonably stable because most of the organizations are SMEs and they tend to adopt a more flexible policy of partnership according to environmental change.

Figure 6-4: The duration of collaboration



6.2.2.5 The collaboration relationship and e-collaboration adoption

Communication is one of the key factors in collaboration success and is vital in maintaining a strong interorganizational relationship. The frequency of the communication at a certain level can reflect if the collaboration relationship is in robust. Furthermore, communication can be facilitated via adopting e-business technologies, such as email, MSN or White Board as discussed in the previous chapter. These e-communication technologies are regarded as the basic application of adopting e-business technologies in organizations. In this case, a study on the frequency of utilizing e-communication technologies in collaboration implies a certain level of e-business diffusion.

Figure 6-5 shows the frequency of the communication via e-business technologies. Most responding organizations classify the e-communication — which would be carried out when needed (Daily) and would be very hard to measure (tick as ‘other frequency’). It implies to a certain extent that many organizations do not frequently utilize these technologies and fail to achieve the optimum benefits of e-business adoption. Nevertheless, the majority of the responding organizations have a positive attitude toward the collaboration relationship.

Figure 6-5: The frequency of e-communication

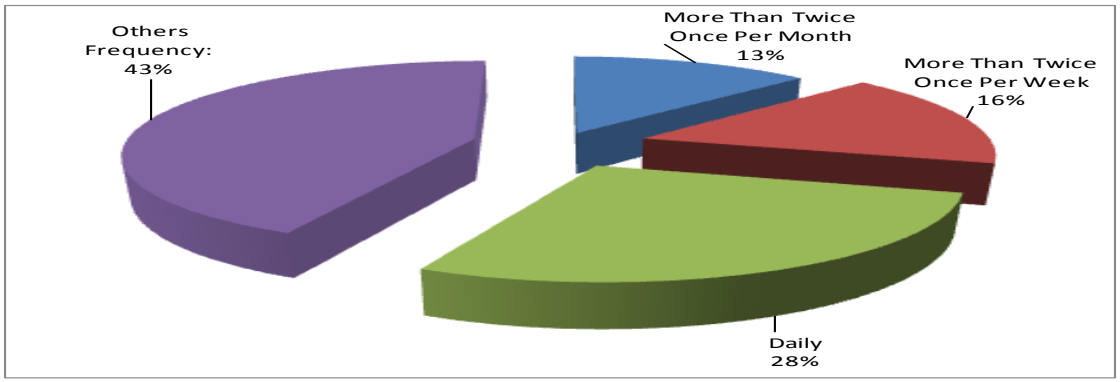


Table 6-4 presents the descriptive statistics of the technologies related to collaboraton utilized by respondent organizations. Asynchronous communication tools such as e-mail, corporate blogs, forums and so on are the mostly frequently used e-collaboration technologies, followed by e-trading systems, e-marketing techniques and synchronous communication tools (instant messaging, virtual white boarding, e-conferencing, VOIP, et al.).

In the context of this research, organizations frequently use e-communication for cost-efficiency. They also put online documents, PowerPoint materials, videos to broadcast policy guidelines, news and virtual classes for various skill training. E-marketing techniques, in most cases, refer to these online advertisements and information exhibition on these top-popular public websites, such as Google, Sina, Taobao and Alibaba. This implied e-business technologies adopted in organizations are usually in the field of e-communication and e-marketing via organizational websites. On the contrary, these logistic related technologies (such as RFID, EAN, BCR and UPC) and the EDI and ERP (regarded as the high-level of networked technologies as shown in Figure 2-1: e-business technologies adoption ladder) are in very limited utilization.

Table 6-4: Descriptive statistics of the e-collaboration technologies

	N	Minimum	Maximum	Mean	Std. Deviation
LAN,VAN	395	0	7	4.89	1.969
Asynchronous Communication Tools	395	0	7	5.17	1.961
Synchronous Communication Tools	395	0	7	4.99	1.987
EDI	395	0	7	4.14	2.389
EAN,BCR,UPC	395	0	7	4.22	2.436
RFID	395	0	7	3.77	2.413
Customer Relationship Management System	395	0	7	4.89	2.087
E-marketing techniques	395	0	7	5.12	2.005
E-trading system	395	0	7	5.15	2.036
SCM	395	0	7	5.08	2.086
ERP	395	0	7	4.81	2.146
Others :	395	0	7	.93	2.094
Valid N (listwise)	395				

6.3 Testing the measurement model

The measures of the model are developed after successive stages including theoretical specification, statistical testing and refinement. After the literature review and pilot study of the Chinese electric industry, the understandability, completeness, wording and precision of the questionnaires' measures were reviewed. In this section, the resulting measures are subjected to a series of statistical validation which contains three stages. Firstly, an analysis of reliability and validity attests to the quality of the proposed measures. Secondly, the dimensional qualities of each measure are assessed with confirmatory factor analysis, and items that impair internal consistency or cross-loaded are eliminated (abbreviations for the items are displayed Appendix 2). The remaining items are subject to hypotheses testing and mediation testing to determine the mediators of operational collaboration and e-business diffusion on the relationship in business using AMOS.

6.3.1 Validity and reliability of the measurement model

Validity and reliability tests are the two most important steps in an empirical study to test the quality of the proposed measures. Only when the data have satisfied validity and reliability, discussion on data and result analysis is persuasive (Rong 2010). In this analysis, content reliability, construct reliability, convergent validity and discriminant validity would be the basis of the evaluation of the content validation (see Section 4.5.3), as shown in Table 6-5.

Table 6-5: A brief description of the main quality test

Quality Test	Techniques Relevance to Methodology
Content validity	♦ Systematical literature review for measurement items ♦ Pilot study
Internal validity	♦ Due to limited number of cases being studied, cross-case pattern-matching between groups will be utilized. ♦ Within-case analysis used during pilot study.
External validity	♦ Mainly in literature review. ♦ Theoretical boundaries defined within diffusion of innovation (DOI) theory and Trust theory.
Construct validity	♦ Data derived from three sources: literature review, pilot study and survey questionnaires. ♦ Sources above presents the chain of evidence required. ♦ within-case analysis and cross-case analysis in qualitative and quantitative research approaches
Convergent validity	♦ The percentage of variance extracted for each measure exceeds the norm of 0.50 (AVE value)
Discriminant validity	♦ Underlay each dimension loads as different factors
Reliability	♦Occurs in literature review, pilot study, and survey questionnaires. ♦Helps formulate the theoretical framework: literature review, pilot study and survey questionnaires ♦Serves as main purpose of having pilot study. ♦All of the Cronbach's alpha of measurement items are higher than 0.7

	♦Confirmatory Factor analysis with majority of the values have significant P value

The first part is about the content validity which refers to the instrument covering the range of meanings included in the concept. All scales used in this study are derived from previous studies related to trust, organizational capacities, collaboration, e-business diffusion and business performance. A draft questionnaire was developed and discussed with several academics in the field. Furthermore, this research conducted a pilot test for the survey instrument to ensure content validity of item measure. The first draft questionnaire consisted of 55 total items related to the aforementioned topics as listed in the previous work. In the pilot study questionnaire, respondents were asked to rank the four most influential attributes for each factor. After the pilot study (as described in Chapter 5), the questions in the revised questionnaire were pared down to 25 items that considered to be relevant for this study, as shown in Appendix 1.

Moreover, interviews for six cases as pilot study were used in the research to discuss the draft questionnaires, and determine and develop the dimensions of each item. These six within-case analyses in the electrical industry sector were undertaken to purify the clearness of questions and dimensionality of scale, and confirm internal validity. Through this process, internal validity has been fulfilled in this research.

Five hundred CEOs, managers, or directors in the marketing, manufacturing, purchase or partner relationship department were asked to rate each item on a seven-point scale anchored on *strongly disagree* (1) and *strongly agree* (7). Three hundred ninety-five usable questionnaires were collected, with a response rate of 80%. Their thoroughness suggests that trust and organizational capacities does affect collaboration, and also most of the attributes do fit the current situation. Based on this process, external reliability has been fulfilled.

Past research has yielded five measurements of instruments that can be used to assess trust, organizational capacities, collaboration, diffusion of e-business, and business performance. This study could not discern any unique features that make the dimensions inappropriate or to exclude any dimension that are not underlying the variables in measuring the effectiveness of the five factors. Moreover, the percentage of variance

extracted (AVE value) for five measurements are 0.62, 0.7, 0.62, 0.5, 0.5 respectively, which exceeds the recommended values and indicates a good fit (norm of $\geqslant$0.50) ; and composite reliability (CR) are 0.87, 0.9, 0.85, 0.77 and 0.8 respectively, which exceeds the recommended values indicating a good fit (norm of $\geqslant$0.70). The fit from AVE and CR supports the convergent validity of this research (Hair et al. 2006).

The statistical validation process is broken down into three components. Firstly, each multi-item measure was subjected to item-to-item correlation analysis to identify potential item contaminants. Next, the dimensional qualities of each measure were assessed with principle component factor analysis. Items that impaired internal consistency or cross-loaded were eliminated. The remaining items were subjected to confirmatory factor analysis using AMOS (Byrne 2001). The combination of quantitative and qualitative research approaches enhances the validity of a research, which is recommended as a sound methodology in business research (Leedy & Ormrod 2005). Both within-case analysis and cross-case analysis were applied. This provided a better comparison between various cases and achieved a robust insight, as well as a higher degree of external validity (see Table 4-2).

The second phase is to test the reliability of each of dimension by the Cronbach's alpha, as shown in Appendix 3. Construct reliability for measure exceeds the 0.60 suggested by Bagozzi and Yi (1988). Theses analyses taken together suggest a high level of construct validity. Additionally, for all the twenty items, the Cronbach's alpha showed that deleting either component will result in a significant influence on the total value. The result is reliable (all the covariance values are >0.05, Cronbach's alpha is 0.895 (>0.8). It means these components are suitable for confirmatory factor analysis and none of these components are redundant. Therefore, the construct reliability of this research is supported.

Moreover, the KMO –Meyer-Olkin (KMO) and Baetlett test is 0.839(>0.8) and Sig.=0.000 shows that these twenty components are suitable for Factor Analysis again and the result is reliable, as shown in Appendix 3. Then, via suppressing small coefficient, principal components analysis (the implemented extraction method), varimax rotation with Kaiser Normalization (the adopted rotation method) with the

Loading ≥ .35 (absolute value blew 0.35), the analysis shows that there is a five-factor model and presenting 68.736% of the total variance (as shown in Appendix 4). The five factors have four attributes and cumulatively explain 68.736% variables, which is appropriate. All the values have significant P value ranging from 0.001 to 0.05, excepting D1 has significant ρ value only with A4, C1 and C4. All the five factors in the research model load close to expectation and have appropriate nomological validity (when items to be loaded together in a factor analysis) and discriminant validity (when items underlying each dimension loads as different factors), as shown in Table 6-6.

Table 6-6: The confirmatory factor analysis

Rotated Component Matrix[a]

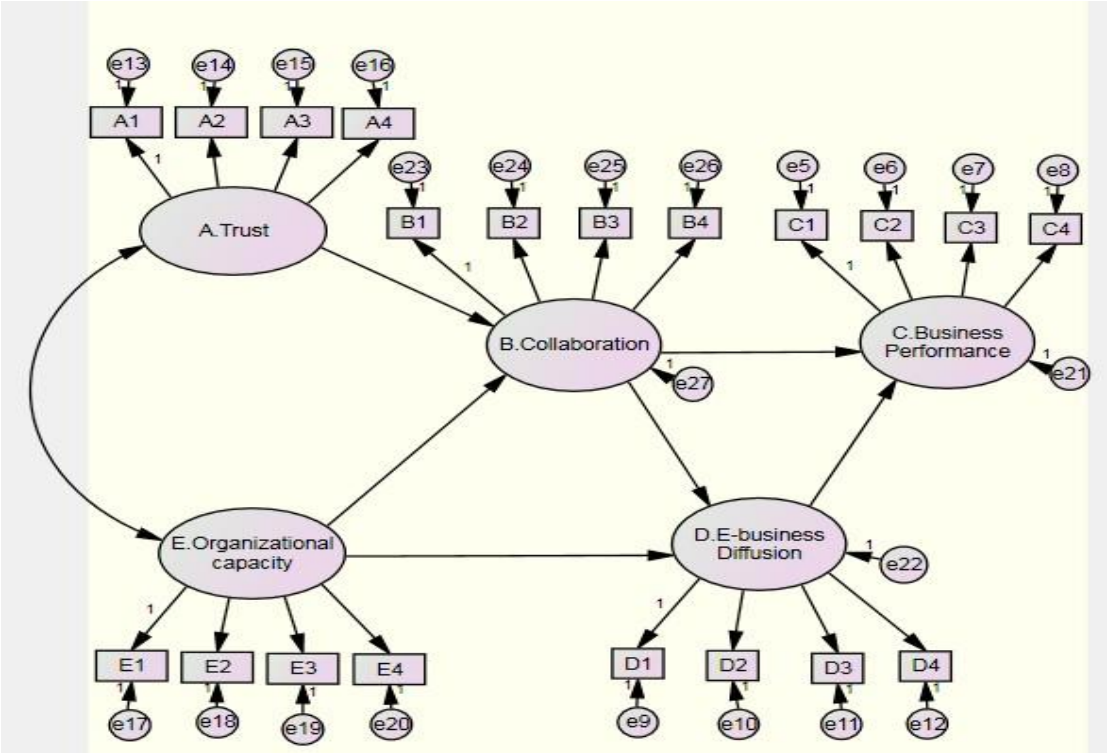
	Component				
	1	2	3	4	5
A1			.864		
A2			.669		
A3			.856		
A4			.746		
B1	.816				
B2	.752				
B3	.872				
B4	.905				
C1		.777			
C2		.703			
C3		.817			
C4		.836			
D1					.611
D2					.719
D3					.770
D4					.609
E1				.745	
E2				.628	
E3				.727	
E4				.724	

a. Rotation converged in 6 iterations.

6.3.2 Measures development of research model

Figure 6-6 displays the research model by using the maximum likelihood base SEM which is the primary data analysis technique in this study. The model contains five constructs which are trust, organizational capacities, collaboration, e-business diffusion and business performance, as confirmed by CFA and shown above. The attributes in every factor would be selected for removing when it has maximal errors with other items in the Modification Index.

Figure 6-6: The research model



After running the model, the result in the regression weight shows the relationship between collaboration and e-business diffusion is insignificant (ρ=0.418 > 0.05) (see the Table 6-7 below) and the structural model fits present a week fit, again at the acceptable threshold levels (CMIN/DF=5.016 > 3.0, GFI=0.843 <0.9; AGFI=0.798<0.9; IFI = 0.867< 0.9; NFI = 0.839 <0.9; CFI=0.866<0.9; RMSEA= 0.101 >0.07) as shown in Appendix 5. Therefore, the link between collaboration and e-business diffusion is insignificant and the model assumes to delete the link, as shown in Figure 6-7. Figure

6-7 represents the adjusted research model as the initial model for testing.

Figure 6-7: The adjusted research model as the initial model

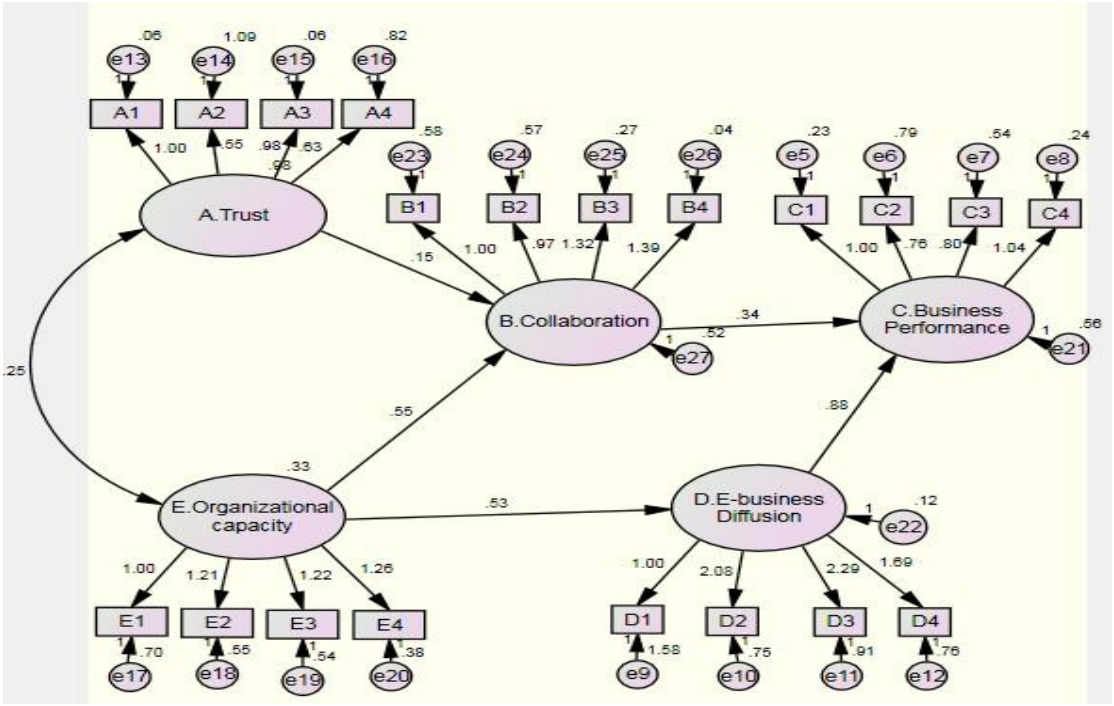
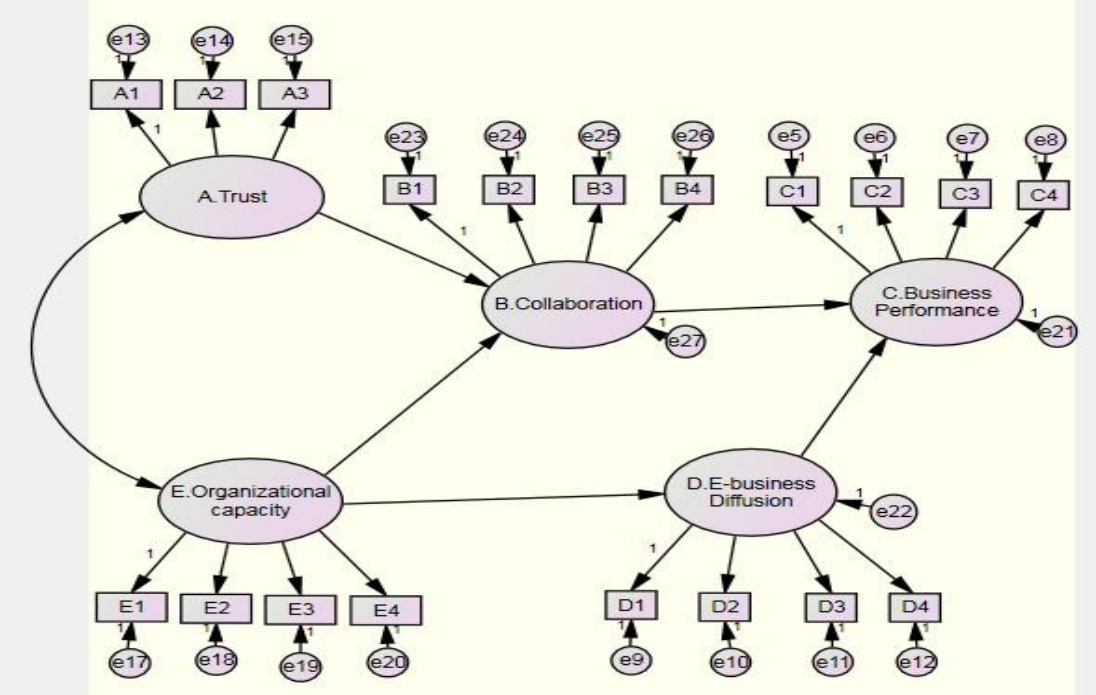


Table 6-7: Regression weights

			Estimate	S.E.	C.R.	P
B.Collaboration	<—	A.Trust	.155	.045	3.430	***
B.Collaboration	<—	E.Organizational_capacity	.539	.099	5.456	***
D.E-business_Diffusion	<—	E.Organizational_capacity	.504	.101	4.983	***
D.E-business_Diffusion	<—	B.Collaboration	.026	.032	.810	.418
C.Business_Performance	<—	B.Collaboration	.335	.059	5.716	***
C.Business_Performance	<—	D.E-business_Diffusion	.885	.179	4.942	***

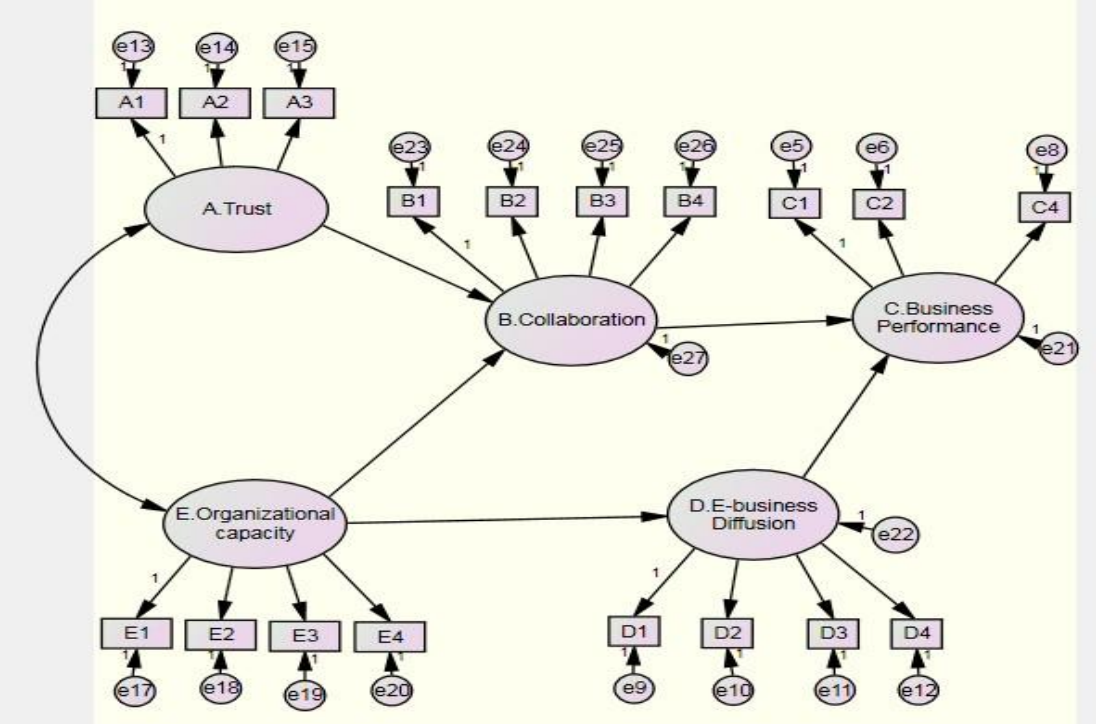
Based on the analysis of the initial model in Figure 6-7, the model fit summary of the initial research model is poor, as shown in Appendix 5 and Table 6-8. From the results in the 'Modification Indices' (see Appendix 5), the errors of e-16 show the biggest error in the Model fit. When A4 is removed (see Figure 6-8), the fitness index of model fit is increased (for example, CFI > .9) but still has CMIN/DF higher than 2 required by the threshold value (see Table 6-8).

Figure 6-8: Interaction 1 with the deletion of A4 (Benevolence)



After running the calculation again, 'Covariance' in 'Modification Indices' shows the highest error occurred between e6 and e 7. When C3 is removed, as shown in Figure 6-9 (the research model 2), the fitness index of model fit is increased (for example, GFI > .9) but still has CMIN/DF higher than 2 (see Table 6-8).

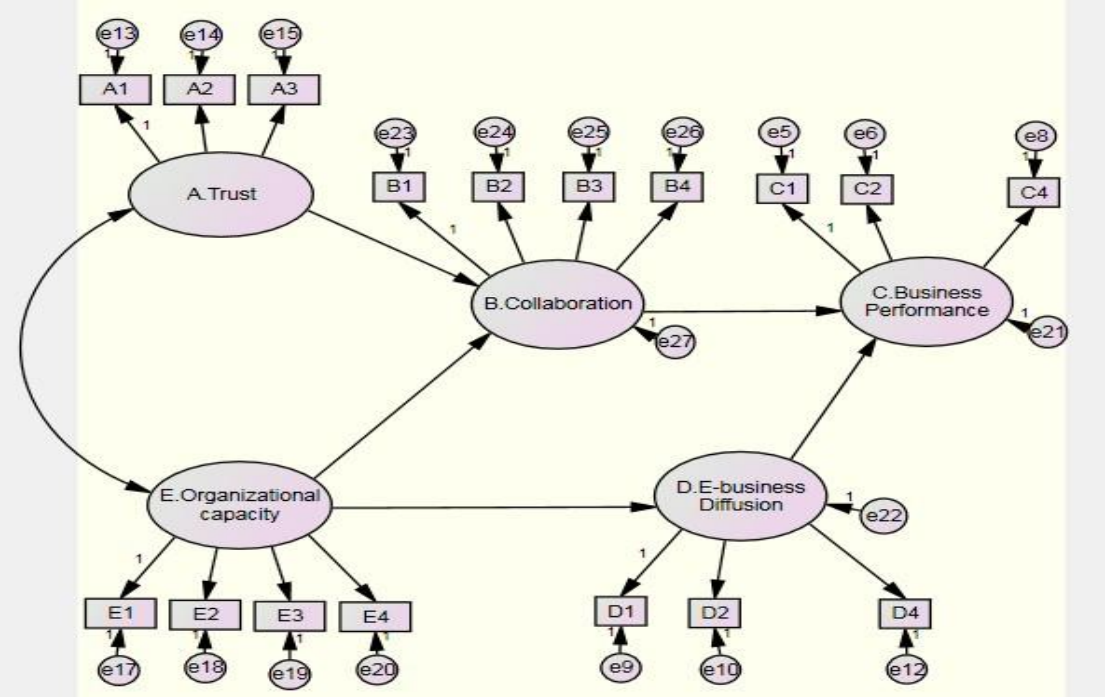
Figure 6-9: Interaction 2 with the deletion of C3 (Organizational Effectiveness)



Following the same calculation by looking at the values in Model Indices, the highest error is shown between e611 and e 9. When D3 has been removed, as shown in the Figure 6-10, all results are an extremely good fit but CMIN/DF (=2.468) exceeds 2 (see Table 6-8). In dealing with errors, access was made to the Modification indices again. There is no e-value in the same variable higher than 10.00. Moreover, in a recent research, CMIN/DF less than 3 is also practical due to the large data set (Rong 2010).

Therefore, Interaction 3 is the most reasonable model. The results take into consideration the strong tendency of the responding organizations towards collaboration and e-business diffusion as indicated by data (tendency to have high score of 6 and 7), which shifts the attention from normality situation.

Figure 6-10: Interaction 3 with the deletion of D3 (Trialability)



Consequently, as shown in Table 6-8, the measurement model fits the data reasonably well in the Interaction 3, based on the acceptable threshold levels as shown in Table 4-4. Interaction 3 has incremental fit indices' values such as GFI =. 919, AGFI=. 891, NFI=. 923, CFI= .95, IFI=. 950, NFI=.923, CFI= .95, greater than 0.9 or closely approaching 0.9, and absolute fit indices, such as RMSEA=.066 suggests that the data in Interaction 3 fit the model well.

Table 6-8: Interactions of the research model

	Initial Model	Interaction 1	Interaction 2	Interaction 3
X^2/df (CMIN/DF)	4.989	3.534	3.043	2.706
GFI	0.893	0.884	0.905	0.919
AGFI	0.799	0.849	0.874	0.891
IFI	0.867	0.917	0.936	0.950
NFI	0.839	0.888	0.908	0.923
CFI	0.866	0.917	0.937	0.95
RMSEA	0.101	0.080	0.072	0.066
Estimate	All values with P≤0.001	All values with P≤0.001	All values with P≤0.001	All values with P≤0.001
Modification Index (Covariance)	e14*<–> e16= 194.272	e6*<–> e7=70.767	e11*<–> e9 =21.519	End
Selected items for removing	A4	C3	D3	End

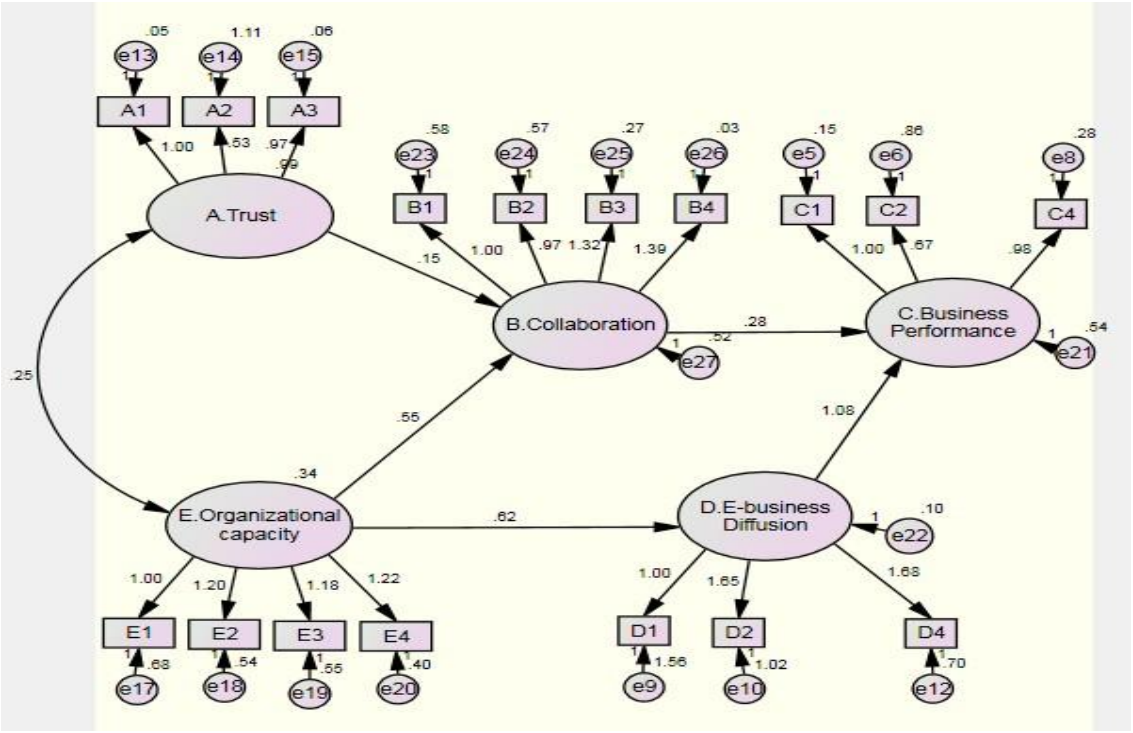
(A4: Benevolence; C3: Organizational efficiency; D3: Trialability)

* This item related to this value has been selected for removing because it has maximal errors with other items

6.3.3 Hypotheses testing

The hypotheses structural model has been tested by SEM, which includes individual tests of the relationships among the constructs as well as the overall model test. The structural model fit statistics reveal the results of the hypotheses tests presented in Figure 6-11. The following hypotheses are acceptable from structural equation analysis at a significant level of 0.001, excepting for Hypothesis 4.

Figure 6-11: The final research model results



Hypotheses	Path	Standard estimate	Significance	Accepted / Rejected
Hypothesis 1	A -> B	.15	0.000	Accepted
Hypothesis 2	E -> B	.55	0.000	Accepted
Hypothesis 3	E-> D	.62	0.000	Accepted
Hypothesis 4	B-> D	/	0.418	Rejected
Hypothesis 5	D-> C	1.08	0.000	Accepted
Hypothesis 6	B-> C	.28	0.000	Accepted

(A: Trust; B: Collaboration; C: Business Performance; D: E-business diffusion; E: Organizational Capacities)

With regard to path coefficient for the model illustrated in the following figure, Trust has a positive influence on collaboration (standardized coefficient = .15, $\rho < 0.001$), which provides evidence that partners' multi-trust plays an important role in predicting the success of collaboration. Therefore, Hypothesis 1 is accepted which supports the prediction that trust directly impacts collaboration. Furthermore, as shown in Table 6-1 descriptive analysis of study variables in Chapter 6, A3 (goodwill trust) and A1 (contract trust) are the most frequently chosen attributes of trust among the Chinese electrical industry, as indicated by its mean of 5.81 and 5.80 respectively. Benevolence, as the highest level in trust, appears to give a low expectation of its benefits on business. This phenomenon is also approved in the pilot study.

The effect of organizational capacities on perceptions of collaboration and e-business diffusion are also significant (standardized coefficient = .55, = 0.62 ρ< 0.001), Hypothesis 2 and Hypothesis 3 —that there is a positive relationship between organizational capacity and collaboration (Hypothesis 2) and diffusion of e-business (Hypothesis 3) — are accepted. These results support strong evidence that organizational capacities play an important role in predicting the success of collaboration and e-business diffusion.

Additionally, it is also observed that as the level of 'Collaboration' and 'Diffusion of E-Business' increased, organizations are increasingly likely to have a higher level of 'Business Performance' (with standardized coefficient = 0.28, 1.08, ρ< 0.001). Therefore, Hypothesis 5 and Hypothesis 6 are confirmed. On the other hand, Hypothesis 4 has to be rejected (with insignificant P value of 0.418) which implies collaboration cannot affect the diffusion of e-business directly.

6.3.4 Test of mediators

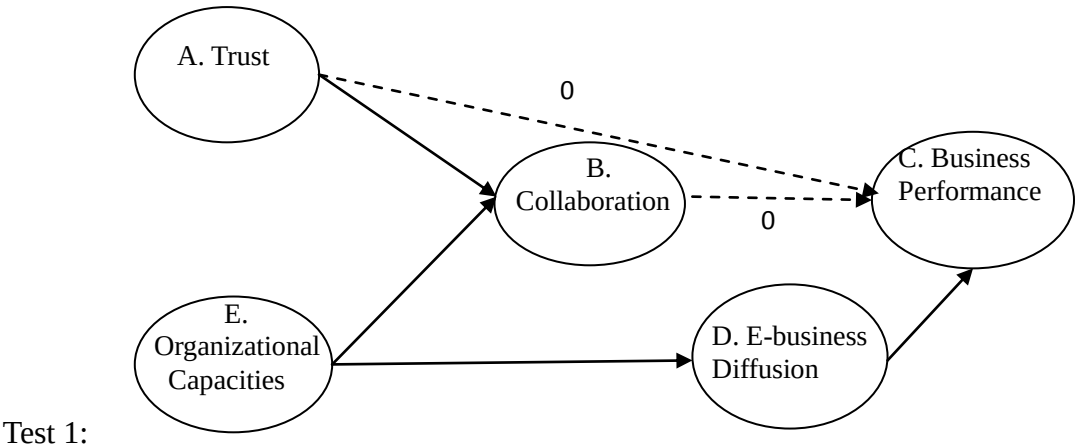
Additional tests have been conducted to determine the mediating effect of operational collaboration and e-business diffusion on the relationship between organizational capacities and business performance. To test the mediation effect from collaboration and e-business diffusion, this research adopts the AMOS technologies and 4 conditions from Baton & Kenny (1984). In this case, this research designed four tests for each potential mediator, and the results of the mediation test are displayed below.

The analysis of the mediator effect is based on four conditions, as shown in 4.5.6 (Methods of data analysis techniques) in Chapter 4. To begin with, the research tests if the collaboration is the mediator in the relationship between Trust and Business Performance. There are four steps in testing. Firstly, the predictor variable (Trust) must impact the mediator (Collaboration) in the proposed direction (Test 1); secondly, the mediator (Collaboration) must impact the dependent variable (Business performance); thirdly, the predictor variable (Trust) must impact the dependent variable (Business performance) in the proposed direction (Test 3); and, fourthly, the impact of the predictor (Trust) on the dependent variable (Business Performance) must not be statistically significant (full mediation) or the impact must be significantly reduced after

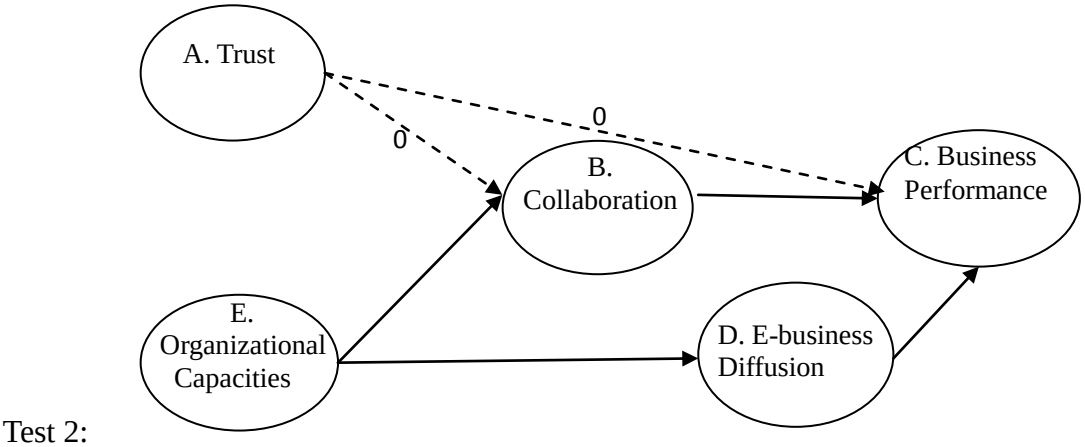
controlling for the mediator (partial mediation) (Test 4).

As shown below, via linking the Trust and Business Performance, the four conditions are generated by AMOS and the analysis is depicted in Figure 6-12:

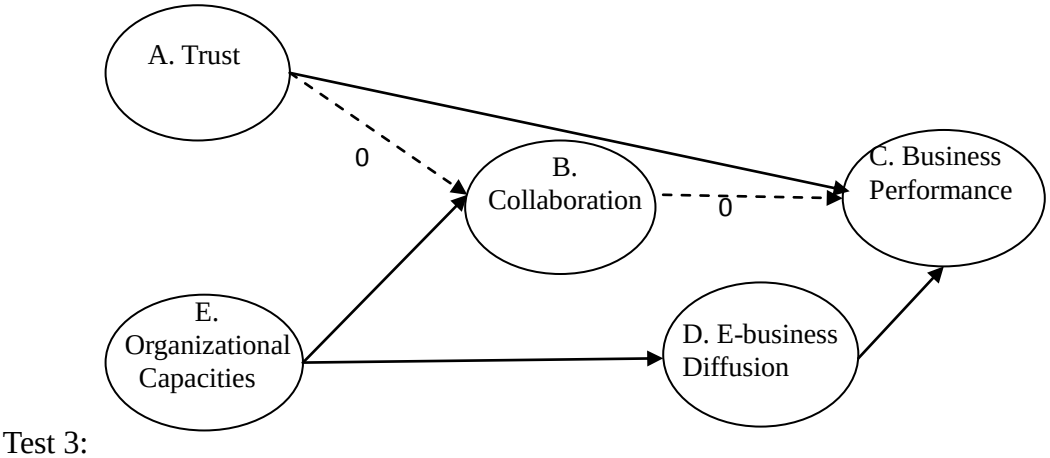
Figure 6-12: The test of the mediation effect of collaboration



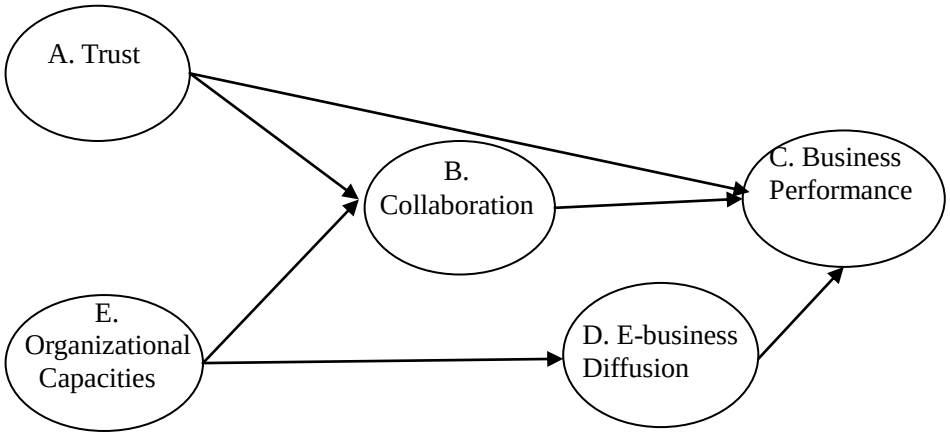
Test 1:



Test 2:



Test 3:



Test 4:

From Test 1, Test 2, and Test 3, the P values of the link is <0.001 which implies the first three conditions from Baton & Kenny (1984) are met, as shown in Table 6-9 and Table 6-10. The relationships between 'Trust' (the predictor variable) and 'Collaboration' (mediator), 'Collaboration' (the mediator) and 'Business Performance' (the dependent variable), as well as 'Trust' (the predictor variable) and 'Business Performance' (the dependent variable) are positive and significant as shown in Table 6-9.

Table 6-9: Assessment of the mediation effect of the collaboration

Model Comparison	Chi. Square difference	d.f. difference	ρ
Comparing Test 4 with Test 3	303.8 – 303.7 = 0.1	113-112 = 1	<0.001
Comparing Test 4 with Test 2	316.4 – 303.7 = 12.7	114-112 = 2	<0.001
Comparing Test 4 with Test 1	333.1 – 303.7 = 29.4	114-112 = 2	<0.001

Finally, from Test 4 (as calculated in Table 6-10), the ρ value of collaboration between the relationship of Trust (A) and business performance (C) is .133 > 0.05 after controlling the impact of the mediator (Collaboration). Furthermore, the indexes in the model fit are almost unchanged due to the added link. In this case, it suggests 'Collaboration' plays a full mediation effect on Trust and Business Performance, and Mediation Hypothesis 7 is supported.

Following the same mediation test procedures, collaboration in the relationship of organizational capacities and business performance, as well as the e-business diffusion also goes through the four conditions. When making a link between organizational

capacities and business performance (calculated as shown in Table 6-10), the ρ values of collaboration in this relationship is insignificant (ρ= .486 > 0.05), which means the covariance is insignificant in this link. It implies that collaboration plays a full mediation for this linked relationship, and Mediation Hypothesis 8a is supported.

Additionally, the ρ value for the e-business diffusion in the relationship of organizational capacities and business performance is also insignificant (ρ= .486 > 0.05), as shown in Table 6-10. Hence, e-business diffusion is also a full mediation for this linked relationship and Mediation Hypothesis 8b is supported.

Table 6-10: Results of the mediation tests

Potential mediator	Mediating Between	Link added	ρ values of the linked relationship	Full/Partial Mediation	Associated Hypothesis	Accepted/ Rejected
B. Collaboration	A and C	A -> C	0.133>0.05	Full	Hypothesis 7	Accepted
B. Collaboration	E and C	E -> C	0.486>0.05	Full	Hypothesis 8a	Accepted
D. Diffusion	E and C	E -> C	0.486>0.05	Full	Hypothesis 8b	Accepted

(A: Trust; B: Collaboration; C: Business Performance; D: E-business diffusion; E: Organizational Capacities)

CHAPTER 7 DISCUSSION AND CONCLUSION

7.1 Introduction

Basing on the above literature review, pilot study, research model test and statistical analysis, this research conducted hypothesises and mediation tests for the relationship of the interorganizational collaboration and business performance, and discussed the facilitating roles from trust, organizational capacity and e-business diffusion from the globalization and e-business management view. A conceptual model was established for the collaboration research linked to the overall business performance via adopting e-business. Surprisingly, there are few empirical studies that include attributes of trust and organizational capacities as antecedents of collaboration success.

This section would conclude the main finding, management enlightenment, theoretical and practical contributions of the study and limitation of this research. As the two antecedents of collaboration exist, this theoretical perceptive supports the re-examination of trust and organizational capacities as antecedents to collaboration. Trust and organizational capacities are identified as the key drivers to the successful outcome of collaboration and e-business adoption as rationalized in the literature review and their structural relationships in the proposed model was tested accordingly.

7.2 Main findings of the research

The research was conducted to answer the main research question regarding the relationship between interorganizational collaboration and performance of the organisations. Determining the effect of collaboration on business performance answered the research question of how and to what extent interorganizational collaboration affects business performance. The derived three sub-questions from the main research questions assisted the analysis and investigation.

The first question aimed to explore the effect of trust. The research indicated that Wenzhou electrical organizations are moving towards achieving positive business performance via mutual-trusted collaboration. This research indicates that trust is an

initiating factor for collaboration advancement, but not all organizations seem to regard it as significant for business performance in the Wenzhou electrical industry in China. This situation is not surprising. Only the organizations facilitate trust to support collaboration, and trust is shown to be a statistically significant influence in business performance improvement in this industry context.

The second question concerned the link of organizational capacities and the implementation of collaboration performances. The research clearly suggests organizational capacities are accepted as part of collaboration practice. In moving to global markets, collaboration eventually contributes to a major improvement in business performance based on organizational capacities advancement.

The third question aimed to understand and identify the effect resulting from e-business on collaboration practices and business performance. Rather than simple technological innovation, most of the practices are centred in the ‘soft’ perspective — diffusion of these e-business technologies. Unfortunately, the empirical evidence from this research implied that these diffusion attributes do not translated properly into the interorganizational collaboration. Their correlation does not prove to be statistically important. The majority of the organizations tend to disregard e-business as a means of in achieving successful collaboration performance. This result may be rationalized by the inability of these organizations to nurture an e-business diffusion culture with their trading partners. On the other side, this research found that proactive business performance improvement activities are consistent with the emphasis on e-business innovation, and organizational capacities are key motivators for an advancement of collaboration. A combination of the sound organizational capacities and constructive e-business diffusion is the best viable approach to contribute to a major improvement in business performance.

Finally, the main research question is answered that collaboration is statistically significant to promote business performance, and a fine level of trust and sophisticated organizational capacities are the two critical antecedent factors of collaboration. Collaboration is aiming to synchronize external resources and become an advantage for organizations. Collaboration practices seem to have the greatest impact on product and service performance, market performance and customer satisfaction performance.

To solve the main question and three sub-questions, this research adopts quantitative methodology and develops a model which integrates trust, e-business diffusion, organizational capacities, collaboration and business performance. The model forms an extension of the current literature review regarding the influences of the adoption of e-business and collaboration on the success of business performance.

Wenzhou's electronics industry is highly export-oriented and follows a globalization strategy. Five hundred CEOs, directors and senior staff members in the marketing, manufacturing, purchasing and partner relationship departments in Wenzhou's electronics industry were asked to rate twenty items on a seven-point scale. Three hundred ninety-five usable questionnaires were collected, a response rate of 80%. Face-to-face interviews were also conducted.

The study began by presenting a conceptual background and literature review. A conceptual model was then developed and hypotheses formulated. The methodology for collecting and analyzing the data is then discussed. The research model was tested by a two-stage data analysis:

Stage 1: Confirmatory factor analysis (CFA) is used to examine the fitness of the structure, constructs and attributes. Research also confirms the validly and reliability of items.

Stage 2: Structural Equation Modelling (SEM) with Maximum Likelihood estimation method was conducted to test hypotheses relationships among the research constructs and the significance of the structural relationship in the model. Moreover, the mediation tests were performed to investigate the effect of the collaboration and e-business diffusion.

- **Confirmatory factor analysis (CFA)**

The data have satisfied validity and reliability tests using CFA. Cronbach's alpha is calculated to be 0.895 with level of significance $\rho = 0.000$. This result is higher than the recommended Cronbach's alpha threshold of 0.8. With the principal components,

varimax rotation and Loading ≥ .35, the analysis shows the five-factor model can cumulatively explain 65.456% variables, and the attributes for the each construct are grouped together. For example, the trust has four attributes and these attributes are grouped into one column in the Rotated Component Matrix without overlapping with attributes of other constructs, as shown in the Chapter 6 Table 6-6.

- **Model developing procedures**

The research model measures business performance via adopting collaboration and e-business innovations. The attributes were analyzed for their suitability and influence on the constructs. The results show that the attribute 'Benevolence' has no significant effect on the level of 'Trust'. 'Organizational Efficiency' has no significant effect on 'Business Performance' and the attribute 'Trialability' also has no significant effect on 'E-business Diffusion'.

The model fits the suggested threshold values reasonably well. The X2/df (CMIN/DF) (equal to 2.706) is less than the upper threshold of 3.0. The absolute fit indices such as the root mean square error of approximation (RMSEA) had a value of .066, which is less the upper threshold of 0.10. Other incremental fit indices, such as GFI = 0.919, NFI= 0.923, CFI=0.95, IFI=0.950, NFI=0.923, CFI=0.95, are greater than the recommended 0.9 threshold. The AGFI value (0.891) is closely approaching the recommended 0.9 threshold.

- **Hypotheses testing**

The hypotheses were tested by SEM, which included individual tests of the relationships among the constructs, as well as the overall model test. All hypotheses are acceptable at a significance level of 0.001, excepting for Hypothesis 4 which assumes there is a positive relationship between collaboration and e-business performance, as concluded in Table 7-1.

Table 7-1: The results of the hypotheses testing

Hypotheses	Accepted / Rejected
Hypothesis 1: there is a positive relationship between trust and collaboration.	Accepted
Hypothesis 2: there is a positive relationship between organization capacity and collaboration.	Accepted
Hypothesis 3: there is a positive relationship between organizational capacity and diffusion of e-business	Accepted
Hypothesis 4: there is a positive relationship between collaboration and diffusion of e-business	Rejected
Hypothesis 5: there is a positive relationship between diffusion of e-business and business performance	Accepted
Hypothesis 6: there is a positive relationship between collaboration and business performance.	Accepted

The research findings show that trust has a positive influence on collaboration (Hypothesis 1), with standardized coefficient equal to 0.15 with $\rho \leq 0.001$. This relationship provides evidence that partners' multi-trust plays an important role in predicting the success of collaboration.

The effect of organizational capacities on their perception of collaboration (Hypothesis 2) and e-business diffusion (Hypothesis 3) are also significant (standardized coefficient equal to 0.55 and 0.62 respectively with $\rho \leq 0.001$). These results provide evidence that organizational capacities play an important role in predicting the success of collaboration and e-business diffusion. It is also observed when the level of 'Collaboration' (Hypothesis 5) and 'Diffusion of E-Business' (Hypothesis 6) increased, the organizations are increasing likely to have a higher level of 'Business Performance' (with standardized coefficient equal to 0.28, 1.08 respectively, with $\rho \leq 0.001$). On the other hand, the research does not find a significant relationship between collaboration and e-business diffusion (Hypothesis 4) (with insignificant ρ value of 0.418).

- **Mediating testing**

The questions adhere to the model development to ascertain whether or not the benefits derived from trust and organizational capacities are captured in business performance. The model posits that collaboration and e-business diffusion are antecedents to business performance. The results reveal that collaboration plays as a full mediator between trust and business performance, as well as between organizational capacities and business performance. E-business diffusion does play as a full mediator between organizational capacities and business performance. The results of the mediation testing are summarized in Table 7-2.

Table 7-2: Brief summary of the mediation testing

Predictor Variable	**Mediator Variable**	**Output Variable**	**Full/Partial Mediation**
Trust	Collaboration	Business Performance	Full
Organizational Capacities	Collaboration	Business Performance	Full
Organizational Capacities	E-business diffusion	Business Performance	Full

According to the results of the mediation testing, the results of their according mediation hypotheses can be concluded as following:

Table 7-3: The results of the mediation hypotheses

Hypotheses	**Accepted / Rejected**
Hypothesis 7: Collaboration plays a full mediator between Trust and Business performance	Accepted
Hypothesis 8a: Collaboration plays a full mediator between Organizational Capacity and Business Performance	Accepted
Hypothesis 8b: E-business diffusion plays a full mediator between Organizational capacity and Business performance	Accepted

Consequently, this research developed and tested a model of collaboration and provides profound analysis of the interorganizational collaboration and its influencing factors from trust, organizational capacities and e-business diffusion. As more detailed

conclusion of the findings is as follows:

1) The attribute of ‘Benevolence’ does not affect trust level, in the presence of other selected attributes

Benevolence is the extent of organizational friendship, where a trusted individual is believed to want to do good to the trustor (Mayer et al. 1995; Ryan et al. 2004). It is an intangible intrinsic benefit that is not highly sought after in this industry. Under high uncertainty, benevolence would not be a strong determinant of commitment. Sequentially, interorganizational relationships, collaborations, alliances and long-term stability are found to have a weaker association according to a low level of trust. These findings from the pilot study also support this situation that the effect on securing collaborating partners with the perspective of benevolence and win-win friendliness is undervalued.

2) The attribute of organization efficiency has an insignificant effect on business performance

Organizational efficiency, which refers to process performance to support the productivity and service of the organization, had little effect on business performance when collaboration is utilized. Organizational effectiveness has received less attention than collaboration, according to the increased complication in operations. This implies that the organization should also pay attention to the negative effects on the organizational efficiency from collaboration. Collaboration may reduce the efficiency, which would consequently reduce customer satisfaction, and overall profit margin. In this case, it will require quality management for future practice.

3) Trialability has no significant effect on e-business diffusion

Trialability refers to the installation of new e-business techniques or collaborative processes. They can be separated into various departments rather than the entire process. Organizations are aggressive in their pursuit of installing innovative systems, thereby running a pre-test of the new system is unimportant. However, it is also implied that the

inadequate pre-testing would result in a higher fail rate in the e-business practice in collaboration.

4) High organizational capacities significantly advanced collaboration and enhanced diffusion of the e-business, and consequently improved business performance

Research on collaboration studies has found that competitive interorganizational collaboration requires fundamental changes in organizational capacities to handle the trends of globalization, diversity, and differentiation. Organizational capacities are a critical element for collaborative success.

5) Collaboration is a full mediator between:
   a) trust and business performance; and
   b) organizational capacities and business performance

Trust can directly improve the business performance in the electrical industry, as well as the organization capacities. Furthermore, trust, an intangible quality, will facilitate the collaborative effort, consequently improving the business performance. Without collaboration, the value of trust cannot be directly observed.

The value of high organizational capacities in managing interorganizational relationship is an intangible characteristic that cannot be easily quantified. Only if sound collaboration is performed will the payback from the organization on improving organizational capacities be visible.

6) E-business diffusion is a full mediator between organizational capacities and business performance

The efforts of the organization to improve organizational capacities will be significantly enhanced when there is suitable e-business diffusion among the collaborating partners. For example, the adoption of e-communication techniques among the partners will improve the communicational capacities of the organization. This will result in increased communication efficiency. E-learning and e-collaborating working techniques will facilitate the sharing of knowledge and information, thereby improving the capacity

for learning and risk management. Those e-business techniques will consequently improve the product and service performance in different markets.

7) E-business facilitates collaboration but does not influence the output of collaborations

From pilot studies, organizations invested more in e-business and their related techniques. To improve the adoption of e-business, organizations must take on the diffusion of e-business within the organization and among their collaborating partners. There is a direct relationship between e-business diffusion and business performance; however no relationship exists between e-business diffusion and collaboration. Without qualified organizational capacities, e-business will not significantly advance the performance of collaboration.

8) Market share, customer satisfaction and product and service performance cannot be achieved without collaboration with other organizations

Collaborating with international wholesalers and retailers is advantageous due to their expertise in a particular market. Their vast knowledge can help the organization develop products and services that will be most useful to the local clientele. This collaboration effort will result in increased market share and higher customer satisfaction. However, the organizational efficiency may be reduced due to the complex transition from globalized collaboration and a greater number of partners from different cultures.

9) It is a waste of money to install an e-business without compatible organizational capacities

Without proper organizational capacities, there will be no observable direct relationship between e-business and the performance of collaboration. Although organizations realize the importance of e-business systems, without improved organizational capacities the profit margin will be minimal.

7.3 Research innovation and management enlightenment

In the ‘post-financial crisis period’, the traditional Wenzhou’s export-oriented economy is threaten by excessive production capacity on the low-end products with quite common features, high foreign dependency and OEM production, lack of intellectual property rights and brands, deficiencies in innovation and high-end products and so on. Wenzhou electrical organizations are persuaded to focus on the building of core competitiveness from the perspective of cost-efficiency of productivity, technological innovation, marketing and branding strategy, etc. Nevertheless, in the highly competitive electrical industry, no individual organization can successfully solve these challenges in seizing the global market.

Actually, how to promote the innovations in product, service, marketing, operation and management is the same question confronted by most industries in China. Collaboration supports Wenzhou electrical industry to overcome the limitation from the scale of economy and specialization in the globalization process, particularly for these small and medium sized organizations. Other industries in China or in worldwide have been confronted with the comparable similar opportunities and threats from the global competition market. And the prospect of adopting collaboration to pursue competitive advantage seems fairly attractive. They also need to improve the performance in receiving products from or supplying products to other organizations. Hence, the adoption of collaboration is an indisputable competing power in facilitating the business performance and brings a great potential for further development in all of industries.

The study on improving the performance of globalized collaboration in Wenzhou would be a good example for other regions of the developing counties. The electrical industry has a long cluster developing history and wide-ranging industrial chain collaboration (more than 75% of organizations involved in interorganizational collaboration relationship). The Wenzhou electrical industry is a relatively centralized cluster for the easiness of researching. From this research, it is realized that the majority of the surveyed electrical organizations has involved in various collaborative relationships with domestic and international partners, covering the field of manufacturing, marketing, R&D, distribution and so on, as shown in Table 6-2. The research on the study of

collaboration is consistent with ‘strategy of going global collaboration’ in Wenzhou’s business culture, as well as for China national competitiveness strategy.

Another new tendency business practice is the considering of e-business adoption. The industry cluster development strategy in Wenzhou highlighted innovation in the ‘export-orientated’ developing model, particularly for the blooming e-business innovation. The research in Wenzhou electrical industry would be a representative example for the study of other industries which tend to adopt Internet and e-business in enhancing the performance of collaboration. Enhanced collaboration network or e-collaboration network is a valuable perspective for electrical industry and also for other globalized industries.

To solve problems in managing the globalized collaboration, this research is highly significant in promoting a sound business performance development model, taking Wenzhou electrical industry cluster as an example, which also includes trusted interorganizational relationships, supportive organizational capacities and capable e-business innovation. This finding of this research highlights the creating of effective collaboration in the business performance improvement activities in China. The analysis reveals the following four valuable suggestions for management enlightenment:

7.3.1 E-business diffusion has no significant effect on the output of collaboration

E-business diffusion is considered as one of the main attributes for enhanced business performance. Most organizations involved in this research have widely recognised the positive outcomes from e-business diffusion in improving business performance (the association between e-business diffusion and business performance has been proven by Hypothesis 5 in Section 6.3). For example, an effective utilisation of e-business technologies can speed work processing, improve productivity, enhance market performance and service levels, upgrade R&D of products and services, but reduce headcount (as also mentioned in the six pilot study interviews). This research is consistent with earlier researches such as Chaffey (2006) and Turban et al. (2006) which posits that implementation of e-business practices is mostly disseminated around

business performance improvement.

However, e-business facilitates collaboration (as one tested attribute in the collaboration element) but does not influence the output of collaborations. Collaboration would be carried out anyway, regardless of the level of e-business diffusion adopted by the organizations involved in collaboration (see the rejected Hypothesis 4). E-business based innovation may not be the optimal option in collaboration implementation. In practice, collaboration is frequently achieved via face-to-face meetings and written correspondence.

A reason for this may be that e-business diffusion needs additional effort in clarifying the relative advantage from the views of employers (decision makers) and employees (end users). These findings are expected since an implementation of e-business practice at an interorganizational collaboration level generally involves complicated instructions or complex modification. A reduction in the complexity in operation is required. Moreover, the development of e-collaboration technologies and systems in organizations may not fit together nicely with collaboration activities. Therefore, a sharing of experiences of e-business adoption with other users also is required to increases confidence and, accordingly, encourages the diffusing of the e-business (regarded as high-level of observability).

Additionally, in the era of globalization, this research realizes that collaboration in the Wenzhou electrical industry is in the primary stages of the three collaboration stages as mentioned by Pearce and Singh (1999). From Figure 6-1 (Type of the collaboration partners) and Figure 6-2 (Number of the Local and international collaboration partners), most collaboration relationships are in the field of manufacturing and marketing channels, with the purpose to adjust their products to match market preferences. They are lagging in the new products R&D innovation for long-term development strategy. Subsequently, organizations are not constantly pressured to foundationally change their business into synergy e-business networks or to form an innovative e-network in the globalized supply chain. Therefore, e-business does not play an important role in bringing opportunities for competitive advantage development.

Another reason for this may be that these researched electrical companies are SMEs.

Generally, SMEs may not have a specialized department for business innovation management. Especially, the supervision of these activities related to e-collaboration adoption is lagging. However, on the other side, these large organizations such as DG, HG and JEA selected in the pilot study, all believe the collaborating relationship would be tighter according to the rapid expansion of production and market share from e-business diffusion. It also proves these large manufacturers would input more resources and commitment towards sustaining their collaboration relationships. In review of the challenges from globalization, a lack of these higher e-business technologies in the adoption ladder with interactive, open and real-time information and knowledge sharing systems would finally affect the willingness and performance of collaboration within organizations' value chain.

The practice, however, does not eliminate types of e-business technologies when organizations embark on collaboration. Departing from e-business diffusion theory, optimization of e-business requires careful directing and systematical designing of user–centred e-business processes and organisational changes. It is a key to facilitate the interactions and quick collaborative decision-making via their external collaborative network. Organizations should bridge the gap between collaboration and e-business practices to achieve performance goal. The new practice with corresponding e-business innovation could be an important perspective for furthering the collaboration studies in the era of globalization.

7.3.2 E-business diffusion should be accompanied with a high level of organizational capacities

E-business diffusion should be accompanied with a high level of organizational capacities in pursuing positive business performance. The established linkage between organizational capacities and business performance via e-business diffusion does lead to different business practices. An inference derived from this situation is that organizations should not invest in e-business technologies for collaboration until they acquire the precise knowledge and master skills required for diffusing these technologies (see the accepted mediation Hypothesis 8b in Section 6.3). Having a very sophisticated IT system without sound organizational capacities would not result in a

significant effect on business performance. Accordingly, it is a waste of money to install an advanced IT system without compatible organizational capacities already in place.

A motivation for organizations' e-business involvement is the resultant higher performance achieved via a positive association with organizational capacities improvement. It shows that the association of organizational capacities improvement with e-business diffusion practices can be further improved. In this circumstance, these electrical organizations need to extensively adopt e-business to enhance their capacities in managing this interorganizational collaboration in a close industry cluster in order to maintain their competitiveness.

From the accepted Hypothesis 3, organizational capacities did influence the e-business diffusion. Due to the limitation of resources, relative advantage of the innovation is the priority in e-business decisions. For example, fast responsiveness, flexibility, innovation, lower total costs, as well as strategic benefits, are widely reported benefits. The capability of learning and innovation (as two main tested attributes in organizational capacities) would impact the consciousness of these benefits. The activities in observing the processes and changes from other organizations also have the expected effect on e-business diffusion. Moreover, from the limited utilization of these high-level networked technologies (such as EDI, SCM and ERP) displayed in e-business technologies adoption configuration (as investigated in Figure 2-1 and Figure 5-1), it also implies internal and external communication capability would result in complexity in e-business diffusion activities.

Another interesting finding as discussed in the pilot studies and questionnaire survey supposes is that an incompatibility with existing work procedures is regarded as an open attitude to innovations. Pursuing on speedy adoption of new technologies and other type of innovation in Wenzhou results in the trialability before implementation is redundant. In another point, these perspectives would present a level of risks in the success of the e-business diffusion, as well as business performance. The results of this research suggest that different practices and perspectives exist among e-business diffusion.

7.3.3 There is no significant direct effect between organizational capacities and business performance without effective collaboration involvement

There is no significant direct effect between organizational capacities and business performance without effective collaboration involvement. The association between organizational capacities and business performance is deleted during model modification (refer to Section 6.3.2). Additionally, through the mediator testing (refer to Section 6.3.4) and the accepted mediation Hypothesis 8a, it was found that impact of organizational capacities on business performance varied, depending on how the collaboration practices develop within this relationship. Organizational capacities are expected to direct interorganizational collaboration management and then facilitate business performance of organizations as well as their trading partners.

This indicates that even though organizational capacities in dealing the interorganizational collaboration relationship do not have strong influence on business performance, their role as a supports for interorganizational collaboration should not be ignored. Collaboration is often regarded as an information-intensive activity. Although most electrical organizations' products are based on customers' specifications, organizations try to improve competitiveness since they aim to enhance their credibility and advantage in the local and global market. Under a great pressure of keeping a profit margin and achieving higher efficiency, enhanced capacities in maintaining this interorganizational collaboration in a close industry cluster are critical to keep their competitiveness. Investments in systematic and comprehensive development of organizational capacities (such as learning capability) may contribute towards collaboration improvement.

It is further supported in the research that a collaboration-based change is one of the strengths from a successful organizational capacity improvement. According to the tendency of global resource optimization, the focus of specialization and outsourcing makes organizations seek collaboration on a worldwide scale. In order to keep a high level of flexibility to match the changed orders overnight, for an example, such capacities regarding interorganizational collaboration issues are related to the capability

of relationship management, learning, communication and innovation. This research finds larger organizations tend to have a higher requirement on relationship management which involves partnership management, quick responsiveness and a high level of flexibility to the changing environment. In turn, it results in a high requirement of the building of multi-trusted relationships. Especially, the innovation capabilities are greatly valued in improving the technological content of products via collaborating with institutions, universities, government, suppliers and even customers over time, as emphasised in the pilot study.

These organizational capacities could govern how the collaboration relationship is managed and achieve improvement in resource sharing, e-technologies, knowledge and information sharing and risk management. There are several reasons that can explain these phenomena:

i. Although many organizations enforce many organizational capacity improvement programs, these programs seem to have nominal impact on business performance. Pressure on globalization has forced organizations to advance collaboration. Effectiveness of improvement of capacities is not perceived as sufficiently important when collaboration is obscured (see the accepted mediation Hypothesis 8a).

ii. Cooperation with business partners allows organizations to gain considerable knowledge, information and resources of local and global markets and marketing, production and logistic efficiency, products and service innovation, etc. The assistance from e-technologies can not be neglected as an important attribute in collaboration, which supports again Hypothesis 5 (see the Section 6.3). Risk management concerning the acceptance of innovation is another significant issue in facilitating business performance improvement. Specifically, when the competence of partners is integrated, relevant risks along the innovation processes from R&D partnerships can be shared and minimized. Eventually, collaboration and global collaboration has a significant effect on businesses performance (see the accepted Hypothesis 6).

iii. Although improving the efficiency in collaboration is more important for their

survival, related organizational capacities are considered highly important in managing the interorganizational relationships and collaboration success (see the accepted Hypothesis 2). The capacity of relationship management results in a sound reaction to the challenges in collaboration relationships; communication capability smoothes the collaboration process and interorganizational relationships; and learning capability and innovation capability to facilitate the building of core-competitiveness from the creditable experience of collaboration.

This research realized that the benefits from maturated organizational capacities should be incorporate with collaboration development. In particular, the advance of market share (especially the international market share), customer satisfaction and product and service performance cannot be achieved without collaborating with other organizations. These findings are consistent with the study of Ward and Daniel (2006), Fawcett et al. (2008) and Verdechoa et al. 2009. They emphasised that manufacturing industries need to be equipped up with qualified ‘soft’ capacities as well as ‘hard’ techniques to achieve web-based product/services in developing collaboration with employees, business trading partners and even customers.

7.3.4 Trust facilitates collaboration and results in a high business performance

When trust increases among the organizations and their partner, the collaboration would be facilitated and end up with a high business performance. From the results of the survey, either the ‘trust’ or ‘organizational capacities’ cannot work alone to affect business performance (because they have insignificant relationships as shown in the mediation hypothesis 7 and Hypothesis 8a). It implies that if organizations try to improve their performance of collaboration, they are required to improve trust and organizational capacities inside the organization with their partners.

In interorganizational collaboration, trust between two organizations is influenced by past experiences, time and the environment. Many studies have proven that trust is perceived as sufficiently important for organizations (e.g. Mayer et al. 1995; Goo &

Huang 2008; Al-Hakim 2010). However, the result of this research also suggests that actions based on the weak restrictions of invisible trust (such as competence trust and goodwill trust) may liberate partners from compliance. Consequently, a successful transition of the beneficial outcome of trust is a push for collaboration (see the accepted Hypothesis 1).

Objectively evaluating trust has become an important issue in collaboration. This research has learned that a higher level of trust corresponds to greater willingness to be involved in collaboration and associated activities in information, knowledge and resources sharing and even risk undertaking, and ultimately extended to collaborated partners. For example, from the literature of the trust management (e.g. Birnbirg 1998; Goo & Huang 2008), the tolerance level of risks would be raised with the enhanced mutual trust from interaction. Trust fills up the vulnerability from the inability to control the other party. Sound risk management based on trusted information sharing would determine the spirit of collaboration.

Additionally, because e-business technologies are considered as an important attribute in collaboration, the positive relationship between trust and collaboration revealed trust-based relationships in focusing on virtual organizations and e-business diffusion environment (see the discussion in Chapter 2.3.1 and Chapter 5.4.3). In particular, the sensitiveness from the virtualized collaboration emphasizes an effective sharing of related resources, information and knowledge, and risks. It implies that the utilization of interactive web technologies and other e-business technologies cannot bring innovation to business partners without a trusted collaboration environment.

Moreover, the result suggests that to ensure the successful advancement of organizational capacities, organizations must act collectively particularly by upholding mutually-beneficial relationships. The consideration of trust also fostered appropriate behaviours and organizational capacities, such as open communication, acceptance of innovation and learning from partners. The initiation of collaboration practices in the electrical industry might include trust plans or policies to enhance these competent trust and goodwill trust, besides of construct trust. For example, organizations could display their certifications, rewards and reputations, or thanks letters from customers or suppliers. Trust has been depicted as the center for all longer-term transactions.

7.4 Contributions of the study

The findings in this research have theoretical and practical contributions:

- Theoretical contribution:

Limited research studies have revealed how collaboration can be adopted to foster business performance. This research contributes to two theories (DOI Theory and Trust Theory) and interorganizational capacities in the era of globalized collaboration.

Findings on the influence of trust on collaboration have given rise to a new idea positing a positive influence of trust on collaboration from different perspectives of study. The benevolence trust is found to diminish as collaboration partners increased. This is probably because in the environment of high social uncertainty and cultural diversity, organizations have to rely on the contract; but on the other side, in a sound trusted relationship, a belief in the task achievement by their partners' competence becomes more important, regardless of their contracts. Failure to comply could result in the loss of business partners.

Moreover, this research has succeeded in developing and testing a new conceptual model by adopting the diffusion of e-business theory in collaboration. The model is comprehensively tested using two research methods, namely, pilot study and survey questionnaires, which facilitated triangulation of the results. From the pilot studies and questionnaire survey, compatibility and trialability in diffusion of e-business are not identified as significant attributes. The reason here is, in the Chinese electrical industry, innovation is regarded as an *incompatibility* and the *relative advantage* from the innovation is the determining attribute.

Little research has employed SEM to systematically measure these correlated relationships among trust, organizational capacities, collaboration, e-business diffusion and business performance. The interest of this study is to identify the existence of a gap between the prediction or expectation and the actual performance as perceived by the subject of the study. This study shows that SEM methods can be clearly and easily

improvised and applied to determine these relationships. Finally, a clear explanation of the relationship between diffusion of e-business and collaboration is obtained, in which organizational capacities are identified as one of the key elements that increases collaboration performance between partners. Diffusion of e-business indirectly influences adoption decisions by becoming one of the determinants of business performance.

- Practical contribution

Collaboration and innovation processes in China electrical industry are typically taking place by chance. Few electrical product manufacturers have managed a sustainable collaboration process to enhance their business performance. Collaboration faces numerous variations in business management practices where e-business innovation arises primarily. This research seeks to explore how trustful interorganizational relationships are facilitated by trust atmosphere and organizational capacities in the electrical industry, and how the diffusion of e-business has been adopted.

The findings and final conceptual model developed from this study could provide the management of an organization with a better understanding on collaboration and how it relates to the issues of trust, organizational capacities and the diffusion of e-business with their collaborating partners. Trust and organizational capacities factors appear to have strong influences on the partners' business-to-business collaboration relationships, excepting e-business diffusion. Positive relationships between the interaction of trust and organizational capacities suggest that relationships built on trust and organizational capacities allow the collaboration relationship to prosper.

A better understanding of the individual components of the conceptual model will allow managers to make better collaboration and e-business adoption decisions. Thus managers should make certain that the collaborating partners provide ample organizational capacities to manage these e-business technologies and systems. Small and medium size organizations may have less e-technologies resources and innovation capability and rely heavily on their partners for information and knowledge sharing in this realm. Collaborating partners can work together effectively and mutually benefit from enhancing the learning capability, communication capability, innovation capability

and relationship management capability.

It is important for electrical organizations to consider their collaborating partner's position when making an e-business adoption decision and ensure that their suppliers or customers also benefit from the implementation. In other words, organizations' efforts in improving trust and organizational capacities cannot produce significant results on business performance without the adoption of collaboration activities.

By understanding the dynamics of trust and organizational capacities, organizations can strategically adjust their social relationship with each other to achieve a desired collaboration outcome. Having a well-balanced element of trust and organizational capacities between each partner in the collaboration will allow each party to reap the benefits of greater support utilizing new technology. Trust and dependency between partners will also help them forge a bond to ensure the success of their relationship and e-business initiative.

Finally, the findings can be used to benchmark the Chinese electrical industry practices against those practices used in developed countries. When formulating policies on e-business adoption within the value chain, managers must consider certain environmental, organizational and technological factors that influence adoption within their organization, and within their partner's organization. Understanding these factors can ensure effective adoption and forge stronger, longer-lasting interorganizational relationships. Managers must study the situation within China, rather than rely strictly on research from other countries due to the differences in adoption decisions.

7.5 Limitation and further researches

This study focuses on the effect of collaboration on business performance and investigates other variables directly affecting business performance, such as DOI and trust, but does not investigate other techniques and issues related to e-business. Moreover, the scope of this research to review these organizational capacities is especially related to the management of interorganizational relationships.

This research only deals with organizations within one geographical in China — in the region of Wenzhou. For further researches, generalizing these findings to organizations in other regions and other cultural contexts must be done cautiously. The majority of the participants in pilot study interviews and survey questionnaires are from the Wenzhou area and further research on these electrical organizations in China or globally should be done to extend the validity of the study. Additionally, in the era of globalization, different collaboration stages as mentioned by Pearce and Singh (1999) would affect the collaboration practices. In this case, collaboration and e-business practices in other industries require further researches.

The questionnaire was completed by a single informant from each organization, rather than multiple organization representatives. Single informant responses to assess organizational-level constructs can sometimes be problematic despite their popularity within interorganizational level collaboration adoption studies. The voluntary nature of questionnaire respondents results in an inevitably self-selection bias. Those organizations interested in using, that have used, or are currently using e-business systems are more likely to respond than those organizations that did not (Tung, Chang & Chou 2008).

The trust which links the organization to the partners may not sufficiently address the dynamic nature within the organization's environment. This is because organizational behavior and human nature cannot adequately be enshrined in formal writing (Martin 2002). It will be appropriate to assume that trust is essential to partner-relationships and corporate survival in the social system (Ryan et al. 2004). The basic assumption is that the nature of the social system, beliefs, values, norms, reputation, or roles of leaders under similar culture or common objectives will encompass the occurring of diffusion process and trust over time (Gregor & Jones 1999; Rogers 2003).

LIST OF REFERENCES

ABB 2011, *Strategy*, viewed 13th August 2011, <http://www.abb.com/cawp/abbzh252/9498df3c222c14b1c1256aed00524b75.aspx>.

Alfaro, JJ, Ortiz, A & Rodrı´guez, R 2007, 'Performance measurement system for enterprise networks', *International Journal of Productivity and Performance Management*, vol.56, no.4, pp. 305–34.

Ahuja, G 2000, 'Collaboration networks, structural holes, and innovation: A longitudinal study', *Administrative Science Quarterly*, vol. 45, no. 3, pp.425-55.

Al-Hakim, L 2011, 'Trust and information quality: performance gap analysis', *International Journal of Information Quality*, vol. 2, no. 4, pp.359-72.

Al-Hakim, L & Chen, J 2005, *E-innovation: information quality perspective*, Zhejiang University Press, Hangzhou.

Alajoustsijarvi, M & Rosenbroijer, C 1999, 'Relevance of focal nets in understanding the dynamics of business relationships', *Journal of Business To Business Marketing*, vol. 6, no. 3, pp. 3 -35.

Albert, TC & Sanders, WB 2003, *E-Business Marketing*, Prentice Hall, NJ.

Al-Gahtani, SS 2003, 'Computer technology adoption in Saudi Arabia: correlates of perceived innovation attributes', *Information Technology for Development*, vol. 10, no. 1, p. 57.

Aljifri, HA, Pons, A & Collins, D 2003, 'Global e-commerce: a framework for understanding and overcoming the trust barrier', *Information Management & Computer Security*, vol. 11, no. 3, pp.130 - 38.

Allen-Meares, P 1995, 'Applications of qualitative research: let the work begin', *Social Work Research*, vol. 19, no. 1, pp.5-7.

Allen, JP 2000, 'Information systems as technological innovation', *Information Technology & People*, vol. 13, no. 3, pp.210-21.

Amany, E 2010, 'From intention to use to actual rejection: the journey of an e-procurement system', *Journal of Enterprise Information Management*, vol. 23, no. 1, pp.81-99.

Amit, R & Zott, C 2001, 'Value creation in e-business', *Strategic Management Journal*, vol. 22, no. 3, pp.493-520.

Ammeter, A, Douglasb, C, Ferrisb, G & Gokab, H 2004, 'A social relationship conceptualization of trust and accountability in organizations', *Human Resource Management Review*, vol. 14, no.1, pp.47-65.

Anthony, T 2000, *Supply chain collaboration: success in the new internet economy* viewed 1st May 2011, <http://anthony.ASCET.com>.

Archer, N, Wang, S & Kang, C 2008, 'Barriers to the adoption of online supply chain solutions in small and medium enterprises', *Supply Chain Management: an International Journal*, vol. 13, no. 1, pp.73-82.

Arino, A & DelaTorre, J 1998, 'Learning from failure: Towards an evolutionary model of collaborative ventures', *Organization Science*, vol. 9, no. 3, pp. 306-25.

Atuahene-Gima, K 1996, 'Market orientation and innovation', *Journal of Business Research*, vol. 35, no. 2, pp.93-103.

Austin, DR & Nolan, LR 2000, *IBM corporation turnaround*, Harvard Business School Press, NY.

Azadegan, A & Teich, J 2010, 'Effective benchmarking of innovation adoptions:A theoretical framework for e-procurement technologies', *Benchmarking: An International Journal*, vol. 17, no. 4, pp.472-90.

Ba, S & Paul, AP 2002, 'Evidence of the effect of trust building technology in electronic markets: price premiums and buyer behavior', *MIS Quarterly*, vol.26, no.4, pp. 243-60.

Baldrige 2009, *Criteria for performance excellence*, Baldrige National Quality Program at the National Institute of Standard and Technology, MD, Gaithersburg.

Baron, MR & Kenny, DA 1986, 'The moderator-mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations', *Journal of American Psychological Association*, vol. 51, no. 6, pp.1173-82.

Barrat, M 2004, 'Understanding the meaning of collaboration in the supply chain', *Supply Chain Management: An International Journal*, vol.9, no.1, pp.30–42.

Barratt, M & Oliveira, A 2001, 'Exploring the experiences of collaborative planning initiatives', *International Journal of Physical Distribution & Logistics Management*, vol. 31, no. 4, pp. 266-89.

Bartle, P 2007, *Sixteen elements of organizational capacity*, viewed 1st May 2011, <http://www.wbiao.cn/cartier-g4674.html>.

Barua, A & Mukhopadhyay, T 2000, 'Information technology and business performance: past, present and future', in Zmud, RW (Ed.), *Framing the Domains of IT*

Management: Projecting the Future through the Past, Pinnaflex Education Resources, Cincinnati, OH, pp. 65-84.

Bentler, P M & Kano, Y 1990, 'On the equivalence of factors and components', *Multivariate Behavioral Research*, vol.25, no.1, pp. 67-74

BCA 1993, *Managing the Innovation Enterprise*, Business Council of Australia, Melbourne.

Bharadwaj, KK & Al-Shamri, MYH 2009, 'Fuzzy computational models for trust and reputation systems', *Electronic Commerce Research & Applications*, vol. 8, no.1, pp. 37-47.

Brewer, PC & Speh, TW 2000, 'Using the balanced scorecard to measure supply chain performance', *Journal of Business Logistics* , vol.21, no.1, pp.75–93.

Bititci, U, Carrie, A & Turner, T 2002, *Integrated performance measurement systems: Structure and dynamics, in Business Performance Measurement: Theory and Practice*, Cambridge University Press, Cambridge.

Bleecker, SE 1994, 'The virtual organization', *The futurist*, vol. 28, no. 2, pp. 9-14.

Blomqvist, K 2002, *Partnering in the dynamic environment: the role of trust in asymmetric technology partnership formation*, University of Lappeenranta.

Bradford, M & Florin, J 2003, 'Examining the role of innovation diffusion factors on the implementation success of enterprise resource planning systems', *International Journal of Accounting Information Systems*, vol. 4, no. 3, pp. 205-25.

Bradley, S, Hausman, JA & Nolan, RI 1993, *Globalization, technology and competition*, Harvard Business School Press, USA.

Birnbirg, JC 1998, 'Control in interfirm co-operative relationships', *Journal of Management Studies*, vol.25, no.4, pp. 421–28.

Brown, S, Dennis, A & Venkatesh, V 2010, 'Predicting collaboration technology use: integrating technology adoption and collaboration research', *Journal of Management Information Systems*, vol. 27, no. 2, pp.9-54.

Boddy, D, Macbeth, D & Wagner, B 2000, 'Implementing collaboration between organizations: an empirical study of supply chain partnering', *Journal of Management Studies*, vol.37, no.7, pp.1003–18.

Bollen, KA & Long, JS 1993, *Testing Structural Equation Models*, SAGE, California.

Bowersox, DJ, Closs, DJ & Stank, TP 2003, 'How to master cross-enterprise collaboration', *Supply chain management review*, vol.7, no.4, pp. 18-27.

Busi, M & Bititci, U 2006, 'Collaborative performance management: present gaps and

future research', *International Journal of Productivity and Performance*, vol.55, no.1, pp.7-25.

Bullington, KE & Bullington, SF 2005, 'Stronger supply chain relationships: learning from research on strong families', *Supply Chain Management: An International Journal*, vol.10, no.3, pp.192–97.

Burgess, K & Singh, P 2006, 'A proposed integrated framework for analysing supply chains', *Supply Chain Management: An International Journal*, vol.11, no. 4, pp. 337–44.

BYF 2006, *Electric power equipment: technology promotion let globalization industry and leading shares rating*, viewed 1st May 2011, <http://news.byf.com/html/20061208/14971.shtml>.

Byrne, BM 2001, *Structural equation modeling with AMOS: basic concepts, applications, and programming*, Lawrence Erlbaum, Mahwah, NJ.

Cahill, D 1996, 'When to use qualitative methods: a new approach', *Marketing Intelligence & Planning*, vol. 14, no. 6, pp. 16-20.

Callioni, G & Billington, C 2001, 'Effective collaboration: Hewlett-Packard takes supply chain management to another level', *OR/MS Today*, vol. 28, no. 5, pp. 34-9.

Carson, D, Gilmore, A, Gronhaug, K & Perry, C 2000, *Qualitative research in marketing*, Sage Publications, London.

Cavana, . RY, Delahaye, BL & Sekaran, U 2001, *Applied business research: qualitative and quantitative methods*, John Wiley & Sons Australia, Milton.

Cecez-Kecmanovic, D, Janson, M & Brown, A 2002, 'The rationality framework for a critical study of information systems', *Journal of Information Technology* vol. 17, no. 4, pp. 215-27.

Chan, FTS & Qi, HJ 2003, 'Feasibility of performance measurement system for supply chain: a process-based approach and measures', *Integrated Manufacturing System*,vol.14, no.3, pp.179–90.

Chapman, RL & Corso, M 2005, 'From continuous improvement to collaborative innovation: the next challenge in supply chain management', *Production Planning & Control*, vol.16, no.4, pp.339–44.

Chaffey, D 2002, *E-business and e-commerce Management*, Pearson Education, Essex.

Chaffey, D 2006, *E-Business and e-Commerce management*, 3rd edn., Prentice Hall.

Chen, CC & Chen, WY 2007, ' A customer-oriented and product-line-based

manufacturing performance measures', *International Journal of Advanced Manufacturing Technology*, no. 34, pp. 1236-45.

Chen, CC & Cheng, HL 2007, 'Determinants of customer repurchase intention in online shopping', *Online Information Review,* vol. 33, no. 4, pp. 761 - 84.

Chen, J 2003, *Global innovation*, Economic and technology press, Beijing.

Chen, S & Xu, T 2010, *Technology frame of security of the E-government system,* Computer Engineering and Design, Beijing.

Chen, TY, Chen, YM, Lin, CJ & Chen, PY 2010, 'A fuzzy trust evaluation method for knowledge sharing in virtual enterprises', *Computers & Industrial Engineering,* vol.60, no. 4, pp. 853-64.

Chen, WS & Hirschheim, R 2004, 'A paradigmatic and methodological examination of information systems research from 1991 to 2001', *Information Systems Journal,* vol. 14, no. 3, pp. 197-235.

Chen, YC & Thurmaier, K 2008, 'Advancing e-government: financing challenges and opportunities', *Public Administration Review,* vol. 68, no. 2, pp. 537-48.

Chiffoleau, Y 2005, 'Learning about innovation through networks: the development of environment-friendly viticulture', Technovation, vol.25, no.10, pp. 1193–204.

Chin, WW 1998, *The partial least squares approach for structural equation modeling,* in Marcoulides, GA (Ed.), *Modern methods for business research,* pp. 295–36, Lawrence Erlbaum Associates, London.

China Market Yearbook 2008, *China market yearbook*, Foreign languages press, Beijing.

Chipika, S & Wilson G 2005, 'Enabling technological learning among light engineering SMEs in Zimbabwe through networking', *Technovation*, vol.26, no.8, pp.969-79.

Choi, TY & Krause, DR 2005, 'The supply base and its complexity: implications for transaction costs, risks, responsiveness, and innovation', *Journal of Operations Management*, vol. 24, no.5, pp. 637-52.

Choi, TY, Dooley, KJ & Rungtusanatham, M 2001, 'Supply networks and complex adaptive systems: control versus emergence', *Journal of Operations Management*, vol. 19, no.3, pp.351-66.

Choudhury, V & Karahanna, E. 2008, ' *The relative advantage of electronic channels: a multidimensional view*', *MIS Quarterly,* vol. 32, no. 1, pp. 179-200.

Chow, C & Luk, P 2005, 'A strategic service quality approach using analytic hierarchy process', *Managing Service Quality,* vol. 15, no. 3, pp. 278-89.

Chua, R & Al-Hakim, L 2005, 'Trust and technology diffusion within the meat supply chain: a conceptual framework', Paper present to International Conference on Business and Information, Hong Kong.

Chui, YY 2009, 'The effect factors of end-user task performance in a business environment: Focusing on computing competency', *Computers in Human Behavior,* vol. 25, no. 6, pp. 1207-12.

CIA 2009, *China information Almanac 2009*, CIA Journal Press, Beijing.

Ciborra, CU 1992, *Innovation, networks and organizational learning*, in C Antonelli (eds), *The economics of information networks* Amsterdam, pp. 91-102.

Clarke, R 1999, *A primer in diffusion of innovations theory,* Xamax Consultancy Pty, Canberra.

Clegg, CW 2000, '*Sociotechnical principles for system design*', *Applied Ergonomics*, vol.31, no. 3, pp.463–477.

Collins, JD & Hitt, MA 2006, 'Leveraging tacit knowledge in alliances: the importance of using relational capabilities to build and leverage relational capital', *Journal of Engineering and Technology Management*, vol.23, no.3, pp.147–67.

Connell, JP 1995, *New approaches to evaluating community initiatives: concepts, methods and contexts*, The Aspen Institute, New York.

Osborne, JW & Costello, A B 2005, 'Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis', *Practical Assessment Research & Evaluation*, vol. 10, no.7, viewed 1st January 2012, <http://pareonline.net/pdf/v10n7a.pdf>.

Cottam, A, Ensor, J & Band, C 2001, 'A benchmark study of strategic commitment to innovation', *European Journal of Innovation Management,* vol. 4, no. 2, pp. 88-94.

Creed, W & Miles, R 1996, *Trust in organizations：a linking organizational forms, managerial managerial philosophies, and the opportunity costs of controls*, ed. RM Kramer, & Tyler, TR, Trust in Organizations： frontiers of theory and research, Sage Publications, Newbury Park, CA.

Creswell, J 1998, *Qualitative inquiry and research design: choosing among five traditions*, Sage Publications, Thousand Oaks.

Croom, S & Brandon-Jones, A 2003, 'E-service: enhancing internal customer service through e-procurement', *International Journal of Service Industry Management,*

vol. 14, no. 5, pp. 539-55.

Currall, SC & Inkpen, AC 2002, 'A multilevel approach to trust in joint ventures', *Journal of International Business Studies*, vol. 33, no. 3, pp. 479-95.

Currie, W 2004, *Value creation from e-business models*, Butterworth-Heinemann, oxford.

Czarnecki, ML, Simons, K, Thompson, JJ, Armus, CL, Hanson, TC & Berg, KA 2010, *Barrier s to pediatric pain management: Anur sing perspective*, Pain Management Nursing, USA.

Damsgaard, J & Lyytinen, K 2001, 'The role of intermediating institutions in the diffusion of electronic data interchange (EDI): how industry associations intervened in Denmark, Finland, and Hong Kong', *The Information Society,* vol. 17, no.2, pp. 195-210.

Danes, MS, Stafford, K & Loy, TJ 2007, 'Family business performance: The effects of gender and management', *Journal of Business Research,* vol. 60, no. 10, pp. 1058-69.

Danese, P 2006, 'Collaboration forms, information and communication technologies, and coordination mechanisms in CPFR', *International Journal of Production Research* , vol.44, no. 16, pp.3207–26.

Daniel, E 2003, 'Exploration of the inside-out mode: e-commerce integration in SEMs', *Journal of Small Business and Development*, vol. 10, no. 3, pp. 223-49.

Dasgupta, P 1988, 'Trust as a commodity', in Gambetta D (eds), *Trust: Making and breaking cooperative relations*, Blackwell,Oxford, UK, pp. 49-72.

Davenport, TH 1993, *Process innovation: reengineering work through information technology*, Harvard Business School Press, USA.

David, G & Chand, D 2007, 'An analysis of trust among globally distributed work teams in an organizational setting', *Knowledge and Process Management, Knowledge and Process Management,* vol. 14, no. 3, pp. 158-68.

Davila, T, Epstein, M, & Shelton, R 2006, 'Design for Innovation', *Leadership Excellence,* vol. 23, no. 2, p.15.

Davis, D 2000, *Business Research for Decision Making*, 5th edn., Duxbury Press, London.

Davis, FD 1989, 'Perceived usefulness, perceived ease of use, and user acceptance of information technology', *MIS Q*, vol. 13, no.3, pp. 319-40.

Deitel, M.H, Deitel, PJ & Nieto, TR 2001, *E-business and e-commerce: how to program*,

Prentice-Hall, Englewood Cliffs, NJ.

Deluga, RJ 1994, 'Supervisor trust building, leader – member exchange and organizational citizenship behavior', *Journal of Occupational and Organizational Psychology*, vol.67, no.4, pp.315 – 26.

Dempsey, SJ Gatti, JF & Cats-Baril, WL 1997, 'The use of strategic performance variables as leading indicators in financial analysts', *Journal of Financial Statement Analysis*, vol. 2, no. 4, pp. 61-79.

Denzin, N 1989, *The research art*, Prentice-Hall, Englewood Cliffs.

Deutsch, M 1958, 'Trust and suspicion', *Journal of Conflict Resolution*, vol. 2, no.4, pp. 265-79.

Diamantoupoulos, A & Winklhofer, HM 2001, 'Index construction with formative indicators: an alternative to scale development', *Journal of Marketing Research,* vol. 38, no. 2, pp.269-77.

Dolena, WM, Dabholkarb,PA & Ruyterc, K 2007, 'Satisfaction with online commercial group chat: the influence of perceived technology attributes,chat group characteristics, and advisor communication style', *Journal of Retailing*, vol. 83, no. 3, pp. 339-35.

Doney, PM, Cannon, J & Mullen, M 1998, 'Understanding the influence of national culture on the development of trust', *Academy of Management Review*, vol.23, no.3, pp. 601-620.

Dong, Jingrong 2009, *Technology innovation diffusion: the theory, method and practice*, Chinese version edn., Sciencep press, Beijing.

Dong, L 2006, 'The relationship between foreign direct investment and China capital performance', *Marketing Research,* vol. 10, no.1, pp. 39-44.

Dransfeld, H, Jacob, G & Dowsland, W 1999, 'Interactive TV and formula one: a strategic issue for engine suppliers', *European Business Review,* vol. 99, no. 5, pp. 292 - 99.

Duarte, M & Davies, G 2003, 'Testing the conflict-performance assumption in business-to-business relationships', *Industrial Marketing Management,* vol. 32, no. 2, pp. 91-99.

Dube, L & Parel G 2003, 'Rigor in information systems positivist case research: current practices, trends, and recommendations', *MIS Quarterly,* vol. 27, no. 4, pp 597-636.

Eastin, MS 2002, 'Diffusion of e-commerce: an analysis of the adoption of four

e-commerce activities', *Telematics & Informatics*, vol. 19, no. 3, p. 251.

Ebers, M 1999, *Explaining inter-organizational network formation,*, in M Ebers (eds), *The formation of inter-organizational networks*, Oxford University Press, Oxford, pp.

El, S 2001, *Redesigning enterprise processes for e-business*, McGraw-Hill international editions:computer science series, London.

Erikson, EH 1950, Childhood and society, New York, NY: Norton, in Ammetera, A., Douglasb,C. Ferrisb, G. & Gokab, H. 2004, 'A social relationship conceptualization of trust and accountability in organizations', *Human Resource Management Review,* vol. 14, no.1, pp. 47-65.

Evans, R & Lindsay, W 2008, *Managing for quality and performance excellence*, 8th edn., South-Western College Pub, New York.

Fawcett, S.E, Magnan, GM & McCarter, MW 2008, 'Benefits, barriers, and bridges to effective supply chain management', *Supply Chain Management: An International Journal*, vol.13, no.1, pp. 35–48.

Fenlon, MR & Sherriff, M 2008, 'An investigation of factors influencing patients' satisfaction with new complete dentures using structural equation modelling', *Journal of Dentistry*, vol. 36, no. 4, pp. 427-434.

Fielden, SL, Davidson, MJ, Dawe, A& Makin, PJ 2003, 'Factors inhibiting the economic growth of female owned small businesses in North West England'**,** *Journal of Small Business and Enterprise Development,* vol. 10, no.2, pp. 152-66.

Fitzgerald, G &Willcocks, L 1994, 'Contracts and partnerships in the outsourcing of IS', *Paper present to Fifteenth International Conference on Information Systems, Shanghai*, China.

Fiske, AP 1990, 'Relativity within Moose culture: four incommensurable models for social relationships', *Ethos*, vol.18, no.2, pp. 180–204.

Flick, U 1998, *An Introduction to Qualitative Research*, Sage Publications, London.

Forza, C 2002, 'Survey research in operations management: a process-based perspective', *International Journal of Operations & Production Management,* vol. 22, no. 2, pp.152-94.

Folan, P & Browne, J 2005, 'A review of performance measurement: Towards performance management', *Computers in Industry*, vol.56, no**.7,** pp. 663-80.

Frigo, ML 2002, 'Strategy, business execution and performance measures', *Strategic*

Finance, vol. 83, no. 11, pp. 23-39.

Fugate, B, Sahin, B & Mentzer, JY 2006, 'Supply chain management coordination mechanisms', *Journal of Business Logistics*, vol.27, no.2, pp. 129-61.

Fukuyama, F 1995, *Trust: social virtues and the creation of prosperity*, Free Press, NY.

Fulk, J, Brief, AP, & Barr, SH 1985, 'Trust-in-supervisor and perceived fairness and accuracy of performance evaluations', *Journal of Business Research*, vol.13, no.4, pp. 301-13.

Gable, GG 1994, 'Integrating case study and survey research methods: an example in information systems', *European Journal of Information Systems*, vol. 3, no. 2, pp. 112-26.

Gaiardelli, P, Saccani, N, & Songini, L 2007, 'Performance measurement systems in the after-sales service: an integrated framework', *International Journal of Business Performance Management*, vol.9, no.2, pp.145–71.

Galloway, L & Mochries, R 2005, 'The use of ICT in rural firms: a policy orientated literature review', *Info*, vol. 7, no. 3, pp. 33-46.

Gambetta, D 1988, 'Can we trust trust?' in D Gambetta (eds), *Trust: Making and breaking cooperative relationship*, Blackwell, Oxford, UK, pp. 213-37.

Ganesan, S & Hess, R 1997, *Dimensions and levels of trust: implications for commitment to a relationship*, Kluwer Academic Publishers, Netherlands.

Garson, DG 2008, *Factor Analysis: Statnote*, viewed 1st January 2012, North Carolina State University Public Administration Program, < http://www2.chass.ncsu.edu/garson/pa765/factor.htm>.

Gefen, D, Pavlou, P, Benbasat, I, McKnight, H, Stewart, K & Straub, DW 2006, 'Icis panel summary: should institutional trust matter in information systems research?' *Communications of the Association for Information Systems*, vol. 17, pp. 205-22.

GEO 2012, *Catalyzing networks for social change*, viewed 1st January 2012, <http://www.geofunders.org/home.aspx>.

Gerybadaze, A & Roger, G 1999, 'Globalization of R&D: recent changes in the management of innovation in transnational corporations', *Research policy*, vol. 28, no.2-3, pp. 251-74.

Ghalayin, AM, Noble, JS & Crowe, TC 1997, 'An integrated dynamic performance measurement system for improving manufacturing competitiveness', *International Journal of Production Economics*, vol. 48, no.3, pp. 207-25.

Gregor, S & Jones, K 1999, 'Beef producers online: diffusion theory applied. information', *Technology & People*, vol.12, no.1, pp.71-85.

Grover, JP 1997, *Resource Competition*, Chapman & Hall, London.

Gilmore, A & Carson, D 1996, 'Integrative qualitative researching: a services context', *Marketing Intelligence & Planning*, vol. 14, no. 6, pp. 21-26.

Gomes, FC, Yasin, MM & Lisboa, VJ 2007, 'The dimensionality and utilization of performance measures in a manufacturing operational context- organizational changes implication', *Cross Culture Management: an International Journey*, vol. 14, no. 4, pp. 286-306.

Goo, J & Huang, D 2008, 'Facilitating relational governance through service level agreements in IT outsourcing: An application of the commitment-trust theory', *Decision Support Systems*, vol. 46, no1, pp. 216-32.

Gottschalk, P 2006, *Managing successful IT outsourcing relationships*, Idea Group Publishing, Hershey, PA.

Gunasekaran, A, Patel, C & Tirtiroglu, E 2001, 'Performance measures and metrics in a supply chain environment', *International Journal of Operations & Production Management*, vol.21, no.1–2, pp. 71–87.

Gulati, R 1995, 'Does familiarity breed trust? the implications of repeated ties for contractual choice in AUiances', *Academy oManagement Journal*, vol. 38, no.1, pp.85-112.

Gulati, R & Gargiulo, M 1990, 'Where do interorganizational network come from?'. *American Journal of Sociology*, vol.104, no.5, pp.1439-493

Gulati, R, Lawrence, PR & Puranam, P 2005, 'Adaptation in vertical relationships: beyond incentive conflict', *Strategic Management Journal*, vol. 26, no. 5, pp. 415-40.

Hafeez, K, Keoy, K & Hanneman, R 2006, 'e-E-business capabilities model validation and comparison between adopter and non-adopter of e-business companies in UK', *Journal of Manufacturing Technology Management*, vol. 17, no. 6, pp. 806 - 28.

Hagedoorn, J 2002, 'Inter-organization R&D partnerships: an overview of major trends and patterns since 1960', *Research Policy*, vol. 31, no. 4, pp. 477-92.

Hair, JF, Anderson, RE, Tatham, RL & Black, WC 2009, *Multivariate data analysis*, 7th edn., Prentice Hall, New Jersey.

Halaris, C, Magoutas, B, Papadomichelaki, X & Mentzas, G 2007, 'Classification and

synthesis of quality approaches in e-government services', *Internet Research*, vol. 17, no. 4, pp. 378-401.

Handfiel, BR & Bechte, C 2002, 'The role of trust and relationship structure in improving supply chain responsiveness', *Industrial Marketing Management*, vol. 31, no4, pp. 367 - 82.

Hara-Devereaux, M & Johansen, R 1994, *Global work - bridging distance, culture and time*, Jossey-Bass Publishers.

Hartono, E & Holsapple, CW 2004, 'Theoretical foundations for collaborative commerce research and practice', *Information Systems and e-Business Management*, vol. 2, no. 1, pp. 1-30.

Heils, A, Teufel, A & Petri, S 1995, 'Functional promoter and polyadenylation site mapping of the human serotonin', *Journal of Neural Transm Gen Sect*, vol. 102, no.3, pp. 247-54.

Hendrick, HW & Kleiner, BM 2001, *Macro ergonomics: an introduction to work system design*, Human Factors and Ergonomics Society, Santa Monica.

Henseler, J, Ringle, CM & Sinkovics, RR 2009, 'The use of partial least squares path modeling in international marketing', *Advances in International Marketing*, vol. 20, no.1, pp.277-319.

Hill, RC & Hellriegel, D 1994, 'Critical contingencies in joint venture management: Some lessons from managers', *Organization Science*, vol. 5, no.4, pp. 594-607.

Hines, P, Holwe, M & Rich, N 2004, 'contemporary lean thinking', *International journal of operations & production management*, vol. 24, no. 10, pp. 994-1011.

Hocevar, SP, Jansen, E & Thomas, GF 2011, 'Inter-organizational collaboration: addressing the challenge', *Homeland Security Affairs*, vol. 7, no.1, pp. 25-32.

Hofstede, GH 1991, *Cultures and organizations: Software of the mind*, McGraw-Hill, London.

Holsapple, KA 2004, 'Equilibrium figures of spinning bodies with self gravity', *Icarus* vol. 172, no.1, pp. 272-303.

Horvath, L 2001, 'Collaboration: the key to value creation in supply chain management', *Supply Chain Management: An International Journal*, vol.6, no.5, pp.205–07.

Hong, W & Zhu, K 2006, 'Migrating to internet-based e-commerce: factors affecting e-commerce adoption and migration at the firm level', *Information & ManagemenT*, vol. 43, no.2, pp. 204-21.

Hosmer, L 1995, 'Trust: the connecting link between organizational theory and

philosophical ethics', *Academy of Management Review*, vol. 20, no. 2, pp. 379 - 403.

Hsu, CW 2005, 'Formation of industrial innovation mechanisms through the research institute', Technovation, vol. 25, pp.1317–329.

Hsu, P, Kraemer, K & Dunkle, D 2006, 'Determinants of e-business use in US firms', *International Journal of Electronic Commerce*, vol. 10, no.4, pp. 9-45.

Hu, JT 2010, *President Hu's speech at G20 meeting*, viewed 28th June 2010, <http://english.gov.cn/2005-10/16/content_78589.htm>.

Hartono, HE & Holsapple, CW 2004, 'Theoretical foundations for collaborative commerce research and practice', *Information Systems and e-Business Management*, vol. 2, no. 1, pp. 1-30.

Huggins, R & Izushi, H 2002, *World knowledge competitiveness index 2002: benchmarking the globe's high performing regions*, Robert Huggins Business & Economic Policy Press, Cardiff.

Hung, SY, Chang, CM & Yu, TJ 2006, 'Determinants of user acceptance of the e-government services: the case of online tax filing and payment system', *Government Information Quarterly*, vol. 23, no. 1, pp. 97-122.

Hussey, J & Hussey, R 1997, *Business research: A practical guide for undergraduate and postgraduate students*, Macmillan Press, London.

Hwang, Y & Kim, DJ 2007, 'Customer self-service systems: the effects of perceived web quality with service contents on enjoyment, anxiety, and E-trust', *Decision Support Systems*, vol. 43, no. 3, pp. 746-60.

Ian, F, Ulf, J & Beverly, W 2004, 'Factors impacting on e-business adoption and development in the smaller firm', *International Journal of Entrepreneurial Behaviour &Research*, vol. 10, no. 3, pp. 178-91.

IBM 2010, *About IBM e-business*, viewed 21st January 2010, <http://www-3.ibm.com/e-business/overview>.

Ifeng 2011, *Ifeng fiance news*, viewed 1st October 2011, < http://finance.ifeng.com/usstock/realtime/20100304/1888653.shtml>.

Ik-Whan, K & Taewon, S 2005, 'Trust, commitment and relationships in supply chain management: a path analysis', *Supply Chain Management: An International Journal*, vol. 10, no. 1, pp. 26-33.

Irani, Z, Ezingeard, J, Grieve, R & Race, P 1999, 'A case study strategy as part of an information systems research methodology: a critique', *International Journal of*

Computer Applications in Technology, vol. 12, no. 2, pp. 190-98.

Ireland, RD, Hitt, MA & Vaidyanath, D 2002, 'Alliance management as a source of competitive advantage', *Journal of Management Information Systems,* vol. 28, no. 3, pp. 413-46.

Iskandar, BY, Kurokawa, S & Blanc, LL 2001, 'Adoption of electronic data interchange: the role of buyer-supplier relationships', *IEEE Transactions on Engineering Management*, vol. 48, no.4, pp. 505-17.

Johson, BR & Onwuegbuzie, A 2004, 'Mixed methods research: a research paradigm whose time has come', *Educational Researcher,* vol. 33, no. 7, pp.14-26.

Jones, O & Tilley, F 2003, *Competitive advantage in SMEs: organizing for innovation and change*, J. Wiley, Hoboken, NJ.

Josang, A, Ismail, R & Boyd, C 2007, 'A survey of trust and reputation systems for online service provision', *Decision Support Systems,* vol. 43, no.2, pp. 18-44.

Kaplan, RS & Copper, R 1998, *Cost and effect - using integrated cost system to drive profitability and performance*, HBS Press, Boston, MA.

Kaplan, RS & Norton, DP 2001, *The strategy-focused organization*, Harvard Business School Press.

Kaplan, S & Sawheny, M 2000, 'E-hubs: the new B2B marketplaces', *Harvard Business Review,* vol. 78, no. 3, pp. 97-103.

Kariva, D, Menziesb, VT, Brennerc, AG, & Filionco, JL 2009, 'Transnational networking and business performance: Ethnic entrepreneurs in Canada', *Entrepreneurship & Regional Development,* vol. 21, no. 3, pp. 239-64.

Karsha, BT, Escotob, KH, Beasleyc, J W & Holdenb, RJ 2006, 'Toward a theoretical approach to medical error reporting system research and design', *Applied Ergonomic*, vol. 37, no.3, pp. 283-95.

Karahanna, E, Straub, DW & Chervany, NL 1999, ' Information technology adoption across time: a cross-sectional comparis on of pre-adoption and post-adoption beliefs', *MIS Quarterly,* vol.23, no.2, pp.183–213.

Katz, M & Shapiro, C 1985, 'Network externalities, competition, and compatibility', *American Economic Review,* vol.75, no3, pp.424–40.

Kay, HAK, Khalid, H & Siau, CLK 2007, 'Evaluating the e-business capability model: empirical evidence from the UK technology-based companies', *International Journal of Logistics Economics and Globalisation*, vol. 1, no. 1, pp. 92-122.

Kern, T, Willcocks, LP & Heck, EV 2002, 'The winner's curse in IT

outsourcing:strategies for avoiding relational trauma', *California Management Review,* vol. 44, no. 2, pp. 47-69.

Kim, C & Galliers, RD 2004, 'Toward a diffusion model for Internet systems', *Internet Research,* vol. 14, no. 2, pp. 155-66.

Kim, WC & Mauborgne, R 2005, *Blue ocean strategy*, Harvard Business School Press, Boston.

Kodama, M 2005, 'Innovation and knowledge creation through leadership-based strategic community: case study on high-tech company in Japan', *Technovation,* vol.27, no.3, pp.115-32.

Kogut, B & Zander, U 1992, 'Knowledge of the firm, combinative capabilities, and the replication of technology', *Organization Science,* vol. 3, no. 3, pp. 383-97.

Kotler, P & Scheff, J 1997, *Standing room only: strategies for marketing the performing arts*, President and Fellows of Harvard College, USA.

Krackhardt, D 1992, 'A Caveat on the Use of the Quadratic Assignment Procedure', *Journal of Quantitative Anthropology,* vol. 3, no. 4, pp. 279-96.

Kuan, KKY & Chau, PYK 2001, 'A perception-based model for EDI adoption in small businesses using a technology-organization-environment framework', *Information & Management,* vol. 38, no.8, pp. 507-21.

Kwon, G & Suh, T 2005, 'Trust, commitment and relationships in supply chain management: a path analysis', *Supply Chain Management: An International Journal,* vol. 10, no. 1, pp. 26-33.

Lau, T, Wong, YH, Chan, KF & Law, M 2001, 'Information technology and the work environment—does IT change the way people interact at work? ', Human *Systems Management,* vol. 20, no. 3, pp. 267-79.

Lebas, M & Euske, K 2002, *A conceptual and operational delineation of performance, in Business Performance Measurement: Theory and Practice*, Cambridge University Press.

Lee, C, Chawla, A, Urbiztondo, N, Liao, D, Boisvert, WA & Evans, RM 2003, 'Transcriptional repression of atherogenic inflammation', *Science of Aging Knowledge Environmen,* vol. 302, no.17, pp. 453-457.

Lee, D-I, Sohn, C & Lee, H 2008, 'The role of satisfaction and trust in mobile CRM activities', *International Journal of Electronic Customer Relationship Management*, vol. 2, no. 2, pp. 101-19.

Lee, HL, Padmanabhan, V & Whang, S 1997, 'The bullwhip effect in supply chains',

sloan Management Review, vol. 38, no. 3, pp. 93-102.

Leedy, PD & Ormrod, JE 2005, *Practical research: planning and design*, Prentice Hall, New York.

Levy, M & Powell, P 2005, *Strategies for Growth in SMEs: The Role of Information and Information Systems*, ELSEVIER Butterworth-Heineman, Oxford .

Lewicki, RJ, McAllister, DJ & Bies, RJ 1998, 'Trust and distrust: new relationships and realities', *Academy of Management Review,* no. 23, pp. 438-58.

Liebscher, P 1998, *Quantity with quality? Teaching quantitative and qualitative methods in an LIS Master's program*, Library Trends, UK.

Lin, YC, Wang, LC, & Tserng, HP 2006, 'Enhancing knowledge exchange through web map-based knowledge management system in construction: Lessons learned in Taiwan', *Automation in Construction,* vol. 15, no.6, pp. 693-705.

Lin, WB 2008, 'The effect of knowledge sharing model', *Expert System with Applications*, vol. 34, no. 2, pp.1508–1521.

LLM 2011, *The rapid development of electric and electrical industry professionals still worry to Weapon*, viewed 15th October 2011, <http://www.spvuk.com/blog/2011/02/the-rapid-development-of-electric-and-electrical-industry-professionals-still-worry-to-weapon/>.

Loa, S & Lieb, T 2008, 'Selection of communication technologies-A perspective based on information richness theory and trust', *Technovation,* vol. 28, no.3, pp. 146-53.

Locker, OK 2008, *Business and administrative communication*, 8th edn., China Machine Press, Beijng.

Loewe, P & Dominiquini, J 2006, 'Strategy & leadership: overcoming the barriers to effective innovation', *Strategy &Leadership,* vol. 34, no. 1, pp. 24-31.

Lorenzoni, G & Lipparini, A 1999, 'The leveraging of interfirm relationships as a distinctive organizational capability: a longitudinal study', *Strategic Management Journal,* vol. 20, pp.317–38.

Lummus, RA & Vokkurka, RJ 1999, 'Managing the demand chain through managing the information flow: capturing moments of information', *Production and Inventory Management,* vol.40, no.1,pp. 16-20.

Luo, Y 2002, 'Determinants of entry in an emerging economy: a multilevel approach', *Journal of Management Studies,* vol. 38, no. 3, pp. 443-72.

MacDuffie, JP & Helper, S 2003, *B2B and Mode of Exchange: Evolutionary and Transformative Effects*, in: Kogut, B (eds), *The global internet economy,* MA: MIT Press, Cambridge.

MacMillan, K, Money, K, Money, A & Downing, S 2005, 'Relationship marketing in the not-for-profit sector: an extension and application of the commitment-trust theory', *Journal of Business Research,* vol.8, no. 58, pp. 806- 18.

Marks, N, Abdallah, S, Simms, A, & Thompson, S 2006, *The happy planet index 1.0*, New Economics Foundation, UK.

Martin, R 2002, 'Trust and technology: the limits of technological control', Paper present to ANZAM/IFSAM 6th World Congress, Gold Coast City, Queensland.

Martinez-Campos, M, Basto, R, Baker, J, Kernan, M & Raff, JW 2004, 'The drosophila pericentrin-like protein is essential for cilia/flagella function, but appears to be dispensable for mitosis', *Journal of Cell Biol.,* vol. 165, no. 5, pp. 673–83.

Martinez, L, Giblin, M & Walshe, E 2006, 'KISA in innovation of Irish software organizations', *International Journal of Services Technology and Management,* vol. 17, no. 2, p. 3.

Maskell, B 1991, *Performance measurement for world class manufacturing: a model for American companies*, Productive Press, Cambridge.

Massey, G & Dawes, P 2007, 'Personal characteristics, trust, conflict, and effectiveness in marketing', *European Journal of Marketing,* vol. 41, no. 9, pp. 1117 - 45.

Martinsons, MG & Martinsons, V 2002, 'Rethinking the value of IT, again', *Communications of the ACM* , vol. 45, no. 7, pp. 25-6.

Martins, CBMJ, Steil, AV & Todesco, JL 2004, 'Factors influencing the adoption of the Internet as a teaching tool at foreign language schools', *Computers & Education*, vol. 42, no. 4, pp. 353-74.

Matopoulos, A, Vlachopoulou, M, Manthou, V & Manos, B 2007, 'A conceptual framework for supply chain collaboration: empirical evidence from the agri-food industry', *Supply Chain Management*: *An International Journal,* vol.12, no.3, pp.177–186.

Mayer, R, Davis, J & Schoorman, F 1995, 'An integrative model of organizational trust', Academy of Management Review, vol. 20, no. 3, pp. 709 - 34.

McAdam, R, McConvery, T & Armstrong, G 2004, 'Barriers to innovation within small organizations in a peripheral location', *International Journal of Entrepreneurial Behaviour & Research,* vol. 10, no. 3, pp. 206 - 21.

McAllister, DJ 1995, 'Affect and cognition-based trust as foundations for interpersonal cooperation in organizations', *Academy of Management Journal*, vol. 38, no.1, pp. 24-59.

McEvily, B, Perrone, V & Zaheer, A 2003, 'Trust as an organizing principle', *Organization Science,* vol. 14, no. 1, pp. 91-105.

McNurlin, BC & Sprague RH 2002, *Information systems management*, 5 edn., Pearson Education, NY.

Meredith, J & Mantel, J 2008, *Project Management: A Managerial Approach*, 7th edn., Wiley.

Mentzer, JT 2001, *Managing Supply Chain Collaboration*', Sage Publications, Thousand Oaks, California.

Miles, M & Huberman, A 1994, *Qualitative data analysis: an expanded sourcebook*, 2nd edn., Sage Publications, Thousand Oaks.

Minhan, T 2005, *The E-Procurement Benchmark Report: Less Hype, More Results*, Aberdeen Group.

Mishira, AK 1996, 'Organizational responses to crisis: The centrality of trust', in RM & Tyler Kramer, TM (eds), *Trust in organizations*, Sage Publications,Newbury Park, CA, pp. 261-87.

Mitroff, I & Linstone, HA 1993, *The unbounded mind: breaking the chains of traditional business thinking*, Oxford University Press, New York.

Moenaert, RK, Caeldries, F, Lievens A & Wauters, E 2000, *Communication flows in international product innovative teams*, J Prod INNOV MANAG.

Mohtadi, H 2008, 'Information sharing in food supply chains', *Canadian Journal of Agricultural Economics*, vol.56, no.2, pp.163-178.

Mohr, J & Nevin, JR 1990, 'Communication strategies in marketing channels: a theoretical perspective', *Journal of Marketing,* vol. 54, no. 4, pp. 36-51.

Mohr, JJ & Spekman, RE 1996, 'Perfecting partnerships', *Marketing Management*, vol.4, no.4, pp.34-43.

Molm, LD, Takahashi, N ＆Peterson,G 2000, 'Risk and trust in social exchange: an experimental test of a classical proposition', *American Journal of Sociology,* vol. 105, no. 5, pp. 1396-427.

Morgan, RM & Hunt, SD 1994, 'The commitment-trust theory of relationship marketing', *Journal of Marketing,* vol. 58, no. 3, pp. 20-39.

Motwani, J, Akbukut, AY, Mohamed, Z & Grffne, C 2008, 'Organizational factors for successful implementation of ERP Systems', *International Journal of Business Information Systems,* vol. 3, no. 2, pp. 158-82.

Moussavi, M 1992, 'A computer simulation model for urban transportation planning process', *Engineering Software,* vol. 14, no. 3, pp. 213-18.

Mun, J, Shin, M, Lee, K, & Jung, M 2009, 'Manufacturing enterprise collaboration based on a goal-oriented fuzzy trust evaluation model in a virtual enterprise', *Computers & Industrial Engineering,* vol. 56, no.3, pp. 888-901.

Mukherjee, A & Nath, P 2003, 'A model of trust in online relationship banking', *International Journal of Bank Marketing,* vol. 21, no. 1, pp. 5 - 15.

Nancarrow, C, Moskvin, A & Shankar, A 1996, 'Bridging the great divide: the transfer of technologies', *Marketing Intelligence and Planning,* vol. 14, no. 6, pp. 27-37.

NBSC 2008, *China statistical yearbook 2008*, National bureau of statistics of China, China statistics press, Beijing.

NBSC 2010, *China statistical yearbook 2010*, National bureau of statistics of China, China statistics press, Beijing.

Neely, A 2002, B*usiness Performance Measurement: Theory and Practice*, Cambridge University Press, UK.

Neuman, W 2003, *Social science research methods: qualitative and quantitative approaches*, 3rd edn., Allyn and Bacon, New York.

Newell, G, Wing, K & Wong, K 2009, 'The significance and performance of infrastructure in China', *Journal of Property Investment & Finance,* vol. 27, no. 2, pp. 180-202.

Newell, S & Swan, J 2000, 'Trust and inter-organizational networking', *Human Relations,* vol. 53, no. 10, pp.1287-328.

Newell, S, Swan, A & Galliers, R 2000, 'A knowledge-focused perspective on the diffusion and adoption of complex information technologies: the BPR example', *Information Systems Journal,* vol. 10, no.3, pp. 239 - 59.

Norris, G 2000, *E-business and ERP: transforming the enterprise*, John Wiley, Chichester.

Norris, SL, Grothaus, LC, Buchner, DM, & Pratt, M 2000b, 'Effectiveness of physician based assessment and counseling for exercise in a staff model HMO', *Preventive Medicine,* vol. 30, no. 6, pp. 513-23.

Norusis, MJ 2006, *SPSS 15.0 Statistical Procedures Companion*, Prentice Hall,

Chicago.

NRC 2011, *Examining core elements of international research collaboration: summary of a workshop*, The National Academies Press, Washington, DC.

O'Hara, K 2012, 'Trust from the enlightenment to the digital enlightenment', in L Roberts, Whittle, C, Cleland, J & Wald, M (eds), *Digital Enlightenment Yearbook 2012*, IOS Press, Luxembourg, pp. 169-83.

O'Neil, S 2009, 'The formation of collaborative inter-organizational networks', PhD thesis, George Mason University.

Orlikowski, WJ & Baroudi, JJ 1991, 'Studying information technology in organizations: research approaches and assumptions', *Information Systems Research*, vol. 2, pp. 1-28.

Parkhe, A 1998, 'Building Trust in International Alliance', *Journal of World Business*, vol. 33, no.4, pp. 417-37.

Paterson, I, Maguire, H & Al-Hakim, L 2008, 'Analysing trust as a means of improving the effectiveness of the virtual supply chain', *International Journal of Networking and Virtual Organisations*, vol.5, no.3, pp.325-48.

Paterson, AM, Winter, JG, Nicholls, KH, Clark BJ, Ramcharan,CW, Yan, ND & Somfers, KM 2008, 'Long-term changes in phytoplankton composition in seven Canadian Shield lakes in response to multiple anthropogenic stressors', *Can. J. Fish. Aquat. Sci.*, vol. 65, no.5, pp. 846-61.

Pathak, P, Joyce, D, & Hall, T 2005, 'Mobile learning as technology-mediated education: an 'activity' approach', Paper present to IADIS International Conference Mobile Learning,

Pathak, SD, Day, JM, Nair, A, Sawaya, WJ & Kristal, MM 2007, 'Complexity and adaptively in supply networks: building supply network theory using a complex adaptive systems perspective', *Decision Sciences*, vol. 38, pp. 547-61.

Patterson, KA, Grimm, CM & Corsi, TM 2003, 'Adopting new technologies for supply chain management', *Transportation Research*, vol. 39, no. 2, p. 95.

Patton, MQ 1987, *How to use qualitative methods in evaluation*, Sage Pubications, Newbury Park, CA.

Pearce, RD & Papanastassiou, M 1999a, 'Overseas R&D and the strategic evolution of MNEs', *Research policy*, vol. 28,no.1, pp. 23-41.

Pearce, RD & Singh, S 1999b, *Globalizing research and development*, MacMillan, London.

Peng, G & Woodlock, P 2011, 'The impact of network and recency effects on the adoption of e-collaboration technologies in online communities', *Electronic Markets - The International Journal on Networked Business*, vol. 19, no. 4, pp. 201-10.

Perry, ML, Sengupta, S & Krapfel, R 2004, 'Effectiveness of horizontal strategic alliances in technologically uncertain environments: Are trust and commitment enough?' *Journal of Business Research*, vol. 57, no. 9, pp. 951-56.

Phatak, AV, Bhagat, Rs & Kashlak, RJ 2005, *International management: managing in a diverse and dynamic global environment*, *McGraw-Hill/Irwin*, Boston, MA.

Podolny, J & Stuart, T 1995, 'A role based ecology of technological change', *American Journal of Sociology*, vol. 100, no.5, pp. 1224-60.

Polonsky, MJ & Macdonald, EK 2000, 'Exploring the link between cause-related marketing and brand building', *Int J Nonprofit Volunt Sect Mark*, vol. 5, no. 1, pp. 46- 57.

Poltrock, S & Handel, M 2010, 'Models of collaboration as the foundation for collaboration technologies', *Journal of Management Information Systems*, vol. 27, no. 1, pp. 97-122.

Poppo, L & Zenger, T 2002, 'Do formal contracts and relational governance function as substitutes or complements?' *Strategic Management Journal*, vol. 23, no. 8, pp. 707-25.

Porter, ME 2001, 'Strategy and the internet', *Harvard Business Review*, vol. 79, no. 3, pp. 1-20.

Portes, A, Haller, W & Guarnizo, L 2002, 'Transnational entrepreneurs: An alternative form of immigrant economic adaptation', *American Sociological Review*, vol. 67, no.2, pp. 278-98.

Powell, W, Koput, K & Smith-Doerr, L 1996, 'Interorganizational collaboration and the locus of innovation: networks of learning in biotechnology', *Administrative Science Quarterly*, vol. 41, no.1, pp. 116-45.

Premkumar, G & Ramamurthy, K 1995, ' Ramamurthy, the role of interorganizational and organizational factors on the decision mode for adoption on interorganizational systems', *Decision Science*, vol. 26, no. 3, pp. 303-36.

Punch, K 2006, *Developing effective research proposals*, 2nd edn., Sage Publications, London.

Rajeev, TS 2004, *E-commerce, business and technology*, Science publishing, New

Delhi.

Ramsay, NA, Walker, AR, Mooney M & Gray JC 2003, 'Two basic-helix-loop-helix genes (MYC-146 and GL3) from Arabidopsis can activate anthocyanin biosynthesis in a white-flowered Matthiola incana mutant', *Plant Mol. Biol.,* vol. 52, no. 3, pp. 679-88.

Ratnasingam, P 2004, 'The impact of collaborative commerce and trust in Web services', *The Journal of Enterprise Information Management,* vol. 17, no. 5, pp. 382-87.

Reicheld, F & Schefter, P 2000, 'E-loyalty: your secret weapon on the Web', *Harvard Business Review,* vol. 78 no. 4, pp. 105-14.

Remenyi, D & Williams, B 1996, 'The nature of research: qualitative or quantitative, narrative or paradigmatic?', *Information Systems Journal*, vol. 6, no. 2, pp.131–46.

Rice, S & Geels, K 2010, 'Using system-wide trust theory to make predictions about dependence on four diagnostic aids', *The Journal of General Psychology,* vol. 137, no. 4, pp. 362-75.

Richtner, A & Rognes, J 2008, 'Organizing R&D in a global environment: Increasing dispersed co-operation versus continuous centralization', *European Journal of Innovation Management*, vol. 11, no. 1, pp. 125-141.

Riegelsberger, R, Sasse, M & McCarthy, J 2003, 'The researcher's dilemma: Evaluating trust in computer-mediated communication', *International Journal of Human-Computer Studies,* no. 58, pp. 759-81.

Riemer, K 2009, 'Corporate social networking sites - modes of use and appropriation through co-evolution', Paper present to 20th Australasian Conference on Information Systems, Australasian.

Riemer, K & Klein, S 2006, *Network management framework*, in S & Poulymenakou Klein, A (eds), *Managing dynamic networks*, Springer Verlag, Berlin, pp. 17-66.

Riemer, K, Steinfield, C & Vogel, D 2009, 'eCollaboration: on the nature and emergence of communication and collaboration technologies', *Electron Markets,* vol. 19, no.1, pp .181-88.

Rogers, E & Kincaid, D 1981, *Communication network: toward a new paradigm for research*, The Free Press, NY.

Rogers, EM 1995, *Diffusion of Innovations*, Free Press, New York.

Rogers, EM 2003, *Diffusion of Innovations*, 5th edn., Free Press, New York.

Romero, D, Galeano, N & Molina, A 2007, *A conceptual model for virtual breeding environments value system*, In: Camarihna-Matos, L, Afsarmanesh, H, Novais, P & Analide, C (eds.), *Establishing the foundation of collaborative networks*, Boston: Springer, pp. 43–52.

Rong, TS 2010, *AMOS and research methodology,* Chongqing University Press, Chongqing, China.

Rotter, JB 1967, 'A new scale for the measurement of interpersonal trust', *Journal of Personality,* no. 35, pp. 651-65.

Rudberg, M, Klingenberg, N & Kronhamn, K 2002, 'Collaborative supply chain planning using electronic marketplaces', *Integrated Manufacturing Systems,* vol. 13, no. 8, pp. 596 - 610.

Rudraswamy, V & Vance, D 2001, 'Transborder data flows: adoption and diffusion of protective legislation in the global electronic commerce environment', *Logistics Information Management,* vol. 14, no. 1, pp. 127-37.

Ryan, P, Giblin, M & Walshe, E 2004, 'From subcontractual R&D to joint collaboration: the role of trust in facilitating this process', *International Journal of Innovation and Technology Management,* vol. 1, no. 5, pp. 205 - 31.

Rycroft, RW & Kash, DE 2004, 'Self-organizing innovation networks: implications for globalization', Technovation, vol.24, no.3, pp.187–197.

Ryssel, R, Ritter, T & Gemunden, HG 2004, 'The impact of information technology deployment on trust, commitme0nnt and value creation in business relationships', *Journal of Business and Industrial Marketing,* vol.19, no.3, pp.197-207.

Saggi, K 2006, *The case for industrial policy: a critical survey*, The World Bank, NY.

Sako, M 1998, 'Does trust improve business performance', in C & Bachmann Lane, R (eds), *Trust within and between organizations*, Oxford University Press,Oxford, pp. 43-76.

Sale, JEM, Lohfeld, LH & Brazil, K 2002, 'Revisiting the quantitative-qualitative debate: implications for mixed-methods research', *Quality & Quantity,* vol. 36, no. 1, pp. 43-53.

Sambasivan, M, Mohamed, AZ & Nandan, T 2009, 'Performance measures and metrics for e-supply chains', *Journal of Enterprise Information Management,* vol. 23, no. 3, pp. 346-60.

Schmidt, S, Steele, R, Dillon, TS & Chang, E 2007, 'Fuzzy trust evaluation and credibility development in multi-agent systems', *Applied Soft Computing,* no. 7,

pp. 492-505.

Shan, W, Walker, G & Kogut, B 1994, 'Interfirm cooperation and startup innovation in the biotechnology industry', *Strategic Management Journal*, vol. 15, no. 5, pp. 387-94.

Shapiro, SP 1987, 'The social control of impersonal trust', *American Journal of Sociology*, vol. 93, no. 3, pp. 623-58.

Simatupang, MT & Sridharan, R 2004, 'The collaboration index: a measure for supply chain collaboration', *International Journal of Physical Distribution & Logistics Management*, vol. 35, no. 1, pp. 44-62.

Simatupang, MT, Wright, A & Sridharan, R 2004, 'Applying the theory of constraints to supply chain collaboration', *Supply Chain Management: An International Journal*, vol. 9, no. 1, pp. 57 - 70.

Simatupang, MT & Sridharan, R 2002, 'The collaborative supply chain', *International Journal of logistical management*, vol. 12, no. 1, pp. 32-48.

Simchi-Levi, D, Kaminsky, P & Simchi-Levi, E 2003, *Managing the supply chain: the definitive guide for the business professional*, McGraw- Hill Professional.

Simmons, R 2000, *Performance measurement and control systems for implementing strategy*, Prentice Hall.

Simonin, BL 1997, 'The importance of collaborative know-how: An empirical test of the learning organization', *Academy of Management Journal*, vol. 40, no. 5, pp. 1150-74.

Singh, W & Mitchell, W 1996, 'Precarious collaboration: business survival after partners shut down partnerships', *Strategic Management Journal*, vol. 17, no. 3, pp. 99-115.

Sirdeshmukh, D, Singh, J & Sabol, B 2002, 'Consumer trust, value, and loyalty in relational exchanges', *Journal of Marketing*, vol. 66,no1, pp. 15-37.

Siw, MF 2012, 'Collaboration for innovation in a big city region', PhD thesis, University of Oslo.

Smith, PR & Chaffey, D 2005, *E-marketing excellence*, 2nd edn., A Butterworth-Heinemann Title.

Soares-Aguiar, A & Palma-Dos-Reis, A 2008, 'Why do firms adopt e-procurement systems? Using logistic regression to empirically test a conceptual model', *Engineering Management*, vol. 55, no.1, pp.120-33.

Spekman, E 1988, 'Strategy supplier selection: understanding long-term buyer',

Business Horizons, vol. 31, no. 4, pp. 75-81.

Spekman, ER & Carraway, R 2006, 'Making the transition to collaborative buyer-seller relationships: an emerging framework', *Industrial Marketing Management*, vol. 35, no.1, pp. 10-19.

SPMP 2011, *Shenzhen precise metal products*, viewed 11th October 2011, < http://www.jgjm.cn/en/news_show.asp?clsid=80&nid=11>.

Staughton, R & Johnston, R 2005, 'Operational performance gaps in business relationships', *International Journal of Operations & Production Management*, vol.25, no. 4, pp.320–332.

Stern, E 2004, 'Philosophies and types of evaluation research', in P & Tessaring Descy, M (eds), *The Foundations of Evaluation and Impact Research, Cedefop reference series*, Office for Official Publications of the European Communities, Luxembourg, pp. 55-56.

Stevens, J 2002, 'Applied Multivariate Statistics for social sciences', *Lawrence Erlbaum Associates*, 4th ed., USA.

Straub, DW 1989, 'Validating Instruments MIS Research', *MIS Quarterly*, vol. 13, no. 2, pp.174-96.

Straub, DW & Burton-Jones, A 2007, 'Veni, Vidi, Vici: breaking the TAM logjam', *Journal of the Association for Information Systems*, vol. 8, no. 4, pp. 223-29.

Strauss, A & Corbin, J 1990, *Basics of qualitative research: grounded theory procedures and technologies*, Sage Publications, London.

Subramaniam, C & Shaw, M 2002, 'A study of the value of B2B e-commerce: the case of web-based procurement', *International Journal of Electronic Commerce*, vol. 6, no. 6, pp. 19-40.

Sun, J 2006, 'Analysis on the influence of Foreign Direct investment on the Industrial Structure of China', *Journal of University of Science and Technology Beijing (Social Sciences Edition)*, vol. 22, no. 1, pp. 33-38.

Svensson, G 2001, 'Perceived trust towards suppliers and customers in supply chains of the Swedish automotive industry', *International Journal of Physical Distribution & Logistics Management*, vol. 31, no. 9, pp. 647 - 62.

Svensson, G 2004, 'Vulnerability in business relationships: the gap between dependence and trust', *Journal of Business & Industrial Marketing*, vol. 19, no. 7, pp. 469 - 83.

Svensson, T. 2000, *Achieving a balance between car accessibility and good urban*

environment, Trafikdage PaAalborg University, Aalborg.

Szulanski, G 1996, 'Exploring Internal Stickiness: Impediments to the Transfer of Best Practice within the Firm', *Strategic Management Journal,* vol. 17 (winter special issue), pp. 27-44.

Tangen, S 2003, 'An overview of frequently used performance measure', *Work Study,* vol. 52, no. 7, pp. 346-54.

Taylor, S & Todd, P 1995, 'Assessing IT usage: the role of prior experience', *MIS Quarterly*, vol. 19, no. 4, pp. 561-70.

Tashakkori, A & Teddlie, C 2009, *Foundations of Mixed Methods Research: Integrating Quantitative and Qualitative Approaches in the Social and Behavioral Sciences,* SAGE Publications, Newbury Park, CA.

Temte, JL & Beasley, JW 2001, 'Rate of case reporting, physician compliance, and practice volume in a practice-based research network study', *J. Fam. Pract,* vol. 50, no.11, p. 977.

Teo, HH, Wei, KK & Benbasat, I 2003, 'Predicting intention to adopt interorganizational linkages: an institutional perspective', *MIS Quarterly,* vol. 27, no. 1, pp. 19-49.

Thomas, LF 2005, *The world is flat*, Chinese version edn., Human Science & Technology Press, Changsha.

Thorgren, S, Wincent, J & Ortqvist，D 2009, 'Designing interorganizational networks for innovation: An empirical examination of network configuration, formation and governance', *Journal of Engineering and Technology Management*, vol. 26, no.13, pp. 148-66.

Tomlinson, E, Lewicki, R & Gillespie, N 2006, 'Models of Interpersonal trust Development: Theoretical Approaches, Empirical Evidence, and Future Directions', *Journal of Management*, vol. 32, no. 6, pp. 991-1022.

Trienekens, J, Uffelen, V, Debaire, J & Omta, O 2008, 'Assessment of innovation and performance in the fruit chain: The innovation-performance matrix', *British Food Journal*, vol. 110, no. 1, pp. 98-127.

Triston, W 1992, *The twilight of sovereignty: how the information revolution is transforming our world*, Charles Scribner's Sons.

Trkman, P 2010, 'The critical success factors of business process management', *International Journal of Information Management*, vol. 30, no. 2, pp. 125-34.

Tschannenn-Moran, M 2008, 'Collaboration and the need for trust', *Journal of*

Education Administration, vol. 39, no. 4, pp. 308-31.

Tse, T & Soufani, K 2003, 'Business strategies for small organizations in the new economy', *Journal of Small Business and Enterprise Development,* vol. 10, no. 3, pp. 306-20.

Turban, E, King D, Viehland, D & Lee, J 2006, *Electronic commerce: a managerial perspective 2006*, Pearson Prentice Hall, New Jersey.

Tung, FC, Chang, SC & Chou, CM 2008, 'An extension of trust and TAM model with IDT in the adoption of the electronic logistics information system in HIS in the medical industry', *International Journal of Medical Informatics*, vol. 77, no. 5, pp. 324-35.

UNCTAD 2008, 'World investment report 2008', *paper present to United Nations Conference on Trade and Development*, Switzerland.

Usoro, A, Sharratt, W & Shekhar, S 2007, 'Trust as an antecedent to knowledge sharing in virtual communities of practice', *Knowledge Management Research & Practice,* vol. 5, no. 3, pp. 199-212.

Vaidya, K 2009, *Electronic procurement: impact on public procurement,* Lambert Academic Publishing, Germany.

Vaidya, K, Sajeev, ASM & Callendar, G 2006, 'Critical factors that influence e-procurement implementation success in the public sector', *Journal of Public Procurement,* vol. 6, no. 1/2, pp. 70-99.

Varda, D, Shoup, A & Miller, S 2012, 'A systematic review of collaboration and network research in the public affairs literature', *American Journal of Public Health,* vol. 102, no. 3, pp. 574-71.

Venkatesh, V 1999, 'Creation of favorable user perceptions: exploring the role of intrinsic motivation', *MIS Quarterly,* vol. 23, no.2, pp. 239-60.

Venkatesh, V & Davis, FD 2000, 'A theoretical extension of the technology acceptance model: four longitudinal field studies', *Manage. Sci*, vol. 46, no.2, pp. 186-204.

Venkatesh, V, Morris, MG, Davis, GB & Davis, FD 2003, 'User acceptance of information technology: toward a unified view', *Mis Q*, vol. 27, no3, pp. 425-78.

Verdechoa, MJ, Alfarob, JJ & Rodriguez, RR 2009, 'Foundations for collaborative performance measurement', *Production Planning & Control*, vol. 20, no. 3, pp. 193-205.

Vince, K 2010, *Business performance measurement: at the crossroads of strategy, decision-making, learning and information visualization*, viewed 16th May

2010, <http://kellen.net/bpm.htm>.

Vrijhoef, R & Koskela, L 2008, *Roles of supply chain management in construction*, viewed 21st August 2008, <http://www.ce.berkeley.edu/~tommelein/IGLC-7/PDF/Vrijhoef&Koskela.pdf>.

Warrington, TB, Abgrab, NI & Caldwell, HC 2000, 'Building trust to develop competitive advantage in e-business relationships', *Competitiveness Review: An International Business Journal incorporating Journal of Global Competitiveness*, vol. 10, no. 2, pp.160 - 68.

Walker, A 2004, *Overcoming the neoliberal legacy: the importance of trust for improved interagency collaborative working in New Zealand*, Local Partnerships & Governance, New Zealand.

Wang, B 2007, *Blue book of Zhejiang– Zhejiang development report (2007)*, Hangzhou Publishing House, Hangzhou.

Wang, J & Yu, WZ 2006, 'The analysis of foreign direct investment in China economy performance', *Science and Technology of West China*, vol. 10, pp. 46-48.

Wang, S & Archer, N 2004, 'Supporting collaboration in business-to-business electronic marketplaces', *Information, Systems and e-Business Management*, vol. 2, no.2-3, pp. 269-86.

Ward, J & Daniel, E 2006, *Benefits management: delivering value from IS/IT investment*, John Wiley and Son, Hampshire.

Weingart, SN, Callanan, LD, Ship, AN & Aronson, MD 2001, 'A physician-based voluntary reporting system for adverse events and medical errors', *Journal of General Internal Medicine*, vol.16, no.12, pp.809–14.

Westphal, I, Thoben, KD & Seifert, M 2007, *Measuring collaboration performance in virtual organi-zations*, In: Camarihna-Matos, L, Afsarmanesh, H, Novais P & Analide, C eds. *Establishing the foundation of collaborative networks*, Boston: Springer, pp. 33–42.

Wen-Chin, W 2006, 'The causal relationship between technology attributes, inward licensing beliefs and process performance among manufacturing firms: An empirical study', *International Journal of Management*, vol. 23, no. 4, pp. 782-93.

Wenzhou Statistical Office, 2009, *Wenzhou statistical yearbook 2009*, China statistical press, Beijing.

Wilson, DT 1995, 'An integrated model of buyer–seller relationships', *Journal of the*

Academy of Marketing Science, vol. 23, no.4, pp. 335–345.

Wilson, JM, Straus, SG & McEvily, B 2006, "'All in due time: the development of trust in computer-mediated and face-to-face teams?' *Organizational Behavior and Human Decision Processes*, vol. 99, no. 1, pp. 16-33.

Wolcott, H 1995, *The art of fieldwork*, Altamira, Walnut Creek.

Wong, K 2008, 'Economic growth and resource allocation: the case of China', *Journal of Chinese Economics and Foreign Trade Studies*, vol. 1, no. 2, pp. 105-27.

Wong, WP & Cheah CH 2011, 'Linking organizational culture to lean implementation in the Malaysian electrical and electronics industry: a conceptual framework', *Advances in Management*, vol. 4, no.4, pp50-57.

World Bank 2009, *Connecting east Asia, a new framework for infrastructure*, viewed 31st November 2009, <http://siteresources.worldbank.org/INTEAPINFRASTRUCT/Resources/855084-1130876718637/Connecting-East-Asia.pdf>.

Worthington, SLS & Boyes, W 2001, *E-Business in Manufacturing: Putting the Internet of Work in the Industrial Enterprises*, Instrumentation, Systems and Automation Society, Research Triangle Park, NC.

Wu, F, Zsidisin, GA & Ross, AD 2007, 'Antecedents and outcomes of e-procurement adoption: an integrative model', *Engineering Management*, vol. 54, no.3, pp. 576-87.

Wu, GL 2010, *The analysis of foreign companies' abilities from FID*, viewed 20th June 2010, <http://www.drcnet.com.cn/DRCnet.common.web/DocView.aspx?DocID=2249930&LeafID=14154&ChnID=3657>.

Wu, X & Wang, J 2003, 'On characterization of distortion premium principle', *Astin Bulletin*, vol. 33, no.1, pp.1-10.

Wycisk, C, Mckelvey, B & Hulsmann, M 2008, 'Smart parts' supply networks as complex adaptive systems: analysis and implications', *International Journal of Physical Distribution & Logistics Management*, vol. 38, no.2, pp. 108-19.

Yacine, A 2002, 'Building trust in e-commerce', *Internet Computing*, vol. 6, no. 1, pp. 18 - 24.

YCLCC 2009, *Yueqing city local chronicles of private enterprises*, 3rd edition edn., Yueqing City Local Chronicles Committee ,Thread-Binding Books Publishing House, Wenzhou.

Yin, KR 2011, *Applications of case study research*, 3rd Edition edn., Sage Publications, Newbury Park, CA.

Yin, RK 2003, *Case study research design and methods*, 3rd edn., Sage Publications, Newbury Park, CA.

Zahra, SA & George, G 2002, 'The net-enabled business innovation cycle and the evolution of dynamic capabilities', *Information Systems Research* , vol. 13, no. 2, pp.147-150.

Zedtwitz, MV & Gassmann, O 2002, 'Market versus technology drive in R&D internationalization: four difference patterns of managing research and development', *Research policy*, vol. 31, no. 4, pp. 569-88.

Zhang, S 2008, *Problems facing the Wenzhou model of economic*, viewed 21st August 2008, <http://www.88088.com/wzsb/sbdt/2008/0815/322060.shtml>.

Zhao, A 2008, *Wenzhou model evolution of the low-voltage electrical industry*, viewed 11th January 2010, <http://www.88088.com/wzpp/yiwz/2008/0829/326460.shtml >.

Zheng, G 2006, *Innovation by total synergy: the way toward the innovative enterprise*, Sciencep, Beijing.

Zhejiang Government 2009, *The almance of Zhejiang 2009*, Zhejiang Almance press, Hangzhou.

Zhu, K, Kraemer, KL & Xu, S 2003, 'E-business adoption by European firms: a cross country assessment of the facilitators and inhibitors', *European Journal of Information Systems*, vol. 12, no. 4, pp. 251-68.

Zikmund, W 1997, *Business Research Methods*, Fort Worth, Dryden.

Zineldin, M & Jonsson, P 2000, 'An examination of the main factors affecting trust/commitment in supplier-dealer relationships: an empirical study of the Swedish wood industry', *The TQM Magazine*, vol. 12, no. 4, pp. 245 - 66.

Zinkhan, MG 2002a, 'Promoting services via the Internet: new opportunities and challenges', *Journal of Services Marketing*, vol. 16, no. 5, pp. 412 - 23.

Zinkhan, MG 2002b, 'Relationship marketing: theory and implementation', *Journal of Market-Focused Management*, vol. 5, no. 2, pp. 83-89.

ZNNES 2010, *Zhejiang non-national economy statistical yearbook 2010*, Zhejiang Non-national Economy Statistical Press, Hangzhou.

Zolin, R, Hinds, PJ, Fruchter, R, & Levitt, RE 2004, 'Interpersonal trust in cross functional, geographically distributed work: A longitudinal study', *Information*

and Organization, vol. 14, no.1, pp. 1-26.

ZPPGRC 2005, *Concerned about the Yangtze River Delta - the Yangtze River delta research data compilation*, Zhejiang Provincial People's Government Research Center, Hangzhou.

Zucker, LG 1986, 'Production of trust: Institutional sources of economic structure', *Research in Organizational Behavior*, vol. 8, no.1, pp. 53-111.

LIST OF APPENDICES

Appendix 1: The characteristics of the revised items in final questionnaire.

Constructs	Dimensions	Questions in Survey
Trust	Contractual Trust	1.1 We believe that our partners perform work / provide services with the standard and performance as agreed.
	Competence Trust	1.2 We are confident that our partners have the ability to perform their roles and duties as promised
	Goodwill Trust	1.3 Our partners inform us of any potential problems that may discover
	Trust Benevolence	1.4 Our partners commit to maintain and develop business relationship 1.5 The commitment of our partners exceeds our expectations
Organizational Capacities	Relationship Management	2.1 The fast and proper relationship to the environmental changes is enhanced by collaboration partnerships and strategic alliances
	Learning Capability	2.2 We are benefited from the substantial learning capability from possessing suitable technology, knowledge, skills and attitudes
	Innovation capability	2.3 We are benefited from the innovation capability from the collaboration
	Communication	2.4 We are benefited from the effectiveness and efficiency of communication
Collaboration	Resource Sharing	3.1 Resource sharing fast the innovation through alliances with other organizations
	E-Technologies	3.2 E-technologies were adopted to guarantee a frequent communication in

		collaboration
	Risk Management	3.3 The risk or uncertainty was maximized from collaboration
	Information Sharing	3.4 An access to external information and new insights were provided by collaborative linkages
Diffusion Of E-Business	Relative Advantage	4.1 E- business gives us better opportunities than the traditional ways of communications
	Complexity	4.2 Technologies associated with e-business are user-friendly, which improves our abilities to discover and correct the mistakes
	Trialability	4.3 Our employees have the opportunities to try technologies before to implement it
	Observability	4.4We are confident that other organizations use and benefit from the e-business technologies
Business Performance	Organizational Effectiveness	5.1 The response-time or cycle-time of our operation department to the request of our partners has been decreased as a result of the e-collaboration with partners
	Product And Service Performance	5.2 The performance of our production to specification has increased as a result of the e-collaboration with our partners
	Financial Performance	5.3 The profit of the company has increased as a result of the adoption of e-collaboration with partners
	Market Performance	5.4 The percentage of the sales has increased as a result of the adoption of e-collaboration with partners
	Customer Satisfaction Performance	5.5 The service level has improved as a result of collaboration with our partners

Appendix 2: Abbreviation in the research model

		Coding		Coding		Coding		Coding		Coding
Variables	Contractual Trust	A1	Resource sharing	B1	Product and Service Performance	C1	Relative advantage	D1	Relationship Management	E1
	Competence Trust	A2	E-technologies	B2	Market Performance	C2	Complexity	D2	Learning Capability	E2
	Goodwill Trust	A3	Risk management	B3	Organizational Effectiveness	C3	Trialability	D3	Innovation capability	E3
	Benevolence	A4	Information sharing	B4	Customer Satisfaction Performance	C4	Observability	D4	Communication	E4
Associated Construct	Trust	A	Collaboration	B	Business Performance	C	E-Business Diffusion	D	Organizational capacity	E

Appendix 3: The reliability statistics

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.895	.899	20

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
A1	108.22	154.758	.560	.906	.889
A2	108.43	153.774	.508	.642	.890
A3	108.21	155.153	.558	.903	.889
A4	108.29	153.511	.560	.682	.889
B1	108.43	158.758	.399	.357	.893
B2	108.50	154.271	.581	.464	.888
B3	108.54	156.544	.489	.415	.891
B4	108.51	156.068	.548	.486	.889
C1	108.18	155.652	.466	.570	.892
C2	108.22	153.966	.542	.554	.889
C3	108.32	151.143	.584	.801	.888
C4	108.33	150.710	.625	.861	.887
D1	108.47	162.316	.173	.207	.902
D2	108.43	152.529	.498	.473	.891
D3	108.59	150.583	.502	.516	.891
D4	108.48	152.341	.567	.435	.889
E1	108.05	152.086	.648	.720	.887
E2	108.11	153.783	.529	.522	.890
E3	107.91	154.606	.546	.598	.889
E4	108.04	152.948	.587	.728	.888

Appendix 4: Total variance explained

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.839
Bartlett's Test of Sphericity	Approx. Chi-Square	4971.253
	df	190
	Sig.	.000

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7.031	35.154	35.154	7.031	35.154	35.154	3.267	16.337	16.337
2	2.123	10.614	45.768	2.123	10.614	45.768	3.001	15.005	31.343
3	1.785	8.926	54.695	1.785	8.926	54.695	2.920	14.599	45.942
4	1.646	8.231	62.926	1.646	8.231	62.926	2.350	11.751	57.693
5	1.162	5.811	68.736	1.162	5.811	68.736	2.209	11.044	68.736
6	.888	4.438	73.175						
7	.867	4.333	77.507						
8	.610	3.051	80.558						
9	.598	2.988	83.547						
10	.562	2.809	86.356						
11	.516	2.579	88.935						
12	.429	2.145	91.080						
13	.370	1.848	92.927						
14	.342	1.712	94.640						
15	.298	1.490	96.129						
16	.285	1.427	97.556						
17	.190	.949	98.504						
18	.158	.790	99.294						
19	.092	.460	99.754						
20	.049	.246	100.000						

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component				
	1	2	3	4	5
A1	.630		-.421	.436	
A2	.568	.367			
A3	.630		-.429	.419	
A4	.629		-.471		
B1	.543	-.602			
B2	.614	-.501			
B3	.664	-.607			
B4	.696	-.618			
C1	.710			-.475	
C2	.617			-.430	
C3	.624			-.544	
C4	.661			-.574	
D1			.466		
D2	.532	.452			.355
D3	.539				.471
D4	.603				
E1	.447		.433		-.425
E2	.624		.410		
E3	.542		.367		-.403
E4	.598		.359		-.363

a. 5 components extracted.

Component Transformation Matrix

Component	1	2	3	4	5
1	.495	.500	.469	.402	.350
2	-.815	.077	.317	.140	.458
3	.066	-.233	-.643	.591	.422
4	.220	-.828	.479	.035	.188
5	.193	.066	-.190	-.684	.674

Appendix 5: Model fit summary of the initial model research model

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	47	817.553	163	.000	5.016
Saturated model	210	.000	0		
Independence model	20	5067.720	190	.000	26.672

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.126	.843	.798	.654
Saturated model	.000	1.000		
Independence model	.406	.309	.236	.280

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.839	.812	.867	.844	.866
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.858	.719	.743
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	654.553	569.024	747.599
Saturated model	.000	.000	.000
Independence model	4877.720	4648.930	5112.869

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	2.075	1.661	1.444	1.897
Saturated model	.000	.000	.000	.000
Independence model	12.862	12.380	11.799	12.977

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.101	.094	.108	.000
Independence model	.255	.249	.261	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	911.553	916.846	1098.561	1145.561
Saturated model	420.000	443.646	1255.566	1465.566
Independence model	5107.720	5109.972	5187.298	5207.298

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	2.314	2.097	2.550	2.327
Saturated model	1.066	1.066	1.066	1.126
Independence model	12.964	12.383	13.561	12.969

HOELTER

Model	HOELTER .05	HOELTER .01
Default model	94	101
Independence model	18	19

Modification Indices (Group number 1 – Initial model)
Covariances: (Group number 1 - Initial model)

	M.I.	Par Change
e22 <–> A.Trust	16.385	.082
e16 <–> E.Organizational_capacity	9.668	.084
e16 <–> e27	6.529	.088
e16 <–> e22	4.708	.043
e16 <–> e21	19.511	.168
e12 <–> e27	7.490	.097
e8 <–> e22	6.268	-.033
e15 <–> e22	4.484	-.015
e7 <–> e16	4.149	.072
e11 <–> E.Organizational_capacity	6.055	-.079
e11 <–> A.Trust	4.558	.108
e11 <–> e21	14.904	-.174
e11 <–> e8	21.327	-.154
e18 <–> e27	15.354	.120
e18 <–> e20	5.559	-.067
e19 <–> e20	11.626	.095
e19 <–> e18	4.439	-.068
e17 <–> A.Trust	5.297	-.094
e17 <–> e21	9.456	.112
e17 <–> e8	4.170	.055
e17 <–> e11	8.530	-.140
e17 <–> e18	14.680	.136
e14 <–> E.Organizational_capacity	18.465	.134
e14 <–> e22	19.739	.102
e14 <–> e21	11.696	.150
e14 <–> e16	194.279	.669
e14 <–> e12	4.686	-.108
e14 <–> e15	7.014	-.045
e13 <–> e22	5.513	.017
e13 <–> e20	5.226	.027
e13 <–> e17	7.038	-.039
e10 <–> e27	9.000	-.112
e10 <–> e12	15.498	-.181
e10 <–> e11	15.227	.203
e10 <–> e14	8.992	.157
e9 <–> A.Trust	5.657	-.142
e9 <–> e27	4.311	-.100
e9 <–> e12	7.105	.161
e9 <–> e18	6.152	.129
e9 <–> e17	7.388	.152
e6 <–> A.Trust	6.267	.107
e6 <–> e22	4.967	-.045
e6 <–> e8	9.973	-.087
e6 <–> e7	70.774	.298
e6 <–> e9	10.248	-.188
e5 <–> e22	8.754	.038
e5 <–> e8	5.858	.038
e5 <–> e7	17.545	-.093

	M.I.	Par Change
e5 <–> e11	6.769	.084
e5 <–> e6	6.123	-.066
e25 <–> e9	4.184	-.072
e24 <–> e7	8.936	.089
e23 <–> e22	4.760	-.037
e23 <–> e21	4.842	-.071
e23 <–> e8	4.118	-.048
e23 <–> e18	8.361	.091
e23 <–> e13	4.079	.026
e23 <–> e6	4.127	.072

Correlations

		A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4	D1	D2	D3	D4	E1	E2	E3	E4
A1	Pearson Correlation	1	.438**	.945**	.542**	.255**	.293**	.300**	.314**	.295**	.322**	.284**	.249**	.043	.304**	.336**	.353**	.142**	.259**	.250**	.340**
	Sig. (2-tailed)		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.390	.000	.000	.000	.005	.000	.000	.000
	N	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395
A2	Pearson Correlation	.438**	1	.426**	.769**	.120*	.187**	.196**	.213**	.364**	.277**	.326**	.332**	.109*	.376**	.359**	.237**	.188**	.250**	.229**	.274**
	Sig. (2-tailed)	.000		.000	.000	.017	.000	.000	.000	.000	.000	.000	.000	.030	.000	.000	.000	.000	.000	.000	.000
	N	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395
A3	Pearson Correlation	.945**	.426**	1	.546**	.249**	.318**	.322**	.335**	.315**	.310**	.278**	.269**	.031	.275**	.305**	.325**	.170**	.253**	.264**	.316**
	Sig. (2-tailed)	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.542	.000	.000	.000	.001	.000	.000	.000
	N	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395
A4	Pearson Correlation	.542**	.769**	.546**	1	.218**	.284**	.291**	.321**	.385**	.380**	.382**	.364**	.044	.306**	.257**	.263**	.149**	.253**	.244**	.249**
	Sig. (2-tailed)	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.382	.000	.000	.000	.003	.000	.000	.000
	N	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395
B1	Pearson Correlation	.255**	.120*	.249**	.218**	1	.523**	.660**	.728**	.230**	.270**	.201**	.195**	.001	.099*	.186**	.221**	.130**	.399**	.279**	.262**
	Sig. (2-tailed)	.000	.017	.000	.000		.000	.000	.000	.000	.000	.000	.000	.992	.050	.000	.000	.010	.000	.000	.000
	N	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395
B2	Pearson Correlation	.293**	.187**	.318**	.284**	.523**	1	.647**	.718**	.324**	.325**	.357**	.300**	.064	.151**	.246**	.233**	.175**	.328**	.257**	.298**
	Sig. (2-tailed)	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.202	.003	.000	.000	.000	.000	.000	.000
	N	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395
B3	Pearson Correlation	.300**	.196**	.322**	.291**	.660**	.647**	1	.891**	.363**	.341**	.342**	.347**	-.021	.142**	.257**	.318**	.157**	.373**	.279**	.293**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.679	.005	.000	.000	.002	.000	.000	.000
	N	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395
B4	Pearson Correlation	.314**	.213**	.335**	.321**	.728**	.718**	.891**	1	.382**	.337**	.339**	.366**	.019	.160**	.264**	.340**	.181**	.410**	.279**	.309**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.704	.001	.000	.000	.000	.000	.000	.000
	N	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395
C1	Pearson Correlation	.295**	.364**	.315**	.385**	.230**	.324**	.363**	.382**	1	.521**	.586**	.816**	.113*	.397**	.344**	.416**	.298**	.387**	.280**	.327**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.025	.000	.000	.000	.000	.000	.000	.000
	N	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395
C2	Pearson Correlation	.322**	.277**	.310**	.380**	.270**	.325**	.341**	.337**	.521**	1	.661**	.514**	-.054	.222**	.167**	.309**	.214**	.330**	.268**	.279**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.284	.000	.001	.000	.000	.000	.000	.000
	N	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395
C3	Pearson Correlation	.284**	.326**	.278**	.382**	.201**	.357**	.342**	.339**	.586**	.661**	1	.644**	.003	.257**	.204**	.294**	.273**	.258**	.212**	.202**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.949	.000	.000	.000	.000	.000	.000	.000
	N	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395
C4	Pearson Correlation	.249**	.332**	.269**	.364**	.195**	.300**	.347**	.366**	.816**	.514**	.644**	1	.087	.329**	.202**	.353**	.307**	.327**	.250**	.304**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.086	.000	.000	.000	.000	.000	.000	.000
	N	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395
D1	Pearson Correlation	.043	.109*	.031	.044	.001	.064	-.021	.019	.113*	-.054	.003	.087	1	.242**	.216**	.311**	.223**	.244**	.133**	.144**
	Sig. (2-tailed)	.390	.030	.542	.382	.992	.202	.679	.704	.025	.284	.949	.086		.000	.000	.000	.000	.000	.008	.004
	N	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395
D2	Pearson Correlation	.304**	.376**	.275**	.306**	.099*	.151**	.142**	.160**	.397**	.222**	.257**	.329**	.242**	1	.616**	.406**	.213**	.312**	.310**	.351**
	Sig. (2-tailed)	.000	.000	.000	.000	.050	.003	.005	.001	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000
	N	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395
D3	Pearson Correlation	.336**	.359**	.305**	.257**	.186**	.246**	.257**	.264**	.344**	.167**	.204**	.202**	.216**	.616**	1	.493**	.165**	.299**	.274**	.328**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.001	.000	.000	.000	.000		.000	.001	.000	.000	.000
	N	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395
D4	Pearson Correlation	.353**	.237**	.325**	.263**	.221**	.233**	.318**	.340**	.416**	.309**	.294**	.353**	.311**	.406**	.493**	1	.276**	.387**	.309**	.369**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000
	N	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395
E1	Pearson Correlation	.142**	.188**	.170**	.149**	.130**	.175**	.157**	.181**	.298**	.214**	.273**	.307**	.223**	.213**	.165**	.276**	1	.488**	.383**	.419**
	Sig. (2-tailed)	.005	.000	.001	.003	.010	.000	.002	.000	.000	.000	.000	.000	.000	.000	.001	.000		.000	.000	.000
	N	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395
E2	Pearson Correlation	.259**	.250**	.253**	.253**	.399**	.328**	.373**	.410**	.387**	.330**	.258**	.327**	.244**	.312**	.299**	.387**	.488**	1	.420**	.471**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000
	N	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395
E3	Pearson Correlation	.250**	.229**	.264**	.244**	.279**	.257**	.279**	.279**	.280**	.268**	.212**	.250**	.133**	.310**	.274**	.309**	.383**	.420**	1	.591**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.008	.000	.000	.000	.000	.000		.000
	N	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395
E4	Pearson Correlation	.340**	.274**	.316**	.249**	.262**	.298**	.293**	.309**	.327**	.279**	.202**	.304**	.144**	.351**	.328**	.369**	.419**	.471**	.591**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.004	.000	.000	.000	.000	.000	.000	
	N	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Appendix 6: Guideline for the pilot study interview

I am conducting a survey on the major factor about interorganizational collaboration and e-business diffusion that impact the overall business performance. This study will enable me to complete a PhD in Management.

To ensure the quality of the result, **the questionnaire is best answered by the people who are knowledgeable about the running of globalized collaboration,** including the CEO, managers or workers from international department, R&D department, or IT department. This interview will appropriately take around 30 minutes to answer. Thank you for your time and patience. Your opinions, along with those of your professional colleagues, are being sought to advance our limited knowledge in this area. Please be assured the responses will be kept strictly conferential and will be used only in aggregate with other study participants. And you can request a copy of the results be posted to you upon completion of the research.

If you have any queries about this interview, please do not hesitate to contact me at the following address:

Mrs. Wu Lu
Business School
Zhejiang University City College
Hangzhou, China
Tel: 13588106657
Email: Luwu@zucc.edu.cn

SECTION A: A General and Demographic Details

Contact Name (optional):_____ Title/Department:_____
The name of company: _____
Address / Contact information: _____
Company Website (if any): _____

Please choose which best describes your company in all 2 categories:

No of employees	Annual sales (RMB)
□ 0-49	□ <10 Million
□ 50-249	□ 10 – 50 Million
□ > 300	□ > 50 Million

A1. Please specify with which organization you have a partnership (please tick as many as apply). Please specify the number of partnerships of you have more than one partnership with same type of organization.

Manufacturer	Distributor	Wholesaler	Retailer	logistics	Agent	Other (Specify)	Total

A2. How many years have your organization collaborated with other organizations? – If different, please specific the maximum.

□ 1-3 years □ 3-5 years □ 5-7 years □ 7 years or more

A3. The frequency of the communication with you partners using e-business technologies (e.g. Internet):

□ More than twice once per month □ More than twice once per week
□ Daily □ or others: ____ ____

Please use the following scales to rate the below statements. If you strongly agree with the statement, tick '7'. If you strongly disagree, tick '1'. If your opinion is less strong, tick one of the numbers in the middle.

SECTION B: Opinion / Perceptions

Section 1: Trust Dimensions	**Degree of Your Agreement** 1	2	3	4	5	6	7
Collaboration elements							
Strategic Value							
Goal Congruence							
Culture Congruence							
Leadership, Planning, Governance, Control							
Function and Infrastructure							
Commitment							
Interdependence							
Coordination							

Trust							
Resources Sharing							
e-Technologies (ICT ,IS, and other e-business technologies)							
Risk Management							
Knowledge and Information Sharing							
E-business diffusion							
Usefulness							
Ease of use							
Social norms							
Visibility							
Demonstrability							
Human values and personality							
Organizational environment							
Relative advantage							
Compatibility							
Complexity							
Trialability							
Observability							
Trust dimensions							
Competence							
Contractual							
Goodwill							
Benevolence							
Friendliness							
Reliability							
Dependability							
Customer oriented							
Ability							
Integrity							
Organization capacities in interorganizational level							
Reliability							
Flexibility							
Responsiveness							
Responsibility							
Traceability							
Readiness							
Power							
Partner Development							
Relationship Management							
Learning Capability							
Communication Capability							
Problem Solving Capability							

Innovation Capability							
Business performance measures							
Organisational effectiveness							
Products and services measures							
Financial and market							
Market Performance							
Customer Satisfaction measures							
Human resources measures							
Governance and social responsibilities							

SECTION C: Ranking of Factor

From these factors listed in Section B and Section C please list in order of relative importance what you believe are the 5 most important factors in undertaking projects with "I" being the most important. It is only necessary to list the reference number.

Ranking	Factor of Reference
1	
2	
3	
4	
5	

Appendix 7: Questionnaire

Date

To whom it may concern

Dear Sir/Madam

I am conducting a survey on the major factor linkage between collaboration and e-business diffusion that impact the overall business performance. This study will enable me to complete a PhD in Management.

To ensure the quality of the result, **the questionnaire is best answered by the people who are knowledgeable about the running of globalized collaboration,** including the CEO, managers or workers from international department, R&D department, or IT department. This questionnaire will appropriately take 15-20 minutes to answer. Thank you for your time and patience to complete the questionnaire. Your opinions, along with those of your professional colleagues, are being sought to advance our limited knowledge in this area. Please be assured the responses will be kept strictly conferential and will be used only in aggregate with other study participants. And you can request a copy of the results be posted to you upon completion of the research.

If you have any queries about this questionnaire, please do not hesitate to contact me at the following address:

Mrs. Wu Lu
Business School
Zhejiang University City College
Hangzhou, China
Tel: 13588106657
Email: Luwu@zucc.edu.cn

Yours sincerely,

Wu Lu

SECTION A: A General and Demographic Details

Contact Name (optional):_____ Title/Department:_____
The name of company: _____
Address / Contact information: _____
Company Website (if any): _____

Please choose which best describes your company in all 2 categories:

No of employees	Annual sales (RMB)
□ 0-49	□ <10 Million
□ 50-249	□ 10 – 50 Million
□ > 300	□ > 50 Million

A1. Please specify with which organization you have a partnership (please tick as many as apply). Please specify the number of partnerships of you have more than one partnership with same type of organization.

Manufacturer	Distributor	Wholesaler	Retailer	logistics	Agent	Other (Specify)	Total

A2. How many years have your organization collaborated with other organizations? – If different, please specific the maximum.

□ 1-3 years □ 3-5 years □ 5-7 years □ 7 years or more

A3. The frequency of the communication with you partners using e-business technologies (e.g. Internet):

□ More than twice once per month □ More than twice once per week
□ Daily □ or others: ____ ____

Please use the following scales to rate the below statements. If you strongly agree with the statement, tick '7'. If you strongly disagree, tick '1'. If your opinion is less strong, tick one of the numbers in the middle.

SECTION B: Opinion / Perceptions

Degree of Your Agreement

Section 1: Trust Dimensions	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Contractual Trust							
1.1 We believe that our partners perform work / provide services with the standard and performance as agreed.							
Competence Trust							
1.2 We are confident that our partners have the ability to perform their roles and duties as promised							

Goodwill Trust							
1.3 Our partners inform us of any potential problems that may discover							
Benevolence							
1.4 Our partners commit to maintain and develop business relationship							
1.5 The commitment of our partners exceeds our expectations							

Section 2: Interorganizational Organization Capacity							
2.1 Collaboration has enhances our relationships with partners to go with the environmental changes							
2.2 We benefited from technology, learning capability, knowledge and skills of our partners							
2.3 We are benefited from the innovation capability of our partners							
2.4 We are benefited from the communication effectiveness and efficiency of our partners							

Section 3: Collaboration elements	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Our collaboration involves the following business processes:							
3.1 Resource sharing fast the innovation through alliances with other firms							
3.2 E-technologies were adopted to guarantee a frequent communication in collaboration							
3.3 The acceptance of innovation risk was minimized from collaboration							
3.4 An access to external information and new insights were provided by collaborative linkages							

Section 4: Diffusion of e-Business	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Relative advantage							
4.1 E- business gives us better opportunities than the traditional ways of communications							
Compatibility							
4.2 E-business fits well with our collaboration activities							
Complexity							
4.3 Technologies associated with e-business are user-friendly, which improves our abilities to discover and correct the mistakes							
Trialability							
4.4 Our employees have the opportunities to try technologies before to implement it							
Observability							
4.5We are confident that other organizations use and benefit from e-business technologies							

Section 5: Business Performance	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Organizational Effectiveness							
5.1 The response-time or cycle-time of our operation department to the							

request of our partners has been decreased as a result of the e-collaboration with partners							
Product and Service Performance							
5.2 The performance of our production to specification has increased as a result of the e-collaboration with our partners							
Financial Performance							
5.3 The profit of the company has increased as a result of the adoption of e-collaboration with partners							
Market Performance							
5.4 The percentage of the sales has increased as a result of the adoption of e-collaboration with partners							
Customer Satisfaction Performance							
5.5 The service level has improved as a result of collaboration with our partners							

SECTION C: E-business technologies

Please specify the technologies used by your organization. Tick "7", if the technology is mostly used by your organization and tick "1" to indicate that the technology is very limited utilization. Please leave the field empty if the technology is not available in your organization.

Techniques	**Degree of the Usefulness** 1	2	3	4	5	6	7
C 1.1. Local Area Networking (LAN), Valuated Network (VAN), or Online shared workspace							
C 1.2. Asynchronous communication tools (e-mail, corporate blogs, forum, et al.)							
C 1.3. Synchronous communication tools (instant messaging, virtual white boarding, e-conferencing, VOIP, et al.)							
C 1.4. Electronic data interchange (EDI)							
C 1.5. European Article Numbering (EAN), Bar-coding Reading (BCR), or Universal Product Code (UPC)							
C 1.6. Radio Frequency Identification (RFID)							
C 1.7. Customer Relationship Management System, Customer Database							
C 1.8. E-marketing techniques							
C 1.9. E-trading system							
C 1.10. Supply Chain Management (SCM)							
C 1.11. Enterprise Resource Planning (ERP)							
C 1.12. Others : _____							

SECTION E: General Question and Comments

From your experience, please provide any questions or comments about projects or project management you consider relevant in relation to importance and preference.

Please use the space provide below.

Your assistance and contribution to this research study is greatly appreciated.