Curtin Business School

An Empirical Investigation of Supply Chain Management Practice, Agility and Competitive Advantage in Apparel Industry of Bangladesh

Mohammed Abu Jahed

This thesis is presented for the Degree of

Doctor of Philosophy

of

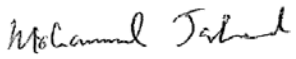
Curtin University

December 2016

DECLARATION

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

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



(Mohammed Abu Jahed)

Date: December 01, 2016

DEDICATION

To my loving family

My Parents, Senowara Begum and Syed Ahmed
My elder brother, Mohammad Abu Jafar
My wife, Ummee Kulsum Auni
My daughters, Diyanah Manar and Aisha Aylin

ACKNOWLEDGEMENTS

My utmost gratitude is to my supervisor, Professor Mohammed Quaddus, for his excellent support, expertise, patience, and encouragement throughout my PhD journey at Curtin University. Without his guidance it would not have been possible for me to complete the research on time. He showed concern for my academic success and personal well-being. Working with him has been a very pleasing and fruitful experience that will benefit me in my future endeavour. I also thank Dr Anand Jeeva and Dr Fazlul Rabbanee, for their insightful comments and suggestions.

I thank the Australian government and Curtin Business School (CBS) for awarding me the Curtin International Postgraduate Research Scholarship (CIPRS). I appreciate the School of Information Systems of the Curtin University for providing sponsorship support to me. I thank Dr Peter Dell, the Head of the School of Information Systems, for his support on this journey. I also express my intense appreciation to the University of Chittagong, Bangladesh, for granting me study leave to pursue my PhD at Curtin University.

I convey special thanks to Curtin Business School, Graduate School of Business, Graduate Research School, School of Marketing, School of Information Systems, and the staff members for their provision of knowledge, support and facilities. My warmest thanks go to my colleagues and friends for their continuous encouragements. Special thanks to Alamgir, Eijaz, Farid, Feroz, Manzu, Maruf, Ndahafa, Shimul, and many others for their support and the wonderful time spent together.

I thank the Bangladesh Garment Manufacturers and Exporters Association (BGMEA) authority, Bangladesh Export Processing Zone Authority (BEPZA), the field study participants, and the survey respondents as the research would not have been possible without their valuable input.

This piece of work would not have been possible without the unconditional support from my family. My heartfelt appreciation goes to my beloved wife, Auni, for her endless love, understanding, sacrifice, patience, constant encouragement, and support during this stressful period. I am extremely grateful to my mother Senowara Begum, my father Syed Ahmed, my mother-in-law Roushan Ara Begum, my father-in-law Md Sirajul Hoque Chowdhury, my caring brothers and brothers-in-law for their love, prayers, encouragement, and invaluable support.

I love you all.

ABSTRACT

Manufacturing firms face numerous challenges in effectively managing their supply chains in today's highly dynamic and increasingly competitive global business environment. Competition has shifted from the boundaries of individual firms to the entire supply chain spectrum, and there is a need to strive for more than effectiveness and efficiency to offer net competitive value to customers in order to remain competitive. In such a context, manufacturing firms are increasingly placing the effective management of their supply chains at the center of their efforts, so as to secure competitive advantage and improve overall firm performance. Despite the increased interest in supply chain management (SCM) research, the effective management of supply chains does not appear to have been realized. There is still a gap in the literature concerning how firms can effectively implement SCM to promote the sound practice of SCM and enable them to respond competitively (i.e., rapidly and effectively) to changes in the dynamic business environment. A few empirical studies, rare in a Bangladesh context, have been conducted on SCM in an integrated manner in the context of the apparel industry. In the wake of many challenges and inefficiencies, and considering its enormous economic importance in the national economy of Bangladesh, the effective implementation and practice of SCM, and achieving supply chain agility, have become critical for the apparel industry of Bangladesh. Against this backdrop, the present study investigates the SCM phenomena more closely in order to identify those factors that contribute to effective SCM practice, enabling firms to secure competitive advantage through supply chain agility in the context of the Bangladesh apparel industry.

Drawing on the transaction cost economics (TCE), the diffusion of innovation theory (DIT) and the resource-based view (RBV), and an extensive review of the relevant literature, this research theorizes an integrated model that combines the possible internal and external antecedent factors of SCM and explains the process of implementation, practice, and impact of SCM in a single framework.

The research adopted a two-phase sequential mixed method, consisting of qualitative and quantitative approaches. An initial research model was first developed based on an extensive literature review. A qualitative field study was then carried out by interviewing ten supply chain executives from apparel manufacturing firms in Bangladesh. A semi-structured interview protocol was used to collect data for the field study, then analyzed using the content analysis technique. The qualitative phase was intended to contextualize and fine-

tune the initial research model. Findings from the qualitative study were also used to develop measures and instruments for the next phase, which used the quantitative method. A survey was carried out with a sample of apparel manufacturing firms, and a total of 296 usable responses were obtained. The collected data was analyzed using partial least squares (PLS) based structural equation modeling (SEM).

The findings of this research confirm that the practice of SCM depends on how well it is implemented in the first place. The findings also reveal that supportive culture and employee competency further facilitate SCM practice after formal implementation. This research confirms the influence of innovative culture, environmental uncertainty, customer focus, inter-firm trust and commitment, and networking as the major antecedents of SCM implementation. The findings support the argument that sound SCM practice will lead to enhanced firm's competitive advantage through supply chain agility. This study also verifies the mediating role of the quality of supply chain relationships in the influence of SCM practice on supply chain agility.

This research has theoretical, methodological and practical implications. One of its significant contributions is the differentiation between SCM implementation and practice as per the diffusion of innovation theory, which has not been addressed by past research. This research extends our understanding of the different factors that could influence SCM implementation and practice. It empirically confirms a set of integrative dimensions of SCM and supply chain agility and provides their validated and reliable measurements. Grounded in the RBV, this study confirms the mediating effect of supply chain agility in the relationship between SCM practice and competitive advantage. This research also corroborates the mediating role of supply chain relationship quality in the relationship between SCM practice and supply chain agility. This extends the RBV hinged on the inclusion of intangible resource as a mediator between organizational practices and outcomes. For supply chain practitioners, this research provides valuable insights into the way SCM implementation and practice should be planned in the apparel manufacturing organizations of Bangladesh. It confirms that firms benefit greatly if they consider building agility into their supply chain in conjunction with SCM practice and that such a combination yields improved competitive advantage and firm performance.

TABLE OF CONTENTS

DECLARATION ii
DEDICATION iii
ACKNOWLEDGEMENTS iv
ABSTRACT v
TABLE OF CONTENTS vii
LIST OF TABLES xii
LIST OF FIGURES xiv

CHAPTER 1: INTRODUCTION 1
1.1 RESEARCH BACKGROUND 1
1.2 RESEARCH PROBLEM 4
1.3 RESEARCH QUESTIONS 7
1.4 RESEARCH OBJECTIVES 7
1.5 RESEARCH SIGNIFICANCE 8
1.5.1 Theoretical contribution 8
1.5.2 Methodological contribution 8
1.5.3 Practical Contribution 9
1.6 DEFINITION OF TERMS 9
1.7 THESIS ORGANIZATION 11
1.8 SUMMARY 13

CHAPTER 2: LITERATURE REVIEW 14
2.1 INTRODUCTION 14
2.2 CONTEXTUAL BACKGROUND 15
2.3 APPAREL SUPPLY CHAIN AND BANGLADESH 19
2.4 SUPPLY CHAIN MANAGEMENT LITERATURE: IMPLEMENTATION AND PRACTICE 22
2.4.1 SCM Implementation 23
2.4.2 SCM Practice 24
2.4.3 Dimensions of SCM 25
2.4.3.1 Strategic Buyer Partnership 28
2.4.3.2 Supplier Partnership 29
2.4.3.3 Information Sharing 31
2.4.3.4 Information Quality 32
2.4.3.5 Postponement 33
2.4.3.6 Lean Systems 34
2.5 ANTECEDENTS OF SCM IMPLEMENTATION 35
2.5.1 Organizational Culture 36
2.5.1.1. Innovative Culture 37
2.5.1.2. Supportive Culture 38
2.5.2 External Influence 39
2.5.2.1 Environmental Uncertainty 39
2.5.2.2 Customer Focus 40
2.5.2.3 Inter-firm Trust and Commitment 42
2.5.2.4 Networking 43
2.6 OUTCOMES OF SCM PRACTICE 45
2.6.1 Supply Chain Relationship Quality 46
2.6.2 Supply Chain Agility 46

2.6.2.1 Demand Response 51
2.6.2.2 Flexibility 51
2.6.2.3 Integration 52
2.6.2.4 Customer Responsiveness 53
2.6.3 Competitive Advantage 55
2..7 THEORETICAL BACKGROUND 56
2.7.1 Transaction Cost Economics 57
2.7.2 Diffusion of Innovation Theory 58
2.7.3 Resource-based View (RBV) 59
2.8 OVERALL RESEARCH GAP 61
2.9 INITIAL RESEARCH MODEL 65
2.10 SUMMARY 66

CHAPTER 3: RESEARCH METHODOLOGY 67
3.1 INTRODUCTION 67
3.2 RESEARCH PARADIGM 67
3.3 RESEARCH METHOD 70
3.4 RESEARCH PROCESS 72
3.5 QUALITATIVE FIELD STUDY 75
3.5.1 Sample Selection 76
3.5.2 Data Collection 77
3.5.3 Data Analysis 77
3.6 QUANTITATIVE STUDY 78
3.6.1 Hypotheses and Questionnaire Development 78
3.6.2 Pre-testing the questionnaire 79
3.6.3 Pilot study 79
3.6.4 Unit of Analysis 80
3.6.5 Sample Selection 80
3.6.6 Data Collection 81
3.6.7 Data Analysis Techniques 82
3.6.8 Partial Least Squares (PLS) Procedures 83
3.6.8.1 Specification of Reflective or Formative Measurement 83
3.6.8.2 Assessment of Hierarchical and Multidimensional Constructs 84
3.6.8.3 Assessment of Measurement Model 88
3.6.8.4 Assessment of Structural Model 91
3.7 SUMMARY 94

CHAPTER 4: FIELD STUDY AND COMPREHENSIVE RESEARCH MODEL 95
4.1 INTRODUCTION 95
4.2 OVERVIEW OF THE FIELD STUDY 95
4.2.1 Qualitative Research Paradigm 95
4.2.2 Interview Questionnaire Development 96
4.2.3 Sample Selection 97
4.2.4 Data collection 98
4.2.5 Data Analysis 99
4.3 FINDINGS OF THE FIELD STUDY (First Stage: Inductive Analysis) 100
4.3.1 Factors and Variables 101
4.3.1.1 SCM Dimensions 101
4.3.1.2 Findings Related to Antecedent Factors 108
4.3.1.2.1 Internal Influence 109

4.3.1.2.2 External Influence 111
4.3.1.2.3 Employee Competency 117
4.3.1.3 Finding Related to Outcomes of SCM Practice 118
4.3.1.3.1 Supply Chain Relationship Quality 118
4.3.1.3.2 Supply Chain Agility 119
4.3.1.3.3 Competitive Advantage 124
4.3.1.3.4 Firm Performance 126
4.3.2 Relationships among the Factors 127
4.4 COMPARISON BETWEEN FINDINGS OF THE FIELD STUDY AND THE INITIAL MODEL (Second Stage: Deductive Model) 130
4.5 JUSTIFICATION OF THE FINDINGS IN THE LITERATURE 132
4.6 THE COMPREHENSIVE RESEARCH MODEL 138
4.7 SUMMARY 140

CHAPTER 5: RESEARCH HYPOTHESES AND QUESTIONNAIRE DEVELOPMENT 141
5.1 INTRODUCTION 141
5.2 RESEARCH HYPOTHESES 141
5.2.1 Organization Culture 141
5.2.1.1 Innovative Culture and SCM Implementation 141
5.2.1.2 Supportive Culture, and SCM Implementation and Practice 142
5.2.2 Environmental Uncertainty and SCM Implementation 144
5.2.3 Customer Focus and SCM Implementation 146
5.2.4 Inter-firm Trust and Commitment and SCM Implementation 147
5.2.5 Networking and SCM Implementation 148
5.2.6 SCM Implementation and SCM Practice 149
5.2.7 SCM Practice and Employee Competency 150
5.2.8 SCM Practice and Supply Chain Relationship Quality 151
5.2.9 SCM Practice and Supply Chain Agility 153
5.2.10 SCM Practice and Competitive Advantage 153
5.2.11 SCM Practice and Firm Performance 155
5.2.12 Supply Chain Relationship Quality and Supply Chain Agility 156
5.2.13 Supply Chain Agility and Competitive Advantage 157
5.2.14 Supply Chain Agility and Firm Performance 159
5.2.15 Competitive Advantage and Firm Performance 159
5.2.16 Hypotheses Related to Mediation Effects 160
5.2.16.1 The Mediating Role of SC Relationship Quality between SCM Practice and Supply Chain Agility 160
5.2.16.2 The Mediating Role of Supply Chain Agility between SCM Practice and Competitive Advantage 161
5.2.17 Control Variable: Firm Size 162
5.3 HYPOTHESES AT A GLANCE 163
5.4 QUESTIONNAIRE DEVELOPMENT 165
5.4.1 Overview of the Questionnaire 165
5.4.2 Measurement Instrument Development 166
5.4.2.1 Section 1: General Information 166
5.4.2.2 Section 2 & 4: Antecedents 167
5.4.2.3 Section 3: SCM Implementation and Practice 171
5.4.2.4 Section 5: Supply Chain Relationship Quality 174
5.4.2.5 Section 6: Supply Chain Agility 175
5.4.2.6 Section 7: Competitive Advantage 176
5.4.2.7 Section 8: Firm Performance 177
5.5 PRE-TESTING OF THE QUESTIONNAIRE 178

5.6 SUMMARY 179

CHAPTER 6: SURVEY AND QUANTITATIVE DATA ANALYSIS 180
6.1 INTRODUCTION 180
6.2 OVERVIEW OF THE SURVEY 180
6.2.1 Sample Selection and Survey Administration 180
6.2.2 Response Rate 181
6.2.3 Pilot Study 182
6.2.4 Common Method Bias 183
6.2.5 Non-Response Bias 184
6.3 DESCRIPTIVE ANALYSIS OF THE SAMPLE 186
6.3.1 Demographic Characteristics of the Firm and Respondents 186
6.3.1.1 Demographic Characteristics of the Surveyed Firm 186
6.3.1.2 Demographic Characteristics of the Respondents 188
6.3.2 Measurement Items 190
6.3.2.1 Antecedent Constructs 190
6.3.2.2 SCM Implementation and Practice 192
6.3.2.3 Supply Chain Agility 194
6.3.2.4 Other Outcome Constructs 195
6.4 ANALYSIS BY PARTIAL LEAST SQUARES (PLS) BASED STRUCTURAL EQUATION MODELLING 196
6.4.1 Assessment of the Measurement Model 197
6.4.1.1 Assessment of the First-Order Measurement Model 197
6.4.1.1.1 First-order Reflective Constructs 198
6.4.1.1.2 Assessment of Formative Constructs 209
6.4.1.2 Assessment of Higher-Order Measurement Model 211
6.4.2 Assessment of the Structural Model 215
6.4.2.1 Collinearity Assessment 215
6.4.2.2 Path Coefficient (β) and Statistical Significance of t-Value 216
6.4.2.3 Explanatory Power Assessment (R^2) 219
6.4.2.4 Predictive relevance (Q^2) 220
6.4.2.5 Power Analysis (1-β) 220
6.4.3 Mediation analysis 221
6.4.3.1 Assessing the Mediating Role of Supply Chain Relationship Quality 222
6.4.3.2 Assessing the Mediating Role of Supply Chain Agility 223
6.4.4 Impact of Control Variable 225
6.5 SUMMARY 225

CHAPTER 7: DISCUSSION AND IMPLICATIONS 227
7.1 INTRODUCTION 227
7.2 DISCUSSION OF HYPOTHESES TESTING RESULTS 228
7.2.1 Hypothesis Related to Antecedent Factors of SCM Implementation 228
7.2.1.1. Innovative Culture and SCM Implementation (Hypothesis H1) 228
7.2.1.2 Supportive Culture and SCM Implementation (Hypothesis H2a) 229
7.2.1.3 Environmental Uncertainty and SCM Implementation (Hypothesis H3) 230
7.2.1.4 Customer Focus and SCM Implementation (Hypothesis H4) 231
7.2.1.5 Inter-firm trust and commitment and SCM Implementation (Hypothesis H5) 232
7.2.1.6 Networking and SCM Implementation (Hypothesis H6) 232

7.2.2 Hypothesis Related to Antecedents of SCM Practice 233
7.2.2.1 SCM Implementation and Practice (Hypothesis H7) 234
7.2.2.2 Supportive Culture and SCM Practice (Hypothesis H2b) 236
7.2.2.3 Employee Competency and SCM Practice (Hypothesis H8) 236
7.2.3 Hypothesis Related to Outcomes of the SCM Practice 237
7.2.3.1 SCM Practice and Supply Chain Relationship Quality (Hypothesis H9a) 237
7.2.3.2 SCM Practice and Supply Chain Agility (Hypothesis H9b) 238
7.2.3.3 SCM Practice and Competitive Advantage (Hypothesis H9c) 239
7.2.3.4 SCM Practice and Firm Performance (Hypothesis H9d) 240
7.2.3.5 Supply Chain Relationship Quality and Supply Chain Agility (Hypothesis H10) 241
7.2.3.6 Supply Chain Agility and Competitive Advantage (Hypothesis H11a) 242
7.2.3.7 Supply Chain Agility and Firm Performance (Hypothesis H11b) 243
7.2.3.8 Competitive Advantage and Firm Performance (Hypothesis H12) 244
7.2.4 Hypothesis Related to Mediation Effects 244
7.2.4.1 Mediation Effect of Supply Chain Relationship Quality (Hypothesis H13) 244
7.2.4.2 Mediation Effect of Supply Chain Agility (Hypothesis H14) 245
7.2.5 Result for Control Variable 247
7.3 SUMMARY 247

CHAPTER 8: CONCLUSIONS AND FUTURE RESEARCH DIRECTIONS 248
8.1 INTRODUCTION 248
8.2 SUMMARY OF RESEARCH 248
8.3 RESEARCH CONTRIBUTIONS 249
8.3.1 Theoretical Contributions 249
8.3.2 Methodological Contributions 252
8.3.3 Practical Contributions 252
8.4 LIMITATIONS 254
8.5 RECOMMENDATIONS FOR FUTURE RESEARCH 255

REFERENCES 257

APPENDICES
Appendix A: Interview Guideline 292
Appendix B: Sample Interview Script 294
Appendix C: Ethics Approval for Qualitative Interview 305
Appendix D: Research Questionnaire 306
Appendix E: Ethics Approval for Quantitative Survey 313

LIST OF TABLES

Table 1.1	: Organization of the Thesis	12
Table 2.1	: Growth of the Apparel Industry of Bangladesh	17
Table 2.2	: A List of SCM Dimensions	27
Table 2.3	: Antecedents of SCM Implementation	36
Table 2.4	: A List of Supply Chain Agility Dimensions	50
Table 3.1	: Positivist vs. Interpretivist Paradigms	69
Table 3.2	: Estimation of Reflective Higher-Order Construct Using PLS	87
Table 3.3	: Two-Stage Assessment Procedure of PLS Analysis	87
Table 4.1	: Issues and Related Questions in the Field Study	97
Table 4.2	: Participants' Profile	98
Table 4.3	: Dimensions and Variables of SCM	102
Table 4.4	: Dimensions of Organizational Culture	111
Table 4.5	: External Influencing Factors	112
Table 4.6	: Employee Competency	118
Table 4.7	: Supply Chain Relationship Quality Issues	119
Table 4.8	: Factors and Variables of Supply Chain Agility	120
Table 4.9	: Competitive Advantage and Firm Performance	127
Table 4.10	: Relationships among the Factors	128
Table 4.11	: Sub-factors and Variables of Supply Chain Management	133
Table 4.12	: Antecedent Factors of SCM Implementation	134
Table 4.13	: Employee Competency Factors	135
Table 4.14	: Supply Chain Agility Factors	136
Table 4.15	: Supply Chain Relationship Quality, Competitive Advantage, and Firm Performance	137
Table 5.1	: Summary of the Hypotheses	164
Table 5.2	: General Information Items	166
Table 5.3	: Measurement Items of Organizational Culture	168
Table 5.4	: Measurement Items and Related Statements of Environmental Uncertainty, Customer Focus, Inter-firm Trust and Commitment, and Networking	170
Table 5.5	: Measurement Items of Employee Competency	171
Table 5.6	: Measurement Items of SCM Implementation and Practice	173
Table 5.7	: Measurement Items of Supply Chain Relationship Quality	175
Table 5.8	: Measurement Items of Supply Chain Agility	176
Table 5.9	: Measurement Items of Competitive Advantage	177
Table 5.10	: Measurement Items of Firm Performance	178

Table 6.1	: *t* Test of 29 items for First and Second Wave Responses	185
Table 6.2	: Characteristics of the Surveyed Firms	187
Table 6.3	: Characteristics of the Respondents	189
Table 6.4	: Descriptive Statistics of Antecedent Constructs	191
Table 6.5	: Descriptive Statistics of SCM Implementation and Practice	193
Table 6.6	: Comparison between SCM Implementation and Practice	194
Table 6.7	: Descriptive Statistics of Supply Chain Agility	195
Table 6.8	: Descriptive Statistics of Outcome Constructs	196
Table 6.9	: Psychometric Properties for First-order Reflective Constructs	201
Table: 6.10	: Intercorrelations of the Latent Variables and Square Root of AVE for First-order Constructs	204
Table 6.11	: Cross-Loadings of Items to their Respective Constructs	205
Table 6.12	: Measures for Formative Indicators	211
Table 6.13	: Measurement of Higher-order Constructs	212
Table 6.14	: Psychometric Properties for Second-order Reflective Constructs	213
Table: 6.15	: Intercorrelations of the Latent Variables of the Second-Order Measurement Model and Square Root of AVE	214
Table 6.16	: Results of Collinearity Assessment	216
Table 6.17	: PLS Structural Equation Modeling Results	218
Table 6.18	: Results of R^2 and Q^2 Values	220
Table 6.19	: Power analysis (1-β)	221
Table 6.20	: Results of Mediation Analysis	225

LIST OF FIGURES

Figure 2.1	: Apparel Supply Chain	20
Figure 2.2	: Initial Research Model	66
Figure 3.1	: Overview of the Research Process	73
Figure 3.2	: Estimating Hierarchical-Reflective Constructs Using the Two-stage Approach to PLS-SEM Modeling	86
Figure 4.1	: Data Analysis Process of the Field Study	100
Figure 4.2	: The Comprehensive Research Model	140
Figure 5.1	: The Hypothesized Research Model	165
Figure 6.1	: First-Order Measurement Model	198
Figure 6.2	: Higher-order Structural Model	214
Figure 6.3	: Results – The Structural Model of PLS Analysis	217
Figure 6.4	: Power analysis (1-β)	221
Figure 6.5	: Mediating Effects of Supply Chain Relationship Quality	223
Figure 6.6	: Mediating effects of Supply Chain Agility	224

Chapter One

INTRODUCTION

1.1 RESEARCH BACKGROUND

The nature of today's highly competitive environment, with its constantly changing trends and changes in the area of globalization and technological innovation, as well as increasingly demanding customers, has challenged the ability of firms to achieve and sustain competitive advantage (Bernardes, & Hanna, 2009; Lin, Chiu & Chu, 2006 ; Moon, Yi, & Ngai, 2012). The resultant competitive challenges faced by contemporary manufacturing firms in such an environment include intense global competition, constant change and volatile markets, shorter product life cycle, increased competition in the supply market, and increased uncertainty of demand (Agarwal, Shankar, & Tiwari, 2007; Tachizawa & Thomsen, 2007). Relentless and intense competitive pressure to improve forces firms to pursue speed, flexibility, efficiency and innovation in their business operations (Trent, 2007). These challenges require major improvements in business operations through adopting new practices and policies. Firms must continuously strive to seek innovative and collaborative ways of managing all their supply chain operations (i.e. all internal and external value-adding activities) more efficiently and effectively, as competition nowadays has shifted from the boundaries of single firms to the entire supply chain spectrum (Moon et al., 2012; Li, Ragu-Nathan, Ragu-Nathan, & Rao, 2006; Tan, 2002). It is also argued that supply chain managers must strive for more than effectiveness and efficiency to ensure that they are offering competitive (i.e., differentiated) net value to customers, so as to remain competitive in today's global marketplace (Fugate, Mentzer, & Stank, 2010). Firms are realizing the importance of ensuring the competitiveness of their entire supply chain, rather than merely focusing on improving efficiencies within an organization, as an increasing proportion of value creation occurs outside the boundaries of an individual firm (Halldorsson, Kotzab, Mikkola, & Skjott-Larsen, 2007; Bruce, Daly, & Towers, 2004). Success does not depend on internal operational efficiency only, but also on the ability to leverage supply chains (Chow et al., 2008; Li, Rao, Ragu-Nathan, & Ragu-Nathan, 2005). Effective coordination and the integration of complex inter-organizational activities have thus become key sources of competitive advantage. According to the Global Manufacturing Outlook (2015), sales growth, cost reductions, and improving speed-to-market by entering into partnerships and adopting new technologies, are at the top of the agenda for global manufacturers, as they prepare for

increased competition; while supplier performance, visibility, and the need for flexibility are the biggest concerns for supply chains globally. In such a context, manufacturing firms are increasingly placing effective supply chain management (SCM) at the center of their efforts to achieve competitive advantage and improve overall firm performance (Magnan, Fawcett, & Fawcett, 2011; Gunasekarana, Lai, & Cheng, 2008; Li et al., 2006; Swafford, Ghosh, & Murthy, 2008).

SCM has been defined as a strategically oriented inter-firm arrangement, involving coordination and collaboration with trading partners to create competitive advantage by ensuring that maximum value is delivered to end-customers (Cao & Zhang, 2011; Das, 2006; Kotzab, Grant, & Friis, 2006; Stank, Davis, & Fugate, 2005). It emphasizes the seamless integration of value-adding activities across organizational boundaries with the objective of improving the performance of both the individual firm as well as the whole supply chain (Li et al., 2006; Hsu, Tan, Kannan, & Keong 2009). Despite the proliferation of SCM research, the literature provides little information about guiding firms in SCM practice to the extent to which it can enable them to realize the overall goal of achieving competitive performance (Cigolini, Cozzi, & Perona, 2004; Li et al., 2006). Failures in effective SCM implementation are still common (Deshpande, 2012; Moberg, Speh, & Freese, 2003). This suggests a need to study the SCM phenomena more closely to identify the factors that contribute to effective SCM practice, and to suggest ways that the implementation of SCM can help firms attain competitive performance through supply chain agility.

Agility has become an issue of enormous importance in the apparel sector globally, due to the trend of increased global sourcing, high levels of price competition, shorter product lifecycles, market volatility and high demand uncertainty in the marketplace (Bruce et al., 2004; Agarwal, Shankar, & Tiwari, 2007). The apparel manufacturers of Bangladesh are further challenged with unique problems, such as their strong dependency on overseas suppliers, poor infrastructural support, low productivity, poor ability to integrate internationally dispersed activities, and frequent political unrest, limiting their ability to achieve the supply chain objectives. To face the challenge of increasing both market presence and profitability, they need to make significant performance improvements by removing overall value chain inefficiencies and reducing the gap between customer expectations and their own abilities. In the context of increased global competition, the dynamic nature of the marketplace environment, and its enormous importance in the economy of Bangladesh, the effective implementation and practice of SCM, and achieving supply chain agility have become critical for the apparel industry of Bangladesh. There has

been renewed concern about building agility in apparel supply chains in order to be responsive to changing customer demands and marketplace opportunities at the front-end, while reducing the back-end risks of supply uncertainty.

Despite increased interest in SCM, the apparel sector has been neglected in terms of SCM research (Bruce et al., 2004; Rajput & Bakar, 2011) in comparison with the amount of SCM research carried out in the automotive, construction, engineering, food processing, electric and electronics, pharmaceuticals, industrial parts, and toy industries, etc. It has been claimed that SCM implementation in the apparel sector is possibly hindered due to the time consuming and labor intensive nature of its manufacturing process (Rajput & Bakar, 2011). It has also been argued that most of the empirical research in SCM has been conducted in developed countries, while a small number of studies in SCM have been carried out in a developing country context (Soni & Kodali, 2012). Only a few studies have been conducted on aspects of SCM in the context of the apparel sector of Bangladesh. For example, the apparel industry has been investigated to minimize lead time by improving operational competencies (Nuruzzaman et al., 2010), and the combined consequence of information and knowledge sharing on supplier's operational performance through supplier-buyer relationships has been researched in the context of the Bangladeshi apparel industry (Rashed, Azeem, & Halim, 2010). Although there is a growing realization among practitioners and academics that SCM is crucial in order for the Bangladeshi apparel industry to compete and reach for a leading position in the global market place, no intensive study has been conducted on the state of SCM implementation and practices in the context of the manufacturing sector of Bangladesh. The current research is motivated by the challenges arising from the increasingly volatile marketplace environment for Bangladeshi apparel manufacturers and the existing gap in SCM literature in differentiating SCM practice from SCM implementation. Hence, the question of how a firm prepares to implement and effectively execute SCM is well worth investigation, which can be explained by the theory of innovation diffusion. Against this backdrop, the current research makes an attempt to address the existing voids in the literature and to study SCM implementation and practice and its outcomes in terms of achieving supply chain agility and competitive advantage in this industry. The research has been undertaken in the context of the apparel industry in Bangladesh for the reasons mentioned above.

1.2 RESEARCH PROBLEM

Apparel manufacturing is one of the most globalized activities in the world economy (Zhu & He, 2014). The increased globalization of apparel manufacturing is mainly attributable to the difficulty in completely automating its processes, which requires labor-intensive operations (Lee et al., 2004), and to the ease of tradability of most intermediate components at each stage of the value chain (Bernhardt, 2014). The labor-intensive nature of apparel manufacturing has driven the growth of international production and supply networks seeking economic efficiency (Lee et al., 2004). With the blessings of low-cost labor, favorable government policy, preferential trade status, and advantageous global market access, apparel has evolved as the main export product of Bangladesh (Uddin & Jahed, 2007). Today, the apparel industry is the leading sector in Bangladesh's economy, and is playing a critical role in the socio-economic development of Bangladesh. This sector accounts for approximately 82% of the country's total export earnings (BGMEA, 2016), and has created direct employment for about four million people and indirect employment for several million others. Bangladeshi manufacturers, however, are currently facing great competition in a quota-free unprotected global market. There has been tremendous pressure from globalization and demanding customers to improve product quality, responsiveness and customer satisfaction, while reducing costs (Saha, 2011b). Bangladesh has, moreover, been omitted from preferential access to one of its main export destinations, the U.S. market, under its generalized system of preference (GSP) since June 2013, which has greatly affected its reputation, as well as economic costs (Wilson, 2013).

Despite significant growth in recent decades, the apparel manufacturing industry of Bangladesh is faced with numerous problems associated with supply chain complexity (Berg, Hedrich, Kempf, & Tochtermann, 2011; Nuruzzaman et al., 2010), operational inefficiencies (Berg et al., 2011; Chowdhury and Quaddus, 2015), limited capacity and capability (Islam, 2013; Haider, 2007), and uncertainty in the form of demand, supply, technology, competition and political instability (Ahmed, 2009; Chowdhury and Quaddus, 2015; Nuruzzaman et al., 2010; Mansur, 2013; Uddin & Jahed, 2007; Saha, 2011a). These problems have greatly challenged its ability to retain and increase its market share, and to realize its target to further consolidate the position of the industry as a top global exporter, reaching the target of USD 50 billion by 2021 from second position behind the global leader, China (Mansur, 2013). It is suggested that the apparel industry of Bangladesh needs to make significant performance improvements by removing overall value chain inefficiencies and minimizing the gap between customer requirements and manufacturer capability (Berg et al., 2011). In such a situation, it is evident that the effective management of supply chains is vital to

reduce inefficiencies and resolve the problems throughout the supply chain, and ultimately to improve overall competitiveness (Lee & Kincade, 2003; Saxena & Salze-Lozac'h, 2010). Although few studies (e.g., Nuruzzaman et al., 2010; Rashed et al., 2010) have been conducted on several aspects of SCM in the context of the Bangladesh apparel industry, no significant integrative studies were found that dealt with SCM implementation and practice in this context. Therefore, this study intends to fill this research gap by studying the state of SCM implementation in the Bangladesh apparel industry and its antecedents, and ways of promoting the sound practice of SCM in order to achieve and sustain competitive advantage through supply chain agility.

Although SCM has received much research interest, effective management of the supply chain does not appear to have been realized. The literature has little to offer with regard to guiding firms in SCM practice (Cigolini et al., 2004; Li et al., 2006) and failures in effective SCM implementation are still common (Deshpande, 2012; Moberg et al., 2003). A number of issues have been suggested as reasons for the failure of SCM implementation, such as conceptual ambiguity, complexity within SCM, and the lack of a theoretical framework identifying the means and methods that can help firms implement SCM effectively (Chen & Paulraj, 2004; Despande, 2012; Li et al., 2005; Min & Mentzer, 2004). There is a gap in the literature concerning how the level of SCM implementation affects the sound practice of SCM. Diffusion of innovation theory (DIT) (Rogers, 2003) suggests that the diffusion or practice of innovation depends on how well it is implemented, however, the existing SCM literature does not differentiate between SCM implementation and practice. Similarly, the factors that promote the sound practice of SCM after implementation are still unexplored. Drawing on DIT, the current study attempts to fill this gap by re-conceptualizing SCM implementation and practice, and proposing that the success of SCM practice in an organization depends on its implementation.

There has also been a lack of comprehensive research exploring various external forces and internal conditions that influence SCM implementation and practice, and testing them empirically. For example, organizational culture is identified as one of the reasons for the failure of inter-organizational relationships, which may influence innovation adoption and collaboration in the context of partnering (Boddy et al., 2000). However, previous research has paid less attention to investigating the role of organizational culture in SCM implementation and practice. Similarly, the resource-based view suggests networking as a resource which focuses on firm strengths that are interwoven with employee connections or social structure within and across firms (Jarvenpaa & Leidner, 1998). It is argued that the

implementation of an innovation or even the ability to form strategic alliances, is influenced by the participation of organizational members in informal networks of relationships (Frambach, 1993; Eisenhardt & Schoonhoven, 1996). However, there is no empirical study that examines the role of networking in SCM implementation. This study therefore seeks to explore various antecedents of SCM implementation and practice, and examine them simultaneously.

Supply chain agility is increasingly considered an important means to securing and sustaining competitive advantage in an environment of uncertainty and continuous change (Lancioni, 2000; Tan, Lyman, & Wisner, 2002; Zhang, 2011). Firms require agility in their supply chains to manage marketplace changes and provide superior value and uninterrupted services to end-customers by rapidly responding to these changes (Braunscheidel & Suresh, 2009). As mobilizing and obtaining the resources and competencies required for developing agility are often challenging, firms emphasize collaboration and strive to leverage the complementary competencies of the supply chain partners (Yusuf, Gunasekaran, Adeleye, & Sivayoganathan, 2004). Nevertheless, supply chain agility as an outcome of SCM has received little attention in the literature. The dynamic capabilities view of the resource-based theory suggests that firms need to be capable of recognizing new opportunities and evolving environmental changes, and responding quickly to them, in addition to having access to resources in order to secure competitive advantage over time (Teece, Pisano, & Shuen, 1997; Hamel & Prahalad, 1994). In the context of today's dynamic marketplace environment, the effect of SCM practice on competitive advantage may remain limited if the SCM practices are not of an agile nature or do not generate the required agile capability of the firm. Previous studies (e.g., Li et al., 2006) have directly linked SCM practice to competitive advantage without considering the possible role of any intervening factor. The mediating role of supply chain agility in the relationship between SCM practice and a firm's competitive advantage has yet to be investigated.

The extant literature suggests that the quality of supply chain relationships is enhanced with the extent and scope of SCM practice. However, past empirical research has not considered the antecedent role of SCM practice in supply chain relationship quality. The quality of supply chain relationships is considered an important ingredient in supply chain agility (Christopher, 2000; Paulraj & Chen, 2007). This implies the possible mediating role of supply chain relationship quality between SCM practice and supply chain agility, which has not yet been addressed by existing research.

Overall, it can be inferred that there is a dearth of theoretically supported and empirically validated comprehensive frameworks for SCM implementation and practice, taking the entirety of the supply chain into consideration, and measuring its success in terms of supply chain relationship quality, supply chain agility, competitive advantage, and firm performance.

1.3 RESEARCH QUESTIONS

Based on the discussion in Section 1.2, this study analyzes a number of theoretical concepts to empirically explore the dimensions of SCM and supply chain agility, along with their antecedent factors. The focus is on assessing the impact of SCM practice and supply chain agility on competitive advantage and firm performance in the context of the Bangladesh apparel industry. This research, therefore, endeavors to investigate the following research questions:

RQ1: What are the antecedents of supply chain management (SCM) implementation and practice in the apparel manufacturing industry of Bangladesh?

RQ2: How does supply chain management (SCM) practice impact supply chain agility and the competitive advantage of apparel manufacturing firms in Bangladesh?

RQ2: Does supply chain agility mediate the relationship between SCM practice and competitive advantage?

1.4 RESEARCH OBJECTIVES

The following specific objectives of this research are developed, based on the research questions outlined in Section 1.3:

i. To examine the antecedents of the implementation and practice of supply chain management;

ii. To examine the effect of SCM implementation on the level of SCM practice;

iii. To assess the impact of SCM practice on competitive advantage in apparel manufacturing firms in Bangladesh;

iv. To investigate the mediating role of supply chain relationship quality in the relationship between SCM practice and supply chain agility;

v. To examine the mediating role of supply chain agility in the relationship between SCM practices and competitive performance.

1.5 RESEARCH SIGNIFICANCE

The significance of the current study lies in its theoretical, practical and methodological contributions, as follows.

Theoretical Contribution

This study combines transaction cost economics (Williamson, 1975; Williamson, 2008), diffusion of innovation theory (Rogers, 2003), and the resource-based view (RBV) (Wernerfelt, 1984; Barney, 1991) in explaining inter-organizational relationships, and examining the possible antecedents of SCM, as well as the process of implementation, practice and outcomes of SCM. The significant difference between the prior studies and this study is in explicitly differentiating SCM implementation and practice, as per the diffusion of innovation theory, which has been neglected so far. There is a paucity of research into the way firms effectively implement SCM in order to enhance its practice and help them to increase their ability to respond quickly to the changes in today's vibrant business environment. This is addressed in this research. More specifically, this study investigates the impact of integrated SCM on supply chain agility and the mediating role of supply chain agility between SCM practice and competitive advantage. This study also examines the mediating effect of supply chain relationship quality on the association between SCM practice and supply chain agility. This enriches the resource-based view by incorporating intangible relational resources as mediators between organizational practices and their outcomes. The present study also makes an important contribution in exploring a number of internal and external environmental factors to examine their antecedent role in SCM implementation and practice, which is connected to a firm's ability to secure competitive advantage.

Methodological Contribution

The current study has employed a mixed-method research approach so as to overcome the limitations of a mono-method application, that is, either a qualitative or quantitative method. While the adoption of a mix-method approach is often suggested in operations and SCM research (Golicic, Davis, & McCarthy, 2005; Naslund, 2002; Soni &

Kodali, 2012; Giunipero, Hooker, Joseph-Matthews, Yoon, & Brudvig, 2008), there are few studies (3.85%; based on a review of 619 empirical studies) that have employed multiple research designs (Soni & Kodali, 2012). Golicic et al. (2005) report a very low percentage of qualitative studies in SCM. This study contributes to the SCM research in terms of use of the mixed-method approach. By utilizing a mixed method, it is believed that appropriate measurements and instruments in the context of this research can be derived, and the dimensionality of the constructs can be explored. Qualitative field study is used to fine-tune and contextualize the research model, and the quantitative survey and analyses validate the proposed comprehensive research model.

Practical Contribution

From a practical perspective, the findings of this study could help apparel manufacturing firms, but in general, would also help other manufacturing firms improve their understanding of how to achieve competitive advantage and eventually improve overall firm performance through SCM implementation. It is expected that a better understanding of both the antecedents and the process of SCM implementation would provide guidelines to assist Bangladeshi apparel manufacturers to promote the sound practice of SCM and to build agility into their supply chains. These firms are facing many challenges and inefficiencies which require them to focus on successfully managing their supply chains in today's complex marketplace, however, no intensive study has been conducted in this field in the context of Bangladesh. In general, research on SCM in the apparel sector is also neglected (Bruce et al., 2004; Rajput & Bakar, 2011). There are a very few empirical studies (merely five percent) of SCM for developing countries (Soni & Kodali, 2012). This research thus provides insight into the approaches needed to compete effectively in an environment of constant change and uncertainty. Although the focus of this research is specifically on the Bangladesh apparel industry context, the findings can be considered relevant to manufacturing sectors in either Bangladesh or in international settings.

1.6 DEFINITION OF TERMS

The following are the operational definitions of terms used throughout this study.

Apparel: The word 'apparel' is used to refer to clothing (Ahmed, 2006), or garments or apparel products that are ready to wear for the end user.

Competitive Advantage: The unique position a firm attains, relative to its competition, through utilization of its competencies (Hofer & Schendel, 1978).

Firm or organization: The unit of analysis is the firm or organization. The terms *organization* and *firm* are used in a wide sense in this study, referring to a manufacturing entity, and can be a part or division of a larger corporation or a complete company.

Firm performance: How well a firm accomplishes its market and financial goals (Yamin, Gunasekaran, & Mavondo, 1999; Li et al., 2006; Ho, 2008).

Networking: A social process where a group of organizational members voluntarily participates in creating and sharing their implicit and explicit knowledge, and enables participants to take effective action and to create knowledge within their circumstances (Jeon, Kim, & Koh, 2011a; Wenger & Snyder, 2000; Braun, 2002).

Organizational Culture: The collection of beliefs, values, and assumptions held by an organization (Schein, 1984).

Supply Chain Agility: The capability of a firm, internally, and in conjunction with its key customers and suppliers, to adapt or respond quickly and effectively to changes in customer and competitive demands in dynamic and continually fragmenting markets (Braunscheidel & Suresh, 2009; Lee, 2004; Baramichai, Zimmers, & Marangos, 2007).

Supply Chain Management (SCM): Strategically oriented inter-firm arrangement, involving coordination and collaboration with trading partners to create competitive advantage by maximizing the value delivered to end-customers (Kotzab et al., 2006; Cao & Zhang, 2011; Das, 2006). In this research, SCM has been studied from a focal firm's perspective involving management of immediate customers and suppliers.

Supply Chain Relationship Quality: The extent of an organization's perceived satisfaction with outcomes from collaboration with its trading partner, perceived outcome fairness and willingness to cooperate in the future (Jap, 2001).

SCM Implementation: Putting formal or informal procedures, policies, principles, processes or some sort of systems in place, leading to the execution of SCM (Ross, 1998). In this thesis, actual implementation of these policies and practices involving management of immediate customers and suppliers has been dealt with.

SCM Practice: The extent of the practice/execution of systems, practices or processes incorporating SCM. In this research, immediate suppliers and customers have been dealt with.

SCM Practices: A set of approaches and practices that effectively integrate suppliers, manufacturers, distributors, and customers to improve the long-term performance of firms and their supply chains (Koh, Demirbag, Bayraktar, Tatoglu, & Zaim, 2007; Chopra & Meindl, 2010).

Trading Partner: Any external organization that plays an integral role in the company and whose business fortune depends entirely, or in part, on the success of the company. This includes buyers, suppliers, contract manufacturers, and so on.

1.7 THESIS ORGANIZATION

The thesis is organized and presented in eight chapters. Table 1.1 presents the organization of this thesis according to the chapters. The brief outline of each chapter is as follows:

Chapter One: Introduction

In this chapter, the background of the study has been introduced with a snapshot of the overall structure of the research. This chapter introduces the research area, which includes identifying the research problem followed by research questions, and defining the research objectives and contributions.

Chapter Two: Literature Review

Chapter Two presents an extensive review of the literature, focusing on supply chain management implementation and practice, antecedents, supply chain relationship quality and supply chain agility. Reviews of the three theories, transaction cost economics, diffusion of innovation theory, and the resource-based view, which are used in developing the theoretical foundation for this research, are presented in detail. This chapter also briefly describes the apparel industry of Bangladesh in terms of its supply chain characteristics, associated problems, and challenges. Finally, based on the literature review, an initial research model is proposed.

Chapter Three: Research Methodology

This chapter presents the methodological underpinning of this research. It primarily focuses upon determining the appropriate research approach employed in undertaking this

research and discusses the methodology adopted. The rationale for and justification of the adopted method are explained. This chapter also describes the research processes for both the qualitative field study and the quantitative survey. The sample selection, data collection, and data analysis processes are detailed for each research phase.

Table 1.1: Organization of the Thesis

Structure	Description	Output
Chapter One	Introduction to the Thesis - Establish the research problem	Determines the research questions and objectives
Chapter Two	Literature Review - Theoretical background - Review of the previous research - Research gaps - Development of initial research model	Discusses the relevant literature and proposes initial research model
Chapter Three	Research Methodology - Details of the methodology	Presents the methodology adopted for this research
Chapter Four	Field Study and Comprehensive Research Model - Details of the qualitative field study - Analysis of the field study	Develops the comprehensive research model
Chapter Five	Hypotheses and Questionnaire Development - Details of the hypotheses of the comprehensive research model - Questionnaire design	Provides the hypotheses of the research model and describes the survey design
Chapter Six	Survey and Quantitative Data Analysis - Details of the survey method - Analysis of the survey data using PLS	Presents the analysis of the findings to confirm the model and hypotheses
Chapter Seven	Discussions and Implications - Discussion of the findings	Provides the interpretations of the research findings
Chapter Eight	Conclusion - Overview of the research - Limitations - Future research directions	Concludes the thesis and proposes future work

Chapter Four: Field Study and Comprehensive Research Model

Chapter Four presents the process and outcome of a qualitative field study. This field study involved interviews with supply chain executives from apparel manufacturing firms in Bangladesh. The description of the process of the field study is followed by data analysis through content analysis, using both inductive and deductive approaches. Based on the findings from the analyses of the qualitative data, the initial research model was modified to contextualize and develop a comprehensive research model.

Chapter Five: Hypotheses and Questionnaire Development

Following the development of the comprehensive research model in Chapter Four, relationships between constructs are hypothesized in Chapter Five. Chapter Five describes the development of the hypotheses based on support from the extensive literature review and field study findings. The formulation of the survey instrument and the sources of measurement items are discussed.

Chapter Six: Survey and Quantitative Data Analysis

Chapter Six provides a detailed description of the quantitative stage and presents the analysis of the quantitative data gathered via a survey of apparel manufacturing firms in Bangladesh. Partial least squares (PLS) based structural equation modeling (SEM) was used to analyze the survey data. Chapter Six includes details of the data examination, model assessment and hypothesis testing.

Chapter Seven: Discussion and Implications

This chapter interprets and discusses the results of the hypotheses testing. The implications for each of the accepted hypotheses are complemented with practical propositions. The rejected hypothesis is examined, and plausible explanations are provided.

Chapter Eight: Conclusion and Future Research Directions

The final chapter presents a summary of the research and its significant contribution to theory and practice. Research limitations and future research directions are also presented in this chapter.

1.8 SUMMARY

This chapter provides a background to the relevant issues in order to clarify and highlight the importance of the current research. Based on the existing literature, the chapter has addressed a major gap in research in the area of SCM. The chapter presented the research questions, objectives and the significance of the research. Finally, the last section of this chapter presented the organization of the thesis to provide a structured picture of this study.

Chapter Two

LITERATURE REVIEW[1]

2.1 INTRODUCTION

Supply chain management (SCM) has become an important focus for achieving competitive advantage and improving firm performance in today's environment (Swafford et al., 2008; Li et al., 2006). Short product life cycles, knowledgeable customers, volatile product demand, tremendous product variety, intense competition, and long and inflexible supply processes are common characteristics of the apparel industry (Sen, 2004; Lee & Kincade, 2003). Considering the dynamic nature of the global marketplace and complex nature of supply chains, the effective implementation and practice of SCM and achieving supply chain agility have become crucial for apparel manufacturing firms in order to compete and be successful in today's marketplace environment. While various aspects of SCM have been widely studied by numerous researchers, there is a lack of research pertaining to the differentiation of SCM implementation and practice, as per diffusion of innovation theory (Rogers, 2003). There is a gap in the literature concerning how the level of SCM implementation affects the sound practice of SCM and enables the firms in a supply chain to quickly and effectively respond to the changes in a dynamic and competitive environment. The current research therefore studies SCM implementation that enhances the SCM practice, which will eventually help firms achieve competitive advantage through supply chain agility (SCA) in the context of the Bangladesh apparel industry.

This chapter presents a review of the literature relevant to the current research. Drawing on transaction cost economics (TCE), diffusion of innovation theory (DIT) and the resource-based view (RBV), the literature review provides a theoretical foundation for this research. This chapter also reveals the gaps in the literature which are to be addressed in this research. This chapter suggests that there is no single model or theory that combines possible internal and external antecedent factors of SCM and explains the process of implementation, practice, and consequences of SCM in a single framework. By discussing the

---

[1] Part of this chapter was presented and published in the following conference and publication:

Jahed, M. A. & Quaddus, M. (2013). A proposed model of supply chain management practice, agility and competitive advantage in Bangladesh apparel industry. In *Proceedings of the Mustang International Academic Conference, 3,* 172-176. October, 2013 Dallas, Texas.

relevant concepts and issues from a theoretical perspective, this chapter carries out the groundwork required to develop such an integrated, if not a 'complete', model. The proposed initial research model depicts the dimensions of the constructs and the relationships between them. The rationale underlying the research framework is as follows: the antecedent factors drive a firm to implement SCM; depending on how well SCM is implemented, SCM practice within the firm will be enhanced; the level of SCM practice will impact SCA; finally, SCA will have a direct or mediated impact on the competitive advantage of the firm.

2.2 CONTEXTUAL BACKGROUND

Bangladesh has emerged as one the most preferred destinations for major international retailers, for sourcing world class fabrics and apparel products. The Bangladesh apparel industry currently holds more than 6% of the total global apparel market share (Tasin, 2013). Beginning from almost nothing in the 1970s, with the blessings of low-cost labor, favorable government policy, preferential trade status and advantageous global market access, apparel evolved as the main export product of Bangladesh, making up about three-quarters of total exports (Uddin & Jahed, 2007). On a journey of challenging experiences in building capacity in response to growing demand and competition, Bangladesh has achieved second position behind the global market leader, China (Mansur, 2013).

The apparel manufacturing industry is made of a complex chain of firms or businesses, from design through production to distribution of apparel products. Apparel wear is the final product of an apparel supply chain. According to the definition of the North American Industry Classification System (NAICS), apparel manufacturing involves making knit garments (i.e., knitting fabric into garment shapes such as sweaters and hosiery, cutting and sewing the knit fabric into a garment), and the cutting and sewing operations from flat fabrics (i.e., procuring woven fabrics, and cutting and sewing them to make apparel garments) (U.S. Census Bureau, 2012). Apparel manufacturers, according to the NAICS 315 code, are firms that carry out all apparel related functions from design, the procurement of fabrics and accessories, and cut and sew operations, to the distribution of the products to wholesalers or retailers.

The apparel industry of Bangladesh is characterized by buyer-driven supply chains (Lee, Lee, & Moore, 2004) and make-to-order type processes. After receiving sales orders from the buyers or buyer's agents, the manufacturers procure the necessary materials from

the overseas and local suppliers. Sometimes, the buyers specify the suppliers to be used by a manufacturer for the procurement of needed materials. After confirming the sources of supply, the sample products are made and sent to the buyers for approval. Necessary adjustments are made to the design (sample) of the products according to the buyer's suggestions. Once the design is approved, the manufacturer begins full-fledged production. The Bangladesh apparel industry produces two broad categories of apparel: woven and knitwear products (Ahmed, 2009). Woven garment products used to make a larger contribution to the total apparel export earnings of the country, however, knit products have made significant progress since 2004 (BGMEA, 2016). Although the sector started its journey with a greater focus on scaling up its capacity and producing basic apparel, with the passage of time, it has directed its focus on securing a larger share in the high-end product market (Islam, 2013). The European Union (EU) and the United States of America (USA) are the two main export destinations for Bangladeshi apparel. These two markets account for 86% of the total apparel exports of the country (Tasin, 2013). Bangladesh currently exports 65 categories of apparel products to as many as 80 countries worldwide, including Canada, Japan, Australia, Brazil, and Middle Eastern countries (Berg, Hedrich, Kempf, & Tochtermann, 2011). Bangladesh has also been successful in capturing the market share lost by the global leader China in the EU market. There is greater opportunity as China moves up the value chain and into other high-end manufacturing, and as its labor becomes more expensive. The industry seeks to further consolidate its position as a top global exporter, reaching a target of USD 50 billion by 2021 and thereafter steadfastly marching toward a higher target of USD100 billion before 2030 (Mansur, 2013).

Today, the apparel industry is the leading sector in Bangladesh, playing a critical role in its socio-economic development. This sector accounts for about 82% of total export earnings and 16% of the country's GDP (BGMEA, 2016). There are currently 4328 factories, employing about four million people directly, and several million people are indirectly involved in this sector. This sector's direct employment comprises over 50% of the total industrial workforce, of whom 80% are women (BOI, 2011). The apparel industry has experienced a tremendous growth over the last decade. The growth of this industry in terms of number of units, employment generation and export earnings is shown in the Table 2.1. During the fiscal year 2015-2016, Bangladesh exported more than USD 28 billion worth of garments, and there was a 10.2% increase over the previous year (BGMEA, 2016). McKinsey forecast that the industry would grow by as much as 9% a year over the next decade (Wassener, 2012). There has also been a slow but steady growth in demand for quality apparel in the domestic market, as consumers are now increasingly choosing branded

apparel and spending a considerable portion of their disposable income on clothing. This has been attributed to the radical improvement in income level of the country's huge middle-class population. In such a context, a least-developed, resource-poor, labor-surplus country like Bangladesh, the apparel industry has been playing a vital role in the emancipation of socio-economic conditions, through employment and foreign earnings, and thereby, acting as a driving force in economic development (Uddin & Jahed, 2007). Despite this, the Multi-Fiber Arrangement (MFA) facility, which was extended to favor least developed countries in exporting textiles and apparel, was phased out after 2005. As a result, the beneficiaries of MFA, including Bangladesh, are facing strong competition in an unprotected global market.

Table 2.1: Growth of the Apparel Industry of Bangladesh

Year	Number of Factories	Employment in Million Workers	Total Apparel Export in Million USD
1983-84	134	0.040	31.57
1984-85	384	0.115	116.2
1985-86	594	0.198	131.48
1990-91	834	0.402	866.82
1995-96	2353	1.290	2547.13
1999-2000	3200	1.600	4349.41
2005-2006	4220	2.200	7900.80
2009-2010	5063	3.600	12496.72
2010-2011	5150	3.600	17914.46
2011-2012	5400	4.000	19089.73
2012-2013	5600	4.000	21515.73
2013-2014	4222	4.000	24491.88
2014-2015	4296	4.000	25491.40
2015-2016	4328	4.000	28094.16

Source: BGMEA, 2016

The industry is also heavily dependent on imported materials (Rahman & Anwar, 2006) and, therefore, needs to maintain a relatively long supply chain with longer lead time to process an order (Nuruzzaman, Haque, & Azad, 2010). Over the years, however, there has been some development in backward linkages (upstream suppliers) within the country. The

knit apparel manufacturers are able to procure 80% of knit fabrics from local suppliers, although the basic raw materials are acquired from other countries. On the other hand, only 15% of the total needs of the woven apparel segment are met by local suppliers, and the balance is met by imported fabrics (Rahman, 2005).

The factories in Bangladesh are on average larger than the competing countries (Miller, 2016). BGMEA's data (BGMEA, 2016) suggests that the production and total export continue to increase despite the downturn in the number of factories in recent years. Today, firms are making significant investments in increasing their capacity and dominance of larger firms is becoming more evident (Miller, 2016). On the other extreme, most of the smaller firms are indirect exporters i.e., subcontractors for the larger firms and focus on a single production process, such as sewing, washing, dyeing, or printing (Labowitz & Baumann-Pauly, 2015).

Despite the phenomenal growth of recent decades, the apparel industry in Bangladesh is facing various challenges in retaining and increasing its market share, such as strong dependence on third country suppliers and the resultant effect on lead time and inventory costs, increased global competition, low productivity, the effects of political unrest on operations, poor infrastructure, limited logistics capacity and capability, increasingly demanding customers, product and market diversification, lack of understanding and coordination among the supply chain members, lack of information sharing, integration, conflicting goals and objectives among the supply chain members, and supply chain complexity due to larger numbers of stock keeping units (SKUs), shorter product life cycles, and pressure to reduce lead time (Berg, Hedrich, Kempf, & Tochtermann, 2011; Ahmed, 2009, Nuruzzaman et al., 2010; Islam, 2013; Haider, 2007; Mansur, 2013; Uddin & Jahed, 2007). Responding to these challenges requires apparel manufacturers to ensure effective management of their supply chains to improve overall competitiveness. Supply chain management (SCM) help firms minimize inefficiencies and resolve problems throughout the supply chain, from raw material sourcing to end customers (Lee & Kincade, 2003). In order to realize the growth potential, Berg et al. (2011) suggest that the apparel manufacturers of Bangladesh need to make significant performance improvements by removing overall value chain inefficiencies and reducing the gap between customer requirements and manufacturer capabilities. In today's highly competitive environment, manufacturers are striving to make a difference that will attract international buyers. To fully enjoy the fruits of their efforts, firms need to manage their operations and supply chain processes in such a way that will help

them reduce their costs, improve quality, and respond to demand in the most effective and efficient manner (Saxena & Salze-Lozac'h, 2010; Solaiman, 2013).

Based on the above discussion, it is realized by the practitioners that SCM is a crucial factor for Bangladesh apparel industry if the sector is to compete and grasp the leading position in the global market place. Although several studies have been conducted on aspects of SCM in the context of the Bangladesh apparel industry (e.g., Nuruzzaman et al., 2010; Rashed et al., 2010), no integrative study has been conducted on the state of SCM in this context. This study thus intends to fill this research gap by studying the implementation of various SCM practices in the Bangladesh apparel industry and their antecedents, and how to promote the sound practice of SCM in order to achieve and sustain competitive advantage through supply chain agility.

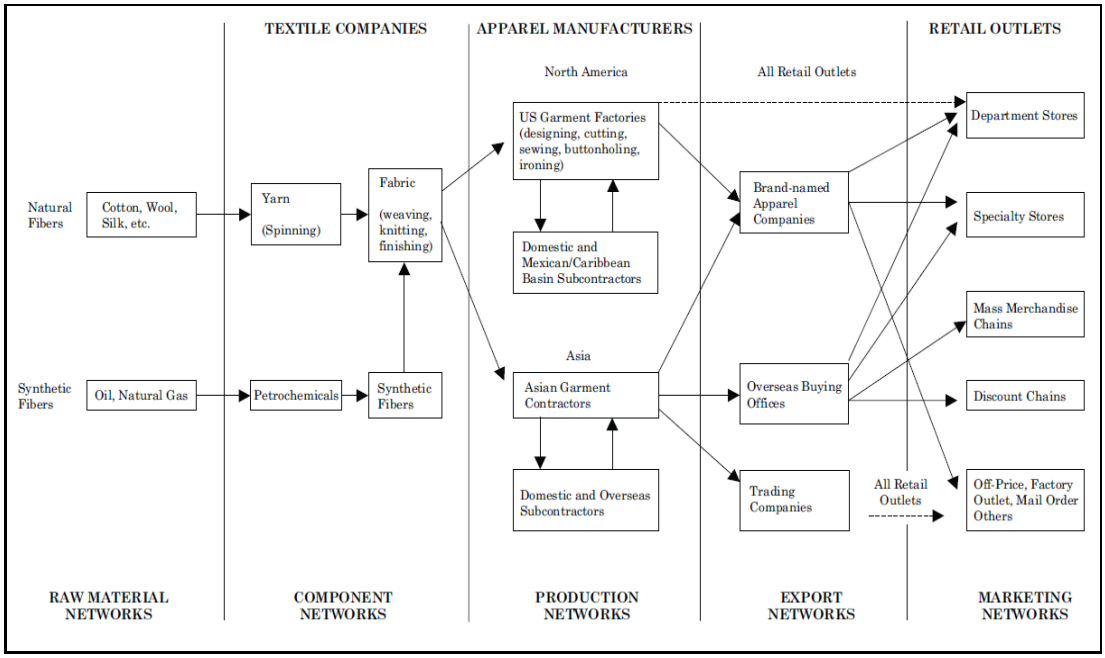
2.3 APPAREL SUPPLY CHAIN AND BANGLADESH

Although many authors view the concept of the 'supply chain' in various ways from various perspectives and applications (Mentzer et al. 2001; Chen & Paulraj, 2004), it is generally described as the flow of materials, goods, information and finances involved in moving a product or service from a source (suppliers, manufacturers, etc.) to a destination (retailers, customers, etc.) (Min & Mentzer, 2004; Peck, 2006; Fawcett, Ellram, & Ogden, 2007). A supply chain consists of all parties involved, directly or indirectly, in fulfilling a customer demand (Chopra & Meindl, 2010), and thus, it is not essentially a chain of firms with one-to-one, business-to-business relationships; rather it is a network of multiple firms and relationships (Handfield & Nichols, 2006; Peck, 2006). Aitken (1998) describes a supply chain as a "network of connected and interdependent organisations mutually and co-operatively working together to control, manage, and improve the flow of materials and information from suppliers to end users" (as cited in Christopher, 2011, p4). Christopher, (2011) asserts that this network of organizations undertakes various processes and activities to generate value in the form of products and services for the final customers.

From the focal firm's perspective, the supply chain consists of upstream suppliers, internal operations, and downstream customers (Handfield & Nichols, 2006). The supplier network includes all firms that supply input, either directly or indirectly, to the focal firm. A firm's internal operations involve the different processes used in transforming the input provided by the supplier network. Lastly, the external downstream part of a firm's supply chain includes all of the downstream distribution channels, processes, and functions that the

product passes through on its way to the final customer. Supply chains are therefore basically a series of connected customers and suppliers; every customer is in turn a supplier to the next downstream firm until a finished product arrives with the ultimate end user (Handfield & Nichols, 2006).

An apparel supply chain consists of apparel manufacturers as the focal firms; suppliers of fabrics, accessories, and other raw materials, and subcontractors in the upstream supply chain; and customers or buyers, or buying agents in the downstream supply chain (Nuruzzaman & Haque, 2009). According to Gereffi (2002), the apparel supply chain is comprised of five major segments: raw material supply; components, such as yarns and fabrics manufactured by textile companies; production networks made up of domestic and overseas apparel manufacturers; export networks; and marketing networks at the retail level (see Figure 2.1).



Source: Gereffi, 2002

Figure 2.1 Apparel Supply Chain

The objective of an apparel supply chain is to create and deliver value for the end customers by providing the right products at minimum cost in a speedy manner, and thereby, to improve the overall competitiveness of a firm and its supply chain. However, the supply chain for the apparel industry is complex, as it is relatively long and comprised of a large number of parties (Jones, 2002). Short product lifecycle, high volatility, low

predictability, and high rates of impulse purchase are the common characteristics of this industry (Bruce et al., 2004). Bangladeshi manufacturers are further challenged with unique problems such as high dependency on overseas suppliers, poor infrastructural supports, low productivity, and frequent political unrest that limits their ability to achieve the supply chain objectives. In a buyer-driven apparel supply chain, customers (i.e. retailers) play the pivotal role in the global production network (Gereffi, 2002; Lee et al, 2004). Building and maintaining collaborative relationships and partnerships is another challenge, as increased global competition places retailers in an advantageous position to exert pressure to push down prices and to demand improved product quality (Bhamra, Heeley, & Tyler, 1998; Lee & Kincade, 2003; MacCarthy, & Jayarathne, 2010). The integration of internationally dispersed activities, including constant interaction with buyers regarding approval of the sample products and components, frequent adjustments to design specifications, and collaboration with the overseas suppliers, is crucial for the apparel manufacturers of Bangladesh. It is argued that apparel manufacturers require more product variety in response to diversified customer demand and rapid changes in fashion trends, which create demand uncertainty and supplier variability (Lee & Kincade, 2003; Cao, 2006). As a result, apparel firms, under such an uncertain environment, face numerous managerial problems in forecasting, production planning, procurement, inventory management, production systems, and timely distribution. The need for improving demand forecasting is often emphasized in managing uncertainty related to demand and supply in Bangladesh apparel industry (e.g., Chowdhury & Quaddus, 2015). The management of the supply chain through greater collaboration with customers and suppliers is thus imperative for effectively dealing with the demand and supply uncertainty, reducing lead times and being able to quickly respond to customer needs, which can be achieved by undertaking an approach like agility. Most supply chains aim to be responsive by playing against costs, but agile supply chains are capable of responding both quickly and cost-efficiently (Lee, 2004). Apparel manufacturing firms should therefore focus on building agility into their supply chains in order to be responsive to changing and diverse customer demands and marketplace opportunities at the front-end, while reducing the back-end risks of supply uncertainty (Lee, 2002; Lee, 2004; Jacobs & Chase, 2014). In order to survive and compete in today's dynamic and highly competitive global marketplace, effective management of the supply chain by undertaking an appropriate approach such as agility is critical for apparel manufacturing firms.

2.4 SUPPLY CHAIN MANAGEMENT LITERATURE: IMPLEMENTATION AND PRACTICE

Despite the proliferation of SCM literature, there is a lack of consensus on its definition, practical implementation and impacts. The varying conceptualizations of SCM has important implications for its implementation (Halldo´rsson, Larson, & Poist, 2008). Such ambiguity suggests a need to study the SCM phenomena more closely to identify the factors that contribute to effective SCM, and to ascertain how the implementation of SCM can shape corporate strategy and performance. SCM is often described as managing the flow of information and materials from the ''suppliers' supplier to the customers' customer" (Fawcett et al., 2007, p. 8). Cooper, Lambert, and Pagh (1997) describe SCM as the management and integration of the entire set of business processes that provide products, services and information that create value for customers, while Lambert et al., (1998) describe SCM as the management of multiple relationships across the supply chain. Mentzer et al. (2001, p. 18) define SCM as "the systemic, strategic coordination of the traditional business functions and tactics across these businesses functions within a particular company and across businesses within the supply chain for the purposes of improving the long-term performance of the individual organizations and the supply chain as a whole". SCM is steadily evolving and changing in response to strategic changes in both firms, and the environment, including technology, competitive actions, suppliers and customer demand. As such, supply chains are becoming increasingly dynamic, strategic and customer-driven (Melnyk, Lummus, Vokurka, & Sandor, 2007). In the light of these definitions, this study defines SCM as a strategically oriented inter-firm arrangement, involving coordination and collaboration with trading partners to create competitive advantage by maximizing the value delivered to end-customers (Cao & Zhang, 2011; Das, 2006; Grant & Baden-Fuller, 2004; Kotzab et al., 2006; Stank et al., 2005).

The conceptual ambiguity and lack of theoretical framework in SCM are reflected in the empirical research. Cousins, Lawson, and Squire (2006) claim that SCM has been studied through different disciplines, as well as from different theoretical viewpoints, which gives rise to richness in the field, but also results in an unclear literature and overlapping constructs, along with inconsistent results. It has also been argued that much of the theoretical and empirical research in SCM merely focus on the downstream or upstream sides of the supply chain, or certain aspects of SCM (Chavez, Fynes, Gimenez, & Wiengarten, 2012; Koh et al., 2007; Lambert & Cooper, 2000; Li, Ragu-Nathan, Ragu-Nathan, & Rao, 2006). It is argued that upstream-focused processes are equally as important as downstream-focused processes in creating value for customers and deriving benefits for the entire supply chain (Tracey, Lim,

& Vonderembse, 2005). Kim (2006) investigates SCM from technical, structural and logistical perspectives and suggests that SCM practices cannot improve their effectiveness if implemented independently. There are only a few empirical studies that have attempted to combine upstream and downstream sides of supply chain, and examine SCM practices simultaneously (e.g., Chow et al., 2008; Li et al., 2006; Tan, 2002). This calls for further investigation of SCM practice from both the downstream and upstream sides of the supply chain, specifically in the apparel industry. Regardless of the increased attention paid to SCM, as well as the abundant expectations of SCM, the evidence of successful implementation is still sparse (Li et al., 2005). The focus of SCM literature is more on SCM practice than on its implementation. There is a lack of research examining how the level of implementation affects sound practice of SCM. This study makes an attempt to address this gap. Drawing upon the DIT (for full theoretical discussion, see Section 2.7) and the information systems and organizational innovation literature, this study posits that the practice of SCM depends on how well it is implemented.

2.4.1 SCM Implementation

Ross (1998) describes SCM as an implementable system, a management process, and business philosophy. He suggests that a number of formative principles are needed regarding organizational structure, resources, basic cultural values, operations processes, communication channels, use of information and communication tools and so on, in any application of the SCM concept. Mentzer et al. (2001) assert that firms implement SCM by establishing various management practices which allow them to act or behave in accordance with the SCM philosophy. SCM literature (e.g., Kotzab, Teller, Grant, & Sparks, 2011; Kotzab et al., 2006; Lambert et al., 1998; Lambert et al., 2004; Teller, Kotzab, & Grant, 2012) stresses the integration of key business operations across the supply chain in measuring supply chain implementation performance. Lambert et al. (1998) suggest that two sets of components are important when implementing SCM. The first set, physical and technical management components, include planning and control methods, organizational structure, work flow/activity structure, facility structure and products, communication and information flow; and the second set of components are managerial and behavioral components such as management methods, leadership structure, culture and attitudes, risk and reward structure. Power (2005) notes that the integration of core processes across organizational boundaries is achieved through enhanced communication, partnerships, and cooperation. In short, the implementation of SCM practices relies on the above components, and the level of such

integration across the supply chain is reflected by the extent of implementation and the practice of these practices and policies within the organization.

Innovation-process studies emphasize the implementation stage in putting an innovation to use in an organization (Rogers, 2003; P. 402). 'Implementation' refers to a course of action taken to put an idea, systems, procedure or practices to use (Rogers, 2003). From a technological diffusion perspective, Cooper and Zmud (1990) describe 'IT implementation' as an "organizational effort directed toward diffusing appropriate information technology within a user community" (p. 124). In this study, SCM implementation is defined as the extent to which the defined set of SCM practices have been implemented in an organization via formal and/or informal procedures, policies, processes or systems. The implementation phase determines activities that include preparation for changes to the organizations, processes, and technologies needed for innovation deployment (Wu & Chuang, 2009). Decisions about what practices are to be implemented are made at the implementation stage of the process (Rogers, 2003). The resources and facilities required for SCM practices, such as personnel, money, time, policy, procedure, training, technological infrastructure, are provided. The subsequent diffusion (i.e., practice) stage initiates the expanded use or practice of these systems/practices which leads to widespread transfer for regular use in an organization (Wu & Chuang, 2009), however, the existing literature does not clearly differentiate between SCM implementation and practice. The current study thus seeks to fill this gap in the literature and attempts to examine the effect of SCM implementation on the level of SCM practice.

2.4.2 SCM Practice

This stage reflects the assimilation of SCM practices by an organization and is evident in the widespread use/execution of these practices or systems. As discussed above, these practices are oriented toward the management and execution of core organizational and inter-organizational processes, including product design, manufacturing, quality improvement, information sharing, customer order fulfillment and process integration. The extent to which organizations execute these practices is reflective of the level of SCM practice in an organization. The actual practice of SCM by an organization attests to the precedence of the implementation stage (Ahire & Ravichandran, 2001).

The success of innovation diffusion involves the regular use of an innovation once it is implemented as practice (Rogers, 2003). There may be substantial variation in the extent to which the implemented practices are used within organizations (Frambach & Schillewaert,

2002). From the diffusion of innovation perspective, this study proposes that there should be formal or informal procedures, policies, principles, processes or some sort of systems put in place at the SCM 'implementation' phase, while at the following phase 'practice' can be assessed by the extent of use of such systems/practices incorporating SCM. Depending on how well these practices or systems are implemented, SCM practice within an organization will be enhanced. The more the SCM practices are practiced within and across the organizations involved in a supply chain, the more benefits these practices will generate for the adopting organizations. However, the existing SCM literature does not differentiate between SCM implementation and practice. The terms 'SCM implementation' and 'SCM practices' are used either inclusively or interchangeably in the literature (e.g., Power, 2005). Moreover, existing research does not offer much information to help deal with the question of how a firm prepares to adopt and execute SCM; the implementation and practice of SCM (Kotzab et al., 2011; Stock, Boyer, & Harmon, 2010). Kotzab et al. (2011) have suggested that there are organizational and technical prerequisites for adopting joint business processes supporting the execution of SCM, both internally, and externally, with suppliers and customers. There is still a gap in the literature about how the level of SCM implementation impacts the practice of SCM in organizations which further enable them to respond quickly and effectively to the changes in a customer driven competitive marketplace (El-Tawy & Galler, 2010). There is also a dearth of research exploring the antecedents promoting sound practice of SCM after implementation, in addition to ambiguous conceptualizations of SCM implementation and practice in the literature. Drawing on the DIT, the current research thus aims to study the SCM implementation that enhances SCM practice, which eventually helps firms to achieve competitive advantage through supply chain agility.

2.4.3 Dimensions of SCM

SCM is implemented and practiced through a whole set of approaches, policies, and practices that effectively integrate suppliers, manufacturers, distributors, and customers to improve the long-term performance of both firms and their supply chains (Koh et al., 2007; Chopra & Meindl, 2010). These are tangible activities, processes or technologies that facilitate the collaboration of a focal firm with its suppliers and/or customers (Gimenez, van der Vaart, & Pieter van Donk, 2012; Van der Vaart, & van Donk, 2008). Using factor analysis Tan (2002) identified six aspects of SCM practices ranging from broad-based supply chain integration to more specific just-in-time (JIT) capabilities. Min and Mentzer (2004) identified long-term relationship, information sharing, vision and goals, risk and award sharing,

cooperation, process integration, and supply chain leadership as underlying the concept of SCM. Robb, Xie, and Arthanari (2008) considered a set of four constructs in their research, namely, customer relationships, supplier relationships, e-commerce and enterprise software. On the other hand, Chen and Paulraj (2004) strongly emphasize the upstream side and consider the supplier network structure, buyer-supplier relationships and logistics integration as key dimensions of SCM. Similarly, Qrunfleh and Tarafdar (2013) considered only the upstream side of supply chains, coupled with internal postponement practices in examining their effect on supply chain responsiveness and firm performance. Although both upstream-focused and downstream-focused processes are considered equally important in creating value for customers, benefiting the whole supply chain (Tracey et al., 2005), only a few empirical studies have been conducted taking the entirety of supply chain into consideration, combining the upstream and downstream sides of supply chains (e.g., Chow et al., 2008; Tan, 2002; Li et al., 2006; Chavez et al., 2012). Some studies, such as Chavez et al., (2012), have considered both upstream and downstream sides simultaneously with an emphasis on information exchange with customers; however, the internal supply chain processes such as postponement, and internal lean practices (Li et al., 2005) have been totally ignored. Kim (2006) suggests that SCM practices should not be applied independently, to avoid ineffectiveness. Table 2.2 provides a list of SCM dimensions used in the literature.

Table 2.2: A List of SCM Dimensions

SCM Dimensions	Author(s)
Integrated behavior, mutually sharing information, mutually sharing risks and rewards, cooperation, the same goal and the same focus on serving customers, integration of process, partners to build and maintain long-term relationship	Mentzer et al. (2001)
Supply chain integration, information sharing, supply chain characteristics, ,customer service management, geographical proximity, JIT capability	Tan et al. (2002)
Supplier quality evaluation, supplier partnerships, customer satisfaction evaluation, competitive benchmarking, continuous improvement teams	Gowen and Tallon (2003)
Agreed vision and goals, information sharing, sharing of risk and award, cooperation, integration of processes, long-term relationship, agreed supply chain leadership	Min and Mentzer (2004)
Supplier base reduction, long-term relationship, communication, cross-functional teams, supplier involvement	Chen and Paulraj (2004)
Strategic supplier partnership, customer relationship, information sharing, information quality, internal lean practices, postponement	Li et al. (2005)
Leadership, intra-organizational relationships, inter-organizational relationships, logistics, process improvement, orientation, information systems, business results and outcomes	Burgess, Singh, and Koroglu (2006)
Customer relationships, supplier relationships, e-commerce, enterprise software	Robb et al. (2008)
Customer and supplier management, supply chain features, communication and speed, information sharing	Chow et al. (2008)
Internal operations, relationships with suppliers, relationships with customers	Law et al. (2009)
Customer relationship, information quality, supplier relationship	Chavez et al. (2012)

The literature depicts different dimensions when examining various practices from a range of different perspectives, with a common goal of improving overall supply chain performance, and thereby achieving competitive advantage. After reviewing the views of many authors, six specific dimensions of SCM were adopted in this study (Li et al., 2006; Li et al, 2005; Chavez et al., 2012): (1) strategic buyer partnerships, (2) supplier partnerships, (3) information sharing, (4) information quality, (5) postponement, and (6) lean systems. These six dimensions are believed to represent all the important practices and policies involved in managing a supply chain (Chow et al., 2008), specifically, in the context of the apparel industry. It can be noted here that the selected dimensions are subject to confirmation through field study findings. These dimensions include, comprehensively, both the upstream

and downstream sides of supply chain as well as internal supply chain processes (Li et al., 2005); reconciling the concepts of SCM (Stock et al., 2010; Stock & Boyer, 2009); and reflecting the ability to perform the cross-functional and inter-organizational activities which are essential in SCM (Wu et al., 2006). Based on the notion of the RBV, these dimensions with their own constituent practices can also be viewed as resources. In Apparel industry, these resources form the core competencies which eventually improve the overall performance of the firm (Barney, 1991; Halldorsson et al., 2007). The following subsection presents a detailed review of the existing literature on each of the dimensions proposed in this study.

2.4.3.1 Strategic Buyer Partnership

The first step in the integrated SCM is identifying the key customers or buyers that a firm considers as critical to its business mission (Lambert & Cooper, 2000). These key firms are potential SCM partners. Effective SCM consists of a series of partnerships, and, therefore, its implementation involves building and maintaining long-term relationships among those partners (Cooper et al., 1997; Mentzer et al., 2001). Cooper et al. (1997) believe that the number of partners should be small, for enhanced cooperation. Taking a long-term perspective, the intensity of buyer–supplier coordination is increased, and supply chain partners are more willing to share risks and rewards when a close relationship is developed (De Toni & Nassimbeni, 1999; Chen & Paulraj, 2004). Ellram and Hendrick (1995) describe partnership as ''an on-going relationship between two firms that involves a commitment over an extended time period, and a mutual sharing of information and the risks and rewards of the relationship'' (p. 41). Customer partnership is defined by Campbell and Cooper's (1999) as "a formalized working relationship between a customer and a manufacturer which involves performing coordinated development activities to develop a new product" (p. 508). The goal of such partnership is "to produce superior mutual outcomes or singular outcomes with expected reciprocity over time" (Anderson, James, & Narus, 1990, p. 43). In this study, *strategic buyer partnership* is defined as the long-term relationship between the firm and its buyers, designed to leverage the operational and strategic competences of individual participating firms to help them realize significant ongoing benefits (Li et al., 2006; Li et al., 2005). This is connected to the relational view of interorganizational competitive advantage (Dyer & Singh, 1998). A strategic partnership centers on close, long-term association, and encourages joint planning and involvement in one or more important strategic areas, such as products, technology, markets etc. (Gunasekaran, Patel, & Tirtiroglu, 2001; Yoshino & Rangan, 1995). This type of relationship with buyers allows firms to work more closely with a

few buyers in the planning and execution of supply chain operations, toward common goals and mutual benefits.

Tan, Kannan, and Handfield (1998) recognize the downstream integration of customers as a key element of SCM. In their study, practices related to customer relations include interacting with customers to set standards, assessing customer complaints, following up customer feedback, improving customer support, predicting the future expectations of customers, predicting key factors affecting customer relationships, and measuring customer satisfaction. They also suggest, based on their study, that these practices emphasize a long-term supply chain perspective in relationships with customers, and that maintaining communication and close contact with customers is critical for future success. The benefits that firms receive from long-term strategic relationships with customers include enhanced product development effectiveness, faster times to market for new products, improving production stability, lowering costs, and helping to justify investments in products and process technologies (Campbell & Cooper, 1999; Fawcett et al., 2007). Although strategic partnerships have been promoted as offering long-term mutual benefits to both manufacturers and buyers in many industries, available research on the nature of the supply chain relationship between apparel manufacturers and retailers (buyers) is limited (Lee & Kincade, 2003). This study identifies, through a review of the literature, a number of key practices such as interaction with buyers to set standards, collaboration in planning, assessing buyer satisfaction, striving for long term relationship, and buyer-oriented capacity planning constituting the strategic buyer partnership dimension of SCM implementation and practice in apparel manufacturing firms in Bangladesh.

2.4.3.2 Supplier Partnership

Due to increased global competition, manufacturing firms are under tremendous pressure to manage their entire supply chain operations more efficiently and effectively. According to Mentzer et al. (2001), effective management of these operations in a global context necessitates closer relationships with suppliers. In the context of the U.S. apparel industry, Lee and Kincade (2003) examined the nature of the relationships among the supply chain members and found that the most desirable relationships between apparel manufacturers and fabric suppliers was partnership-like and based on the long-term. Partnership-like relationships are defined as close co-operations between manufacturers and their suppliers (Goffin, Lemke, & Szwejczewski, 2006). Supplier partnership in the form of collaborative relationship with suppliers significantly improves a manufacturer's performance

in terms of constant improvement in quality levels, cost reductions, delivery reliability and enhancing new product development (Goffin, et al., 2006). As mentioned earlier, supplier partnerships facilitate manufacturers to work more closely with a core group of suppliers who are willing to assume shared responsibility for the product's success (Li et al., 2006). Dyer, Dong, and Wujin (1998) suggest that to select strategic partners, suppliers should be evaluated strategically to decide which can potentially contribute to the core competence and competitive advantage of the buying firm. In an empirical study on strategic supplier partnerships, Stuart (1993) identified information sharing, joint problem-solving, and continuous improvement effort as the critical factors in successful supplier partnerships.

Supplier partnerships are different from other types of relationships as they involve not only buying goods and services from the suppliers; but also leveraging the supplier's systems and competence, creating value for both parties, and enhancing the overall performance of the entire supply chain (Monczka, Petersen, Handfield, & Ragatz, 1998). The benefits of integrating suppliers in the new product development process, and business planning have been highlighted in the extant literature (Chen & Paulraj, 2004; Primo & Amundson, 2002; Ragatz, Handfield, & Petersen, 2002). Some of the benefits of early supplier involvement include, as mentioned by Tan et al. (2002), supplier suggestions about cost-effective design alternatives, assistance in better component and technology selection, and support in design assessment. Supplier partnerships are also emphasized in encouraging cross-functional activities within the individual firms, leading to cross-functional improvements between firms (Landeros, Reck, & Plank, 1995). Graham, Daugherty, and Dudley (1994) observed that strategically oriented supplier partnership facilitates the improvement of supplier operations quality, and ensures the quality of parts that are supplied, which leads to improved product quality. Theodorakioglou, Gotzamani, and Tsiolvas (2006) conclude, based on their study, that better supplier relationship management improves the extent of intra-firm quality management practices required for their business success. Supplier development activities (e.g., training, placement of engineering personnel, direct investment etc.) are also often relevant when suppliers lack the abilities and competence needed to meet a buyer's quality standard requirements (Krause & Ellram, 1997; Monczka et al., 1998; Theodorakioglou, Gotzamani, & Tsiolvas, 2006). Based on existing literature, this study utilizes 'supplier selection process', 'supplier performance monitoring and evaluation', 'collaboration in planning and goal-setting activities', 'joint problem solving, 'suppliers' involvement in product development', and 'building long term relationships' as the key practices of supplier partnership in the context of Bangladesh apparel industry.

2.4.3.3 Information Sharing

Information is a critical enabler of collaboration in an SCM context (Sheu, Yen, & Chae, 2006). It drives the entire supply chain system and links various stages, enabling them to coordinate and enhance total supply chain effectiveness (Chopra & Meindl, 2010). Information is even sometimes seen as an independent production factor, along with the traditional production factors of material, capital, and human capital. Indeed, information sharing is a prerequisite to effective supply chain operations because "no product flows until information flows" (Mukaddes, Rashed, Malek, & Kaiser, 2010). Inefficiencies in the supply chain, such as parts or raw material shortages, an excessive finished goods inventory, underutilized plant capacity, or high transportation costs, are usually due to erroneous or untimely information (Laudon, Laudon, & Dass, 2010). An important practice in managing an integrated supply chain is thus to share information among supply-chain partners (Li et al., 2006). Lee (2000) considers this practice a mechanism for the coordination and seamless integration of the processes and activities along the supply chain. Supply chain information sharing is recognized as an effective way of dealing with the challenges of a competitive environment (Huo, Zhao, & Zhou, 2014).

Liu, Ke, Kee Wei, and Hua (2013) define information sharing as "the extent to which information is exchanged among members across the supply chain" (p. 325). According to Li et al. (2006), information sharing is the communication of crucial and proprietary information among the supply chain partners. Sanders and Premus (2005) consider information sharing as "providing firms with forward visibility, improved production planning, inventory management, and distribution" in their study of IT capabilities, collaboration, and firm performance. Again, in defining information sharing, the Global Logistics Research Team at Michigan State University (1995) emphasize the willingness to make both strategic and tactical data available to firms involved in a supply chain.

Zhou and Benton (2007) studied information sharing from three aspects: information sharing support technology, information content, and information quality. Information sharing support technology involves the hardware and software or IT applications needed to support information sharing. In terms of content, shared information can range from strategic to tactical in nature (Mentzer et al., 2001). It could be related to logistics, customers, inventory, sales, shipments, customer orders, demand forecasts, manufacturing, product design, procurement, schedules, markets, performance and capacity or more (Lee & Whan, 2000; Mentzer et al., 2001; Eisman, 2008; Ying, 2006). In their study involving North American manufacturing firms, Zhou and Benton (2007) found that effective information sharing is

critical for achieving better supply chain performance. Mohr and Spekman (1994) point out that information sharing and being knowledgeable about each other's business, assists the members of a supply chain to maintain longer-term relationships. Uncertainties in the market and the resultant negative impact (e.g., the bullwhip effect) on a supply chain can thus be significantly minimized if supply chain members share more information and knowledge with other members (Yu, Ting, & Chen, 2010; Ogan, 2010). The practice of information sharing within a supply chain also enables firms to significantly reduce supply chain cost and react more promptly to changes in customer needs (Cheng, 2011; Li & Lin, 2006; Li et al., 2006; Huang, Lau & Mak, 2003) and thus provides competitive advantage. The current study examines information sharing practice using five measures such as adoption of formal communication procedure, use of support technologies, keeping each other informed about events that may affect other partner, informing partners in advance of changing needs, and information exchange that helps establishment of business planning.

Although researchers have emphasized the significance of information sharing in SCM, there is a disinclination on the part of organizations in the supply chain to share information with each other (Vokurka & Lummus, 2000) because of the fear of giving away competitive and sensitive information (Ballou, Gilbert, & Mukherjee, 2000; Croom, Romano, & Giannakis, 2000). Certain information may also be withheld from supply chain partners due to lack of trust, (Barrat, 2004). Fawcett et al. (2008) suggest supporting policies and measures, along with technological connectivity, to promote willingness to share relevant information in a timely fashion. In this context, the importance of information quality is increasingly being emphasized to enhance information sharing for the supply chain as a whole.

2.4.3.4 Information Quality

As noted earlier, information sharing is essential for the successful operation of supply chains. Sharing quality information is not only important, but critical, specifically in industries that operate in an environment of changing competitive conditions (Chavez et al., 2012; Christopher & Towill, 2000). Information quality is measured by the extent to which the shared information meets the needs of the sharing organizations (Petersen, 1999). It is important to ensure that the right information is shared with the right supply chain partner in the right format and at the right time. Several important attributes of information quality have been identified in the literature. Cao and Zhang (2011) describe the sharing of information as "the extent to which a firm shares a variety of relevant, accurate, complete, and confidential information in a timely manner with its supply chain partners" (p. 166).

According to Moberg, Cutler, Gross and Speh (2002), accuracy, timeliness, and the appropriate formatting of the information determine its quality. Li et al. (2005), and Li and Lin (2006) measured information quality by timeliness, accuracy, adequacy, completeness, and reliability. Mohr and Sohi (1995) stress the credibility of the source and adequacy of the format in defining information quality. Monczka et al. (1998) assessed five attributes of information quality including timeliness, accuracy, adequacy, completeness and credibility of the communicated information. In a more recent study, Zhou et al. (2014) measured nine aspects of information quality: accuracy, timeliness, availability, internal connectivity, external connectivity, relevance, completeness, accessibility, and information update frequency. In line with the existing research, this study assesses the quality of information using four criteria: timeliness, accuracy, completeness, and adequacy in the context of the apparel industry.

According to Forslund (2007), only a few studies have examined the impact of information quality on process or firm performance within operations management. Wiengarten, Humphreys, Cao, Fynes, and McKittrick (2012) find that the performance impacts of several collaborative supply chain practices (i.e. information sharing, incentive alignment, joint-decision making) significantly varies with the quality of information that is shared across the supply chain. Chavez et al. (2012) emphasize the importance of information quality in SCM practice to improve flexibility and/or cost. Inaccurate and incomplete information will add costs to supply chain operation and may result in poor performance. Sum, Yang, Ang, and Quek (1995) find that data accuracy is critical for operational efficiency and customer service. Chopra and Meindl (2010) suggest that information must be accurate, accessible in a timely manner, and valuable for making supply chain decisions. Low quality information misleads managers, hindering the true picture of a situation and good supply chain decisions.

2.4.3.5 Postponement

Postponement refers to the practice of "moving forward one or more operations or activities (making, sourcing and delivering) to a much later point in the supply chain" (Li et al., 2006, p. 110). Within this practice, firms try to avoid stocking manufacturing products. Instead, they stock component parts and delay manufacturing, assembly or even the design activities of end products until a customer order has been received, specifying which variant is required. This is what Hsuan Mikkola and Skjøtt-Larsen (2004) refer to as 'modularization'. Postponement enables a firm to be flexible in making different variants of the product in order to fulfil changing customer requirements, and to distinguish a product or to modify a

demand function (Waller, Dabholkar, & Gentry, 2000). The reason behind this practice is concerned with the risk and uncertainty costs associated with the differentiation of goods (in terms of form, place, and time), that takes place during manufacturing and logistics operations (Hsuan Mikkola & Skjøtt-Larsen, 2004). By keeping materials or parts undifferentiated for as long as possible in the manufacturing process, firms are able to enhance their flexibility and responsiveness capability in responding to changing customer needs, and improve supply chain cost-effectiveness by lowering inventory requirements through fewer stock-keeping variants (van Hoek, Voss, & Commandeur, 1999; Christopher, 2000; Lee, 2002; Li et al., 2005). A number of factors are relevant while implementing postponement, such as product types and design, market demands, structure or constraints within the manufacturing and logistics systems (Pagh & Cooper, 1998). From a practical perspective, the adoption of postponement may be considered appropriate for innovative products, products with high monetary density, high customization, and broad range; manufacturing or logistics systems with small economies of scale that require no special technology or knowledge; and markets characterized by high demand uncertainty, long delivery lead time and low delivery frequency (Fisher, 1997; Li et al., 2006; Pagh & Cooper, 1998).

2.4.3.6 Lean Systems

The market-driven and highly competitive market has compelled manufacturing firms to look for and adopt new approaches or tools to sustain competitive advantage. One of these approaches is the lean system, which has received extensive acceptance for its great promise in improving operational efficiency (Shah & Ward, 2003; Stock, Boyer & Harmon, 2010). The term 'lean' is used to refer to a system that utilizes minimum input to produce output at the level of a mass production system while ensuring high quality and offering more variety for the end customers (Panizzolo, 1998; Jacobs & Chase, 2014). In the context of supply chains, lean centers on the idea of eliminating waste through continuous improvement and maximizing or fully utilizing the activities that add value from the customer perspective. It emphasizes abolishing or avoiding seven types of waste from the supply chain, as identified by the former president of Toyota, Fujio Cho: (1) overproduction, (2) waiting time, (3) transportation waste, (4) excess inventory, (5) processing waste, (6) unnecessary motion, and (7) production defects (Jacobs & Chase, 2014).

Lean systems involve eliminating waste (in cost, time, etc.) in a manufacturing system which is characterized by reduced set-up time, improved operational procedures, small lot

sizes, and a pull production system (Womack & Jones, 2010; McIvor, 2001; Li et al., 2005). Womack and Jones (2010) suggest five principles of 'lean thinking': precisely specifying the value of products, identifying value streams, ensuring an uninterrupted flow of value, letting customers pull the value from the manufacturer, and pursuing perfection. They also suggest that these principles need to be clearly understood and tied together in order make full use of the lean techniques. Shah and Ward (2003) identified a list of lean manufacturing practices based on a review of the literature: bottleneck removal, cellular manufacturing, competitive benchmarking, continuous improvement programs, cross-functional work teams, cycle time reductions, focused factory production, lot size reductions, JIT/continuous flow production, maintenance optimization, new process equipment/technologies, planning and scheduling strategies, preventive maintenance, process capability measurements, pull production/Kanban, quality management programs, quick changeover techniques, reengineered production processes, safety improvement programs, self-directed work teams, and total quality management. Li et al. (2005) studied lean production systems with five measures including set up time reduction, continuous quality improvement programs, pull production systems, shorter lead-times with suppliers, and streamlining ordering and receiving procedures and other paper works with suppliers. The synergistic effect of these practices is a streamlined, high quality system that produces end products as required by customers with less or no waste (Shah & Ward, 2003). These practices are keys to a highly integrated supply chain that promises cost savings and best value for customers through a more productive working partner relationship. Lean practices must be extended down through the supply chain in order to achieve the complete effectiveness of the lean system (McIvor, 2001). Based on the existing literature, this current research studies lean practices in Bangladesh apparel industry utilizing six constituents practices such as work study program to improve operational efficiency, efficient utilization of machine time, pull production system, streamlining operations, ordering and shipping processes, elimination of wastes, and continuous quality improvement program.

2.5 ANTECEDENTS OF SCM IMPLEMENTATION

According to the extant literature, a number of factors have been explored as major antecedents to SCM implementation. Organizational culture is internal to the firm and considered one of the influencing factors in SCM implementation. There are external influences as well, which are basically various external conditions and forces that create opportunities and threats to the organization, and exert pressure to implement and practice

SCM, such as environmental uncertainty, customer focus, inter-firm trust and commitment and networking. Table 2.3 provides a list of antecedents of SCM implementation, explored in the relevant literature.

Table 2.3: Antecedents of SCM Implementation

Antecedent	Definition	References
Organizational culture	The collection of beliefs, values, and assumptions held by an organization.	Liu, Ke, Wei, Gu, and Chen (2010); Mello and Stank (2005); McDermott and Stock (1999); Lau and Ngo (1996); Leidner and Kayworth (2006); Boddy, Macbeth, and Wagner (2000); Kotzab et al. (2006)
Innovative culture	Organizational environment that supports creativity, innovative behavior, and risk taking.	Baird, Hu, and Reeve (2011); Benitez-Amado, Llorens-Montes, and Nieves Perez-Arostegui (2010); Hurley and Hult (1998); O'Cass and Ngo (2007b)
Supportive culture	Organizational atmosphere that promotes an open and harmonious environment where people tend to be fair, friendly and helpful to each other and to the organization.	Koberg and Chusmir (1987); Liao, Hu, Chen, and Lin (2013); Baird et al. (2011); Prajogo and McDermott, (2011); Khalil, Claudio, and Seliem (2006)
Environmental uncertainty	The source of events and changing trends that pose potential opportunities and risks for individual firms.	Cao and Zhang (2011); Fawcett et al. (2008); Fynes, Burca, and Marshall (2004); Mentzer et al. (2001); Mentzer, Min, and Zacharia (2000); Paulraj and Chen (2007); Richey, Chen, Upreti, Fawcett, and Adams (2009); Williams (1994)
Customer focus	An orientation toward customers as having sufficient understanding of the target buyers' expectations to be able to continuously create superior value for them.	Spekman, Kamauff, and Myhr, (1998); Draaijer (1992); Narver and Slater (1990); Rust, Kordupleski, and Zahorik (1993); Lado, Paulraj, and Chen (2011)
Inter-firm trust and commitment	The degree of trust and commitment between trading partners.	Mentzer et al. (2001); Mentzer et al. (2000); Fawcett, Jones, and Fawcett (2012); Pulles, Veldman, Schiele, and Sierksma (2014); Tan, Kannan, and Handfield (1998); Vijayasarathy (2010); Wu, Chuang, and Hsu (2014)
Networking	A social process where a group of organizational members voluntarily participates in creating and sharing implicit and explicit knowledge	Frambach (1993); Maskell, Bathelt, and Malmberg, (2006); Rogers (1991); Wenger and Snyder (2000)

2.5.1 Organizational Culture

Organizational culture can become either a strength or weakness for a firm when it pursues SCM implementation, depending on nature of the environment in which it operates. It might be considered a weakness if it inhibits the firm from facing competitive threats or from adapting to any environmental changes. This calls for an understanding of the formal

and informal rules of organizational practices to facilitate the execution of strategic changes in the organization (Wallach, 1983; Martin, 1993).

According to Hofstede (1991, p. 262) organizational culture is "the collective programming of the mind which distinguishes the members of one organization from another". Schein (1984) identifies the pattern of cultural elements within an organization as a learned and shared set of responses to the organizational environment, tasks and problems. Research into organizational culture focuses on how organizations carry out collective preferences to advance organizational missions, goals and strategies (Dowty & Wallace, 2010). Lau and Ngo (1996) examined the effects of organizational cultures in developing an understanding of how shared meanings and values held by groups in a society influence business practices. A firm is more likely to adopt a new system or practice if the values embedded in this system or practice fit its organizational culture (Leidner & Kayworth, 2006). Organizational culture is identified as one of the reasons for the failure of inter-organizational relationships, and it may encourage or discourage innovation and collaboration in the context of partnering (Boddy et al., 2000), however, there has been a relative dearth of research linking organizational culture with SCM implementation. Wallach (1983) broadly defined three distinct organizational cultures: bureaucratic, innovative, and supportive cultures. These dimensions of culture are believed to be common to varying extents in all organizations, and considered a useful and measurable typology of organizational culture (Koberg & Chusmir, 1987). This study utilizes the innovative and supportive dimensions of organizational culture to examine their antecedent role in SCM implementation.

2.5.1.1. Innovative Culture

An innovative culture is an organizational environment that supports creativity, innovative behavior, and risk taking (Menon & Varadarajan, 1992). It supports the creation and implementation of new ideas, practices or procedures. Wallach (1983) described innovative culture as dynamic, entrepreneurial, driving, creative, challenging, risk-taking, stimulating and result oriented, and argued that an innovative culture is suitable for an organization which operates in a competitive and dynamic environment. An innovative culture tends to be adaptive and externally oriented, as it focuses on innovation and fosters internally-based competences to adopt new ideas, processes, technological breakthroughs or to take aggressive competitive moves (O'Cass & Ngo, 2007b). This indicates that to attain competitive advantage and to successfully survive in a changing environment, the

implementation of SCM practices must be supported by an innovative culture. Most research has tended to focus on innovative activities and their links with organizational characteristics, or examined particular aspects of innovative capability, such as product innovation (Wang & Ahmed, 2004). Research that directly links integrated SCM implementation with innovative culture is sparse.

An organization whose culture is characterized by creativity, entrepreneurship, and adaptability to the external environment is likely to be able to handle uncertainty and exploit unique market opportunities (O'Cass & Ngo, 2007a; Stock & McDermott, 2000). 'Innovativeness' can be considered a complementary transformational resource, as it implies that an organization is proactive through the exploration of new opportunities rather than merely the exploitation of existing strengths (Menguc & Auh, 2006). Resource based theory suggests (for full theoretical discussion, see Section 2.7) that innovative firms secure competitive advantage by leveraging their core capabilities in a unique and better way (Barney, 1991). According to Teece et al. (1997) a firm's dynamic capabilities reflect its ability to gain innovative forms of competitive advantage through the integration, development, and reconfiguration of internal and external competences in response to a changing environment. To remain competitive in a constantly changing marketplace environment, firms adopt new practices, systems, work methods, and strategic orientation, and encourage continuous learning and innovation among employees to achieve strategic goals of the firm.

2.5.1.2. Supportive Culture

The supportive culture of an organization provides an atmosphere which promotes an open and harmonious environment where people tend to be fair, friendly and helpful to each other and to the organization (Koberg & Chusmir, 1987). Wallach (1983) described a supportive culture as trusting, equitable, encouraging, relationship-oriented, and collaborative. These values influence employee involvement in teamwork, participation in decision making, and engagement in free communication (Hartnell, Ou, & Kinicki, 2011). These behaviors in turn lead to collective employee attitudes that facilitate cross-functional coordination, and the enhancement and optimization of a firm's internal resources and business processes (Roh, Hong, & Park, 2008). Liao et al., (2013) examined the relationships between organizational culture, knowledge transfer, and innovation capability. They concluded that organizations should emphasize supportive culture in order for employees to be able to improve their acceptability of new concepts and the achievement of various

aspects of innovation, such as products, procedures, management and strategies, through mutual support and collaboration.

The culture of an organization can be said to be supportive of supply chain collaboration if the norms, beliefs, values and organizational practices in the organization facilitate joint effort, information exchange, knowledge productivity, and cooperation with other parties in a supply chain (Wuyts & Geyskens, 2005; Boddy et al., 2000; Li, 2007; Hart, 2004; Abraham & Leon, 2006). During SCM implementation, these values may influence critical decisions and emerging norms, such as how and what SCM practices should be implemented and integrated internally and externally with trading partners.

2.5.2 External Influences

There are external influences which are basically various external conditions and forces that create opportunities and threats to the organization, and involve pressure to implement and practice SCM, such as environmental uncertainty, customer focus, inter-firm trust and commitment, and networking. These are explored as major antecedents for encouraging SCM implementation factors.

2.5.2.1 Environmental Uncertainty

Uncertainty is a common feature of today's business environment. Environmental uncertainty can be defined as the source of events and changing trends that pose potential opportunities and risks for individual firms (Turner, 1993; Lenz, 1980). The concept of uncertainty has involved different definitions in the literature, including ideas such as complexity, unpredictability, variability, dynamism, and vulnerability (Chavez et al., 2012; Clark, Varadarajan, & Pride, 1994; Kara & Kayis, 2004; Prater, Biehl, & Smith 2001). According to Daft (2004), environmental uncertainty means that decision makers have limited information about environmental forces and face difficulties in predicting external changes. As suggested by Matson and McFarlance (1999), uncertain changes occur "internally or externally to a production system, which can affect its operational performance", and are "either outside its control" or have "not been planned by the system" (p. 767). Several factors contribute to marketplace uncertainty, such as global sourcing trends, on-time and quality based competition, the proliferation of product varieties, and rapidly changing technology and economic conditions (Mentzer, 2001; Candace, Ngai, & Moon, 2011). Environmental uncertainty makes it difficult for manufacturing firms to anticipate and respond to future events. Changes in the supplier market, customer requirements, products, production

technology and processes, and competition can affect a firm's ongoing business practices with its trading partners.

According to Davis (1993), three different sources of uncertainty are prevalent in supply chains: demand uncertainty, supply uncertainty and technological uncertainty, which have been adopted by a number of researchers, such as Wong and Boon-itt (2008), Chen and Paulraj (2007, 2004) and Li (2002). Ettlie and Reza (1992) saw perceived environmental uncertainty as unexpected changes in customers, competitors, suppliers, and technology in the manufacturing sector. Following this line of research, this study conceptualizes environmental uncertainty as unknown or unplanned changes in terms of demand, supply, technology, and competition. Demand uncertainty involves changes and unpredictability associated with quantity, timing, and product characteristics of customer demand (Fynes et al., 2004; Ho, Chi, & Tai, 2005). Generalizing from previous studies, Ho et al. (2005) list a number of issues on the demand side that should be considered while examining demand uncertainty, such as rate of new product introduction, product variety, product lifecycle, lead-time from design to production, accuracy of demand forecasts, predictability of product demand etc. Supply uncertainty arises from timely delivery performance, average lateness and degree of inconsistency (Davis, 1993). It can be measured by examining a supplier's product quality and delivery performance (Chen & Paulraj, 2004). Technology uncertainty refers to the degree of technological changes evident within the industry (Chen & Paulraj, 2004). In today's environment, the increased rate of change and innovation in technology greatly impacts the ability of manufacturing firms to remain competitive in the marketplace. Competition uncertainty results from change and unpredictability associated with business competition. Increasing global competition continues to exert pressure on manufacturing firms to reduce cost, speed up product development, and improve product quality and variety. Competition in the apparel industry is perceived as fierce; therefore, uncertainties arising from competitors are considered critical in the context of supply chains (Candace et al., 2011). Firms tend to have vulnerable strategic position in highly competitive markets as they offer low margins and little opportunity for product differentiation. To enhance competitiveness, firms need to seek out effective ways of handling uncertainty as a result of the external environment.

2.5.2.2 Customer Focus

Customer focus is paramount to a firm's market success in today's business environment. A firm's negligence of its customers may lead to a vulnerable position despite

the adoption and use of the state-of-the-art process improvement techniques and effective management (Rust et al., 1993). Indeed, the increasing pressure to streamline operational processes has been largely due to customer demand for a wide variety of quality products within short lead times (Draaijer, 1992). Mokhtar (2013) defines customer focus as the function of identifying customer needs and satisfying them in attaining the organization goals. Bharadwaj, Nevin, and Wallman, (2012) construe customer focus as "a market-sensing capability which manifests itself in the key organizational processes (i.e., intelligence generation and continual performance assessment) and values (i.e., a customer orientation serves as the guiding principle)" that allow the customer requirements "to be heard throughout the organization" (p. 1013). Narver and Slater (1990) describe an orientation toward customers as having sufficient understanding of the target buyers' expectations to be able to continuously create superior value for them. They emphasize the suppliers understanding of the buyer's current and evolving value chain, given the internal and market dynamics. Since customer needs are dynamic in nature, firms should regularly assess them and make the necessary adjustments to their operations (Chen & Paulraj, 2004). Learning about the customers and the competitive market environment, and promoting a value system within the organization that prioritizes the customers' interest in strategic and tactical planning and decision making enhances a firm's competitive capabilities in terms of market needs anticipation and satisfying them by delivering superior value (Deshpandé, Farley, & Webster, 1993; Day, 1994; Bharadwaj et al., 2012). Deshpandé et al. (1993) stress the need to assess a firm's performance through the eyes of its customers, as they may define problems differently, and thus call for different solutions. Specifically, the more a firm is adept at incorporating customer requirements, the more influence it will have on customer perceptions as to the solution that it delivers relative to alternative sources (Bharadwaj et al., 2012). This leads to enhanced customer satisfaction which, in turn, affects the buyer's willingness to continue business with them. Customer satisfaction is the main focus of any business, and is emphasized in this strategy. In short, customer focus guides firms in managing business operations efficiently and effectively to create superior value, and, therefore, can be considered a unique resource by RBV (Li, Chau, & Lai, 2010; Hsieh, Tsai, & Wang, 2008; Liu et al., 2013).

Chen and Paulraj (2004) operationalized this theoretical construct based on the importance given to the practice of strategic planning, quality improvement initiatives, product customization, and responsiveness. Some researchers have conceptualized customer focus as an 'outcome' construct (e.g., Hines, 1996; Das & Narasimhan, 2000). Lado et al. (2011) conceptualized customer focus as one of the key drivers of supply-chain relational

capabilities and performance, however, there is a dearth of research addressing the question of the extent to which customer focus influences the implementation of SCM practices. The present study examines whether customer focus drives SCM implementation in apparel manufacturing firms.

2.5.2.3 Inter-firm Trust and Commitment

Trust and commitment are often referred to as the key foundations of inter-firm relationships. These factors serve as a driver for connecting organizations within a network. Mentzer et al. (2001) developed an SCM model in which they identify trust, commitment, shared vision, and organizational compatibility as the prerequisites of implementing a supply chain orientation across the firms in pursuing SCM. Trust and commitment are essential in building long-term cooperative relationships between trading partners and accruing mutual rewards (Tan et al., 1998; Vijayasarathy, 2010). The underlying notion is that with the existence of trust, trading partners are more willing to collaborate.

Ballou et al. (2000) describe trust as "a general expectancy held by a channel member that the word of the other can be relied upon" (p. 16). This means that trust is the belief of one party that the other exchange partner is reliable or dependable. The presence of trust creates a congenial working atmosphere for the partnering firms as it reduces risk and uncertainty, improves the reliability of contracts, and encourages inter-firm cooperation (Wu et al., 2014). A number of different trust dimensions have appeared in the literature, such as benevolence, altruism, integrity, ability, faith, reliability, confidence, credibility, predictability, openness, fairness, capability, know-how, mutual respect, and a partner's unique knowledge and competence (Laeequddin, Sahay, Sahay, & Waheed, 2010; Doney & Cannon, 1997; Svensson, 2001; Min & Mentzer, 2004). Trust is generally considered to consist of two distinct components: credibility and benevolence (Ganesan, 1994; Cullen, Johnson, & Sakano, 2000; Doney & Cannon, 1997; Fawcett et al., 2012). Credibility is the rational or practical component of trust, which is based on the extent to which one party believes that the other party has the intent and required capability to perform the job effectively and reliably. Benevolence is the emotional or subjective component of trust, which is based on the extent to which one party believes that the other party will act fairly and will not take unfair advantage in changed circumstances (Ganesan, 1994; Cullen et al., 2000). Credibility focuses on the exchange partner's competence and reliability, and benevolence relates to the motives and intentions of the exchange partner. The empirical evidence of Fawcett et al. (2012) maintains that even though benevolence underlies trust in personal relationships,

trust in a supply chain context is capability-based. Given today's intensely competitive marketplace, two types of capabilities are emphasized: performance capability and relationship commitment capability.

In addition to trust, commitment is an important factor that reflects the willingness of trading partners to take a long-term orientation of their relationship (Ganesan, 1994; Vijayasarathy, 2010). Commitment is an enduring aspiration to maintain a valued relationship, and involves willingness to invest resources in the partnership (Mentzer et al., 2000). It means using maximum effort to make the partnership work and suggests a future orientation in which partners shows a willingness to go beyond mere contractual obligations (Cullen et al., 2000). Commitment is therefore (a) a key success factor for a strategic partnership in realizing long-term benefits; (b) indicates an intention to become more closely involved in the partnership through investment and risk sharing; and (c) signifies the importance of the relationship to the partners (Mentzer et al., 2000). It results in mutual respect for both the parties and drives them toward pursuing a common goal in a competitive environment (Yang, Wang, Wong, & Lai, 2008). Without commitment, inter-firm relationships turn out to be fragile and vulnerable (Kwon & Suh, 2005). As such, enduring commitment is fundamental to successful SCM implementation.

2.5.2.4 Networking

Networking can be defined as a social process where a group of organizational members voluntarily participates in creating and sharing their implicit and explicit knowledge (Jeon, Kim, & Koh, 2011a; Wenger & Snyder, 2000; Braun, 2002) and enables participants to take effective action and to create knowledge within their circumstances. Through regular participation in these collaborative, interactive informal networks, organizations may learn and acquire important information, and even find suitable partners to complement their needs (Maskell et al., 2006). A similar concept is the 'communities of practice' in the domain of knowledge management (Jeon et al., 2011a; Du Plessis, 2008; Wenger, McDermott, & Snyder, 2002) which is increasingly viewed as the fundamental means to promote and enhance knowledge sharing, learning and integration within organizations (Zboralski, 2009; Lesser & Storck, 2001). As firms now consciously support and leverage relevant knowledge, networking supports firms in linking their internal networks with external sources of knowledge. The role of these networks is the finding and sharing of best practices, stewarding knowledge, and supporting their members to work better (Vestal & Lopez, 2004).

Networking can exist internally within an organization or externally across organizational boundaries (Allen, James, & Gamlen, 2007; Paiva, Roth, & Fensterseifer, 2008). They may be formed by formal initiatives within the organization or informally as individuals come together to exchange their knowledge. They are dynamic in nature and evolve over time (Du Plessis, 2008; Jeon et al., 2011a). Members accumulate knowledge through their face-to-face or virtual interactions by sharing information, insight, advice and ideas (Du Plessis, 2008; Lesser & Storck, 2001). This knowledge leads to the development of a common set of approaches, practices, techniques, tools, methodologies and approaches (Wenger et al., 2002; Hinton, 2003). The constructed understanding assists in transferring knowledge and innovation across the organizational boundaries and incorporating them into the firm's business strategy (Du Plessis, 2008).

Knowledge and information transfer have become increasingly important for firms all over the world (Drucker, 1993), and networking offers a vehicle for knowledge diffusion (Storck & Hill, 2000). SCM implementation often involves transferring the business knowledge incorporated in adopting organizations. The building of knowledge acquisition capabilities within a firm creates an organization with efficiency, that is innovation driven and responsive to changing competitive conditions (Quinn, 1992; Hinton, 2003). Frambach (1993) suggests that "the participation of members of an organization in an informal network of relations facilitates the spread of information on a certain innovation" (p. 25). He argues that the possibility of an organization implementing an innovation increases with its members' extensive participation in informal networks. He further argues that the extent of certain stages in the adoption process is dependent on information availability and absorption capacity. An organization's absorptive capability (i.e., learning capability) reflects its ability to evaluate, adopt, and strategically leverage external knowledge and may influence the extent of innovation adoption and implementation (Wu, Zsidisin, & Ross, 2007; Cohen & Levinthal, 1990). Networking can thus be considered one of the antecedents of SCM implementation.

Based on the notion of the RBV, networking may be seen as a resource that focuses on firm strengths that are rooted in the employee connections or social structure within and across firms (Jarvenpaa & Leidner, 1998). It provides access to information that might not otherwise be available and allows firm to take proactive action to identify and exploit opportunities (Burt, 1997). Eisenhardt and Schoonhoven (1996) observed that a firm's ability to form strategic alliances was dependent on the personal and social networks of its top management. However, there is no empirical study that examines the role of networking in SCM implementation. Braun (2002) points out that service firms are markedly more likely to

be involved in formal and informal networking than manufacturing firms. Therefore, this study attempts to examine the antecedent role of networking in the adoption of SCM practices in a manufacturing context, specifically in the Bangladesh apparel industry.

2.6 OUTCOMES OF SCM PRACTICE

The outcomes of SCM practice involve the real benefits or impacts that the adopting firms believe they have received from practicing SCM (Rogers, 2003; Iacovou, Benbasat, & Dexter, 1995). The current study assumes that these impacts are reflected as outcomes of sound SCM practice in the form of supply chain relationship quality, supply chain agility, and competitive advantage.

2.6.1 Supply Chain Relationship Quality

Supply chain relationship quality (SCRQ) is a less researched area, and related empirical research has primarily focused on the nature of relationship processes (Fynes & Burca, 2005) rather than the impact of SCM practice. DeWulf, Odekerken-Schröder, and Iacobucci (2001, p. 36) refer to 'relationship quality' as "an overall assessment of the strength of a relationship". Lee and Kim (1999) used the term 'partnership quality' and defined it as how well the outcome of a partner relationship matches the expectations of the participants. Johnson (1999) describes relationship quality as "the overall depth and climate of the inter-firm relationship" (p. 6). Although there is no agreement on the definition, the essence of relationship quality is a "belief in the integrity and reliability of the other party" (Jap, 2001, P. 88). These beliefs are reflected in (1) assessment of the current relationship, and satisfaction with the collaboration and outcome fairness, and (2) future expectations of the relationship, and willingness to collaborate in the future. In short, SCRQ is an overall assessment of the current relationship strength. The strength of the current relationship is a function of the satisfaction of the working relationship with supply chain partners, an organization's perceived fairness in receiving outcomes and gains from the collaboration, and an organization's willingness to engage in mutual endeavors again, if the opportunity arises. This study adapts Jap's (2001) conceptualization of relationship quality, which refers to the extent of a firm's perceived satisfaction with the outcomes from the collaboration with its trading partner, perceived outcome fairness and willingness to collaborate in the future. Since firms involved in a supply chain need to work with each other on a recurrent basis, handling inter-firm relationships is becoming more important. An

organization's previous behaviors relating to working relationships will develop its reputation, which influences its future cooperation with other organizations (Jap, 2001).

While new relationships where trust has not yet been established involve new roles and processes, and high cost in terms of time, uncertainty and temporary inefficiency, well-established relationships of longer durations are based on stable ties where partners are familiar with each other's operational procedures and performance expectations (Fynes, Burca, & Mangan, 2008). A study of buyer-supplier relationship governance by Liu et al., (2009) revealed that transactional mechanisms (i.e. formal contracts) are more effective in preventing opportunism, while relational mechanisms such as inter-organizational trust and relational norms are more powerful in enhancing relationship performance in the form of increased sales volume, market share, discounts and marketing support from a particular relationship. The literature on channel relationships indicates that the satisfaction of a channel member is important in increasing morale, and cooperation between channel members, lowering the number of relationship terminations and reducing litigation (Ganesan, 1994). Lee and Kim (1999) investigated partnership quality in outsourcing success and found that active participation, information sharing, and information quality contribute positively to partnership quality. However, they reported that partnership quality was not significantly related to the extent of joint activities (such as long-range planning, product design, quality control design, and training), coordination, and cultural similarity. This instigated the further investigation of the association between integrated SCM practice and SCRQ. There is also a paucity of empirical research considering SCM practice as an antecedent of SCRQ. This study investigates the impact of SCM practice on SCRQ, and the antecedent role of SCRQ on SCA. This research also investigates the mediating role of SCRQ in the association between SCM practice and SCA.

2.6.2 Supply Chain Agility

Agility has become an issue of enormous importance in the apparel sector due to the trend of increased global sourcing, high levels of price competition, shorter product lifecycles, market volatility and high demand uncertainty in the marketplace (Bruce et al., 2004; Agarwal et al., 2007). Firms require agility in their supply chains to manage marketplace changes, and provide superior value and uninterrupted services to customers by rapidly responding to these changes (Braunscheidel & Suresh, 2009). This study assumes supply chain agility (SCA) as the desirable outcome of SCM practice and examines its mediating effect on the competitive advantage of a firm. Swafford, Ghosh, and Murthy (2006a) identify

SCA as an outcome or externally focused concept, and it is therefore viewed as a capability. To be competitive, manufacturers need to develop agile supply chain capabilities by focusing on quickly responding to the unique customer and market needs. The RBV perspective suggests that firms operating in markets characterized by uncertainty and continuous change requires dynamic capabilities to sustain competitive advantage (Barney, 1991; Wernerfelt, 1984). These capabilities include the ability of the firm to recognize new opportunities and evolving environmental changes, and adapt, integrate, and reconfigure internal and external resources to quickly respond to these changes (Teece et al., 1997; Hamel & Prahalad, 1994). Since mobilising and obtaining the required resource competencies are often challenging, firms strive to collaborate and leverage the complementary competencies of the supply chain partners (Yusuf et al., 2004). An agile supply chain enables its partners to sense, respond rapidly to, and exploit predicted or unforeseen changes in demand and the marketplace environment (Sharifi & Zhang, 2001). This implies that SCA reflects the firm's capability to compete on the basis of market responsiveness, however, there is no agreement on the definitions of SCA in the supply chain literature. van Hoek et al. (2001) disputes that there is a lack of insight into SCA as researchers have emphasized manufacturing agility rather than SCA. From a manufacturing perspective, Yusuf et al. (2014) define agility as the "successful adoption of competitive bases (speed, flexibility, innovation proactivity, quality, and profitability) through the integration of reconfigurable resources and best practices in a knowledge rich environment to provide customer-driven product and services in an uncertain market settings" (p. 532). Khan and Pillania (2008) describe SCA as the ability of a firm's internal supply chain functions to secure strategic advantage by responding to marketplace uncertainty. Christopher (2000) suggests that SCA represents a firm's capability to rapidly handle the changes in customer demand in terms of volume and variety. Although, numerous distinct issues are highlighted in the existing definitions, there are themes which are common to all definitions. In this study, a firm's SCA is defined as the capability of a firm, internally, and in collaboration with its key customers and suppliers, to adapt or respond quickly and effectively to changes in customer and competitive demands in dynamic and continually fragmenting markets (Baramichai et al., 2007; Lee, 2004; Braunscheidel & Suresh, 2009). Again, there is a conceptual confusion between agility and flexibility in the supply chain literature. It is thus important to recognize the difference between these two concepts. Differences are also evident in the literature. According to Goranson (1999), flexibility is the planned adaptation to unforeseen yet expected external circumstances, whereas agility is the unplanned and unscheduled adaptation to unexpected and unforeseen external circumstances. Baker (1996) finds that the real difference lies in the level of application of the

concept, agility placing greater focus on the strategic levels, whilst flexibility is most often associated with the operational levels. He further argues that flexible operations are needed to provide 'agility' at the organizational and business network levels. Prater, Biehl, and Smith (2001) identify flexibility as relating to adaptability and versatility; on other hand, agility is more focused on speed or the time required to adapt (Manders, 2009; Swafford et al., 2008; Prater et al. 2001). Swafford et al. (2008) showed that achieving SCA is a function of other capabilities within a firm, specifically supply chain flexibility and IT integration. This study conceptualizes flexibility as one of the important dimensions of SCA.

Although some researchers (e.g., Swafford et al., 2008; Khan & Pillania, 2008) define SCA as a unidimensional concept, many researchers (Braunscheidel & Suresh, 2009; Li et al., 2009; Lin et al., 2006; Gligor, Holcomb, & Stank, 2013) operationalize it as a multi-dimensional concept. Researchers in the operations management discipline emphasize different capabilities such as flexibility/adaptability, speed, visibility, demand response, joint planning, integration, customer responsiveness and opportunity seeking capability, in order to measure agility in the supply chain (Pandey & Garg, 2009; Braunscheidel & Suresh, 2009; Gunasekaran et al., 2008; Li et al., 2009). While, a few studies have examined the relationship between several individual supply chain initiatives and dimensions underlying SCA, the specific dimensions differ from study to study. These dimensions are not necessarily distinct from each other (Gligor et al., 2013); rather, they are interrelated and complementary. Lin et al. (2006) identified four major capabilities of SCA, such as responsiveness (i.e. the ability to identify changes and respond to them quickly), competency (i.e. the ability to realize firm objectives effectively and efficiently), flexibility/adaptability (i.e. the ability to implement various processes and apply different facilities to accomplish the same objectives), and quickness/speed (i.e. the ability to complete an activity as fast as possible). Similar dimensions were also used by Li, Chung, Goldsby, and Holsapple (2008), in developing a framework for 'agility capabilities', specifying the required strategic abilities to deal with changes. Agarwal et al. (2007) identified a total of 15 variables for developing a framework for improving SCA. These variables include market sensitivity, delivery speed, new product introduction, data accuracy, use of IT tools, centralized and collaborative planning, process integration, lead-time reduction, cost minimization, service level improvement, quality improvement, customer satisfaction, uncertainty minimization, and the minimization of resistance to change. To be truly agile, according to Christopher (2000), a supply chain must possess four distinguishing characteristics: (1) market sensitivity, which refers to the capability of sensing and responding to real demand; (2) information driven virtual integration through the use of IT; (3) process integration, collaborative work between buyers

and manufacturers, joint activities, common systems, and shared information, and lastly (4) the network, which means linking all supply chain partners as one entity rather than remaining stand-alone entities. Li et al. (2009) maintained that SCA has two key dimensions, alertness to change and response capability, at three levels, strategic, operational, and episodic. Braunscheidel and Suresh (2009) operationalized a firm's SCA as a second-order construct consisting of the first-order dimensions of demand response, joint planning, customer responsiveness, and visibility. Similar dimensions of agility were later used by Chiang, Kocabasoglu-Hillmer, and Suresh (2012) in their study of strategic sourcing and flexibility. Through a review of the various definitions of agility in the existing literature, Yusuf et al. (2014) derive four common themes: customer sensitivity, network integration, process integration, and leveraging the impact of people and information. Using similar factors to those in the definitions of agility, and according to past research (Braunscheidel & Suresh, 2009; Christopher, 2002; Pandey & Garg, 2009; van Hoek et al., 2001), the current study modifies and adopts demand response, flexibility, integration, and customer responsiveness as the four distinct dimensions of SCA, considering their relevance and importance in the apparel supply chain. These dimensions highlight the dynamic capabilities of a supply chain which enable firms to adapt or quickly respond to environmental changes (Teece et al., 1997; Hamel & Prahalad, 1994; Amit & Schoemaker, 1993). Each of these dimensions is discussed in the following sub-sections. Table 2.4 provides a list of the SCA dimensions used in previous literature.

Table 2.4: A List of Supply Chain Agility Dimensions

Supply Chain Agility Dimensions	Author(s)
Market sensitivity, virtual integration, network based, process alignment	Christopher (2000); Christopher, Lowson, and Peck, (2004)
Responsiveness, competency, flexibility/adaptability, quickness/speed	Lin et al. (2006); Li et al. (2008)
Strategic alertness, strategic response capability, operational alertness, operational response capability, episodic alertness, and episodic response capability	Li et al. (2009)
Demand response, joint planning, customer responsiveness, visibility	Braunscheidel and Suresh (2009); Chiang et al. (2012)
Alertness, accessibility, decisiveness, swiftness, and flexibility	Gligor et al. (2013)
Customer sensitivity, network integration, process integration, and leveraging the impact of people and information	Yusuf et al. (2014)

Paulraj and Chen (2007) concluded that organizations increase agile capability with enhanced strategic buyer-supplier relationships. Postponement and the decoupling of information have been seen as relevant initiatives in making the supply chain a reality (Gunasekaran et al., (2008). Ledyard and Keough (2007) described the case of a firm which improved agility through better information sharing with its suppliers. In the empirical work of Braunscheidel and Suresh (2009), organizational practices such as internal and external integration with key suppliers and customers, and external flexibility were shown to have a significant positive effect on a firm's SCA. Studies examining the impact of integrated SCM practice (which comprehensively incorporates upstream and downstream components of supply chain) on SCA are lacking, however. The notion of SCA is seen in the literature as an important weapon for manufacturing organizations in achieving strategic advantage in a competitive environment of continuous and unpredictable changes (Lancioni, 2000; Tan et al. 2002). In line with the above arguments, it is therefore proposed that SCA as a business capability is an outcome of SCM practice, and is a possible mediator between SCM practice and a firm's competitive advantage. This research investigates the impact of SCM practice aimed at augmenting the SCA of a firm, and explores whether SCA is a possible mediator between SCM practice and a firm's competitive advantage.

2.6.2.1 Demand Response

Demand response is defined as the ability to anticipate or handle changes in market demand (Braunscheidel & Suresh, 2009). It reflects the ability of a firm in conjunction with its key suppliers and buyers to acquire information about marketplace changes, and improve the accuracy of demand information and opportunities which enable them to collectively develop a more effective demand response strategy and improve customer responsiveness (Chiang, Kocabasoglu-Hillmer, & Suresh, 2012; Flynn, Huo, & Zhao, 2010). This helps a manufacturer reduce product design and production planning time, and inventory obsolescence, enhancing the demand response capability (Flynn et al., 2010). This capability also assists firms in meeting customer expectations whilst predicting or attenuating supply challenges in meeting customer demand (Fisher, 1997). Li et al. (2008) stress two complementary attributes in defining SCA: alertness to changes, and response capability to changes. The alertness component highlights agility as an opportunity-seeking capability, to detect changes in the marketplace, and sources of demand and supply, while the response capability reflects the supply chain's capability to use resources in proactively or reactively responding to these changes in a timely and flexible manner. The timely awareness of change is identified as one of the triggers of effective responses (Holsapple & Jones, 2005; Gligor et al., 2013). Yusuf et al. (2014) suggest that the ability to capture demand information rapidly improves a firm's speed of response. A firm's supply chain capability to respond to demand is enhanced by the ability to detect and estimate change in market demand and opportunity, (Fisher, 1997).

2.6.2.2 Flexibility

Flexibility is identified as a key agility dimension (Gligor et al., 2013). Agility in the apparel supply chain is achieved by flexible operations which are capable of handling frequent product specification changes in the production line (Lee & Kincade, 2003). Flexibility is described as an internal competency that reflects a firm's ability to adapt and respond to changes (Li, 2002; Braunscheidel & Suresh, 2009). It indicates how well a firm is able to meet market needs without excessive cost, organizational disruption or loss of performance (Aggarwal, 1997). Swafford et al. (2006a) define flexibility in terms of three critical supply chain processes: procurement/sourcing, manufacturing, and distribution/logistics. Vickery, Calantone, and Droge (1999) suggest that supply chain flexibility can be measured by five dimensions: product flexibility, volume flexibility, new product introduction or launch flexibility, distribution flexibility, and responsiveness to target

markets. Product flexibility refers to the ability to customize products to meet customer specifications (Vickery et al., 1999). Volume flexibility is the ability to adjust capacity to effectively increase or decrease production in response to customer demands without negatively impacting the cost, quality or service (Vickery et al., 1999; Braunscheidel & Suresh, 2009). In the same way, Tomlin (2006) describes volume flexibility as the amount of excess capacity that becomes available, and the promptness with which it becomes available when there is supply disruption. New product introduction or launch flexibility is reflected in the ability to quickly introduce completely new or revised products and product varieties (Vickery et al., 1999). Distribution or access flexibility is the ability to effectively provide widespread distribution coverage, and, lastly, responsiveness to target markets refers to the overall ability to respond to the target market's needs (Vickery et al., 1999). In short, flexibility is an adaptive response to the uncertainty arising from supply side, internal processes, and the customer side, which is reflected in the firm's ability to operate efficiently at varying output levels, to implement changes in product design for customization purposes, in the fast development of new products, and to reduce delivery lead times in response to changing market needs and demands (Narasimhan & Das, 1999; Vickery et al., 1999; Braunscheidel & Suresh, 2009). Since customers continuously seek product variety, competitive prices, better quality, and faster delivery, manufacturing firms are required to make design changes quickly and respond promptly to customer needs to keep themselves ahead of their competitors in today's competitive environment.

2.6.2.3 Integration

In pursuit of agility in the supply chain, integration, in addition to flexibility, is a critical factor in ensuring a connected and coordinated response to meet unpredicted changes (Braunscheidel & Suresh, 2009). It is concerned with the sharing of resources, risk, and knowledge between supply chain partners (Kim, Cavusgil, & Calantone, 2006). The goal is to provide maximum customer value at low cost and greater speed through effective and efficient flows of products and services, information and knowledge, money and decisions (Flynn et al., 2010). Frohlich and Westbrook (2001) recognized two interrelated forms of integration employed by manufacturing firms: the first type of integration involves the coordination and integration of the forward physical flow of deliveries between suppliers, manufacturers, and customers; the second type of integration involves the backward coordination of information technologies and the flow of information from customers to suppliers.

The current study defines integration as the extent to which business processes or activities across departments or functions within an organization, and with its customers and suppliers are integrated (Stock, Greis, & Kasarda, 2000; Narasimhan, Swink, & Viswanathan, 2010; Paulraj & Chen, 2007; Flynn et al., 2010). A greater extent of supply chain integration is a desired outcome of the SCM practice. There are several different interpretations, and classifications of supply chain integration (Flynn et al., 2010). Supply chain integration is generally broken into internal and external integration (Stock et al., 2000; Braunscheidel & Suresh, 2009; Pagell, 2004; Narasimhan et al., 2010; Flynn et al., 2010). Internal integration involves the integration of all internal functions, and these functions are expected to operate as part of an integrated process (Stock et al., 2000; Flynn et al., 2010). The success of internal integration revolves around the ability of merging various operational activities and practices into one synchronized, synergistic process that involves a great amount of cross-functional planning, communication and coordination to achieve enhanced supply chain performance (Su & Yang, 2010; Khan & Pillania, 2008). Integration with both suppliers and customers is commonly referred to as external integration, and is reflected in the extent to which a manufacturing firm develops collaborative relationships, shares information and knowledge, and jointly plans and coordinates supply chain activities with its external supply chain partners (Danese, Romano, & Formentini, 2013). Yusuf et al. (2004) point out that building external competence through supply chain integration, which facilitates the seamless flows of resource coalitions, is necessary for enhanced competitive performance.

The need to respond to marketplace changes is crucial for manufacturing firms, specifically for those that operate in the apparel sector. Supply chain integration plays a critical role in meeting this need (Kim, 2009). The literature identifies the lack of effective internal and external integration as the root cause of some of the common problems faced by manufacturing firms, such as supply shortages, quality and delivery problems, and cost surges (Wong & Boon-itt, 2008; Welker, van der Vaart, & van Donk, 2008; Kim, 2009). A highly integrated supply chain enables firms to effectively handle these problems and meet customer needs faster and more efficiently, while maintaining their profitability. The level of supply chain integration is thus a real representation of a firm's SCA capabilities (Wu, Yeniyurt, Kim, & Cavusgil, 2006).

2.6.2.4 Customer Responsiveness

Responsiveness is one of the key capabilities enhancing agility in a supply chain (Swafford et al., 2008). According to Bernardes and Hanna (2009), to achieve competitive

advantage, responsiveness is one of the most important capabilities for manufacturing firms competing in markets influenced by international competition, shorter product life-cycle, and increasingly demanding customers. In the context of the international supply network, problems due to a lack of responsiveness, such as delay in deliveries, longer lead time, and the inability to promptly address customer requests, may quickly create further problems that can cascade through the chain (Danese, Romano, & Formentini, 2013). As suggested by Meehan and Dawson (2002, p. 32), customer responsiveness is "about being fast and right. The value of being right is obvious - customers get something that meets their needs. But the value also depends critically on the speed with which the response is produced".

In this study, customer responsiveness is defined as the capability for promptness and adequacy in responding to customer needs and wants (Holweg, 2005; Charles, Lauras, & Van Wassenhove, 2010; Swafford et al., 2008). Su and Yang (2010) describe responsiveness as the effective and efficient accommodation of unique customer requests. Charles et al. (2010) break down responsiveness into three capabilities: reactivity, velocity and visibility, and argue that they all enable firms to provide a prompt and adequate response to short-term changes. Christopher et al. (2004) maintain that a firm's success or failure in fashion markets is largely determined by two capabilities, flexibility and responsiveness. They identify several attributes of responsiveness, such as short time-to-market, the ability to quickly scale up (or down) and the fast incorporation of customer preferences into the design process. Although there is no consensus on definitions, the distinction between flexibility and responsiveness can be drawn from the literature. While flexibility refers to the ability to adapt to internal or external influences, responsiveness is the ability to quickly address changes and customer requests (Holweg, 2005). It is suggested that a number of measures are included in assessing customer responsiveness, such as lead time, order fill rate, stockout probability, total cycle time, average backorder levels, total response time for an order, and the timeliness of an order (Lee & Billington, 1992; Beamon, 1999). It is suggested that responsiveness can be improved through flexibility and integration efforts (Danese at al., 2013; Hallgren & Olhager, 2009; Flynn et al., 2010). The overall objectives of supply chain strategy should be to become increasingly responsive to customer needs and create superior value for the customers (Owens & Richmond, 1995). Thus, customer responsiveness can be considered an important dimension of SCA, reflecting the outcome measurement of SCM practice.

2.6.3 Competitive Advantage

This study proposes competitive advantage as a desired consequence of well-implemented and practiced SCM. Competitive advantage is defined as the extent to which a firm is capable of creating a defensible position over its competitors (Terpend, Tyler, Krause, & Handfield, 2008; Li et at., 2006). RBV suggests that a firm's competitive advantage lies in its heterogeneity due to the value and distinctiveness of its unique resources (Barney, 1991). According to Hofer and Schendel (1978), competitive advantage is achieved through the unique position a firm attains, relative to its competition, by deploying its resources and capabilities. There are potential capabilities that differentiate a firm from its competitors, which are the result of critical management decisions (Tracey et al. 1999). In a research framework based on the prior literature, Koufteros et al. (1997) identify five dimensions of competitive capabilities: competitive pricing, premium pricing, value-to-customer quality, dependable delivery, and product innovation. In the context of export oriented manufacturing firms, Kaleka (2002) points out that firms achieve competitive advantage in relation to the combination of three types of advantages: cost advantage which is associated with production cost and selling price; service advantage which is related to after-sale service, delivery speed and reliability, and product line breadth offered; and product advantage which is defined by superior quality, design and other features offered to customers in comparison to the competitors. The important competitive capabilities which are generally found within the empirical literature are: price/cost, quality, delivery dependability, innovative marketing or service differentiation according to their supply chain's structure, the nature of their business, and their competitive environment (Kim, 2006; Li et al., 2006; Tracey et al., 1999; Jin, Vonderembse, & Ragu-Nathan, 2013). In today's environment, 'time to market' is also recognized as a source of competitive advantage (Holweg, 2005; Jin et al., 2013). Based on the existing literature, a number of measures of competitive advantage, competitive price, quality, delivery dependability, ability to provide customized products, responding to customer demands for new features, and fast product development, have been adopted in this study with minor modifications.

SCM is perceived as an effective means to gain competitive advantage and improve profitability (Li at al., 2006; Tan et al, 2002). Christopher (2012) notes that the greater the collaboration between customer and supplier, the greater the possibility that competitive advantage can be attained by firms. A long-term buyer-supplier relationship, characterized by extensive information sharing and commitment, results in enhanced collaboration, which in turn drives better firm performance in terms of cost, quality, product customization, and so

on (Jin et al., 2013). Ragatz, Handfield, and Petersen (2002) show that supplier integration can reduce the costs of materials, quality, product development, and manufacturing, and the product development time while improving functionality. Frohlich and Westbrook (2001) found that integration with both suppliers and customers is significantly related to performance improvement, including cost, time, speed of product development, delivery dependability, and so on.

Notwithstanding the proliferation of SCM research, there is still a gap in the literature concerning how the level of SCM implementation impacts the practice of SCM in organizations and eventually helps them secure competitive advantage directly and through SCA. Although only a few empirical studies (e.g., Li et al., 2006) examined the impact of an integrative set of SCM practices on competitive advantage, there is a dearth of empirical research in the context of the export-oriented apparel manufacturing industry. These studies (e.g., Li et al., 2006) also directly linked SCM to competitive advantage without considering the possible intervening role of SCA. It has been pointed out that firms such as those in apparel manufacturing require agile capability to achieve and sustain competitive advantage in today's increasingly complex marketplace environment (Swafford et al., 2006b; Zhang, 2011), and the effect of SCM practice on competitive advantage may remain limited if the SCM practices are not of an agile nature, or do not generate the required agile capability for a firm. While, SCA is considered as one of the most important issues of contemporary SCM (Gligor et al., 2013), there has been little empirical research addressing the effect of SCA on competitive advantage in this context.

2.7 THEORITICAL BACKGROUND

Halldorsson et al. (2007) argue that there is no "unified theory of SCM" for a theoretical explanation when analyzing the SCM phenomena. There are different theories that offer insights into how and why various SCM practices evolve and emerge, and for understanding the effect of these practices on a firm's competitiveness, such as transaction cost economics (TCE), the principal-agent theory (PAT), the resource-based view (RBV) and the network perspective (NT). These theories are considered most useful in explaining both the structure and management issues of supply chains (Halldorsson et al., 2007). This study examines SCM implementation and practice, and SCA from three perspectives: transaction cost economics, diffusion of innovation, and the resource-based view. This section explains the three underlying theoretical foundations on which this research is based.

2.7.1 Transaction Cost Economics

Transaction cost economics (TCE) is a very influential theory for explaining inter-organizational relationships (Williamson, 1975; Williamson, 2008; Barringer & Harrison, 2000; Cao & Zhang, 2011). The TCE perspective suggests that a firm organizes its inter-organizational activities to reduce production costs within the firm, and transaction costs within the market (Koh & Venkatraman, 1991). According to TCE, the choice of using either vertical integration/hierarchies or market mechanisms is subject to various factors, such as what investments have to be made specific to the relationship (i.e., asset specificity), what activity is critical for effective firm performance (Premkumar, 2006), the relative monitoring costs that arise from bounded rationality and uncertainties because of a partner's self-interest and opportunism (Cao & Zhang, 2011; Kaufman, Wood, & Theyel, 2000), together with environmental conditions (Clark & Lee, 2000).

SCM relationships can be represented by the hybrid mode of governance between markets and hierarchies (Herna´ndez-Espallardo, 2010; Halldorsson et al, 2007). Co-operation, teamwork and the timely sharing of information among firms in a supply chain will reduce transaction costs (Hobbs, 1996). Within the collaborative paradigm, the business world is comprised of a network of interdependent relationships built and advanced through strategic collaboration, with the aim of gaining mutual benefits (Ahuja, 2000; Borys & Jemison, 1989; Madhok & Tallman, 1998; Chen & Paulraj, 2004). Supply chain collaboration supports firms in reducing opportunism and the monitoring costs which are inherent in market transactions, through mutual trust and process integration (Croom, 2001; Cao & Zhang, 2011). It thus increases the likelihood that supply chain members will act in the greater interest of the partnership. SCM also assists firms in avoiding the internalization of an activity which may not be aligned with their core competencies (Cao & Zhang, 2011) and the positioning of each firm in the supply chain to do what it does best while spreading the asset ownership risks, and minimizing market risk through enhanced co-ordination and communication (Ellram, 1993). All this leads to improvements in the overall competitiveness of the supply chain. In line with the above arguments, this study views SCM as a strategically oriented inter-firm arrangement, involving coordination and collaboration with trading partners that seeks to reduce transaction cost, to benefit from economies of scale, to leverage a firm's external sources of know-how, to reduce the risks of uncertainty, and to create competitive advantage by delivering the maximum value to end-customers (Koh & Venkatraman, 1991; Hobbs, 1996). The current study uses TCE literature as a basis for exploring the SCM phenomenon because it appears to provide the basis for much of the

theory on competition and competitive strategy (Ellram, 1991). Through a review of TCE literature, this study first explores some of the important antecedents that encourage a firm to enter into a SCM type of arrangement, and then explains the rationales for adopting different key SCM practices.

2.7.2 Diffusion of Innovation Theory

Rogers's diffusion of innovation theory (DIT) is the first reported theory that explains adoption diffusion at an organizational level. Diffusion of innovation is defined as the implementation of an idea, process, practice, policy, program, system, process, product, or service that is new to the adopting organization (Rogers, 2003). Innovation is something new or improved and adopted by the firm to create significantly added value, either directly for the firm, or indirectly for its customers (Carnegie, Butlin, Barrat, Turnbull, & Webber, 1993). DIT was originally applied to a range of organizational innovations (such as technological, more specifically information systems innovations), but now the focus is more on innovation as a process, with an emphasis on a stage model (Rogers, 2003, Wu & Chuang, 2009; Wu & Chuang, 2010). Various stages of the diffusion process in general and for specific applications have been proposed in the literature. Quaddus (1995) conducted a comprehensive literature review on the stage models used to study the diffusion process of information technology, and identified thirteen stage models of innovation diffusion. However, it has been found that the various stage models of innovation diffusion comprising a distinct number of stages inherently adhere to a similar diffusion pattern (Cooper & Zmud, 1990; Kwon & Zmud, 1987; Premkumar, Ramamurthy & Nilakanta, 1994; Xu & Quaddus, 2005; Wu and Chuang, 2009). DIT suggests that diffusion, i.e., the practice of an innovation, depends on how well it is implemented, however, the existing literature in SCM does not differentiate between SCM implementation and practice or execution. The current study attempts to fill this gap by modeling SCM as an organizational innovation.

Ross (1998) describes SCM as an implementable system, a management process, and a business philosophy. SCM, at its core, involves changes to organizational goals and the ways of achieving these goals. To implement SCM, firms need to shift from traditional, arms-length relationships with trading partners to a specific, long-term business partnership. As opposed to the traditional functional thinking approach, it requires that firms undertake a holistic approach to managing the value-added processes across organizational boundaries to satisfy the real needs of the end customer (Power, 2005; Fawcett et al., 2007). Using the innovation diffusion perspective from the information systems and organizational innovation

literature, this study examines SCM practice through a three stage process: implementation, diffusion or practice, and outcomes. SCM implementation may be initiated by internal and external forces. Internally, organizations may feel a need for a particular innovation, and externally, various forces may drive an organization to adopt the innovation (Quaddus, 1995; Rajagopal, 2002). Again, due to a lack of top management support, cost or other constraints, the use of the innovation may not spread within the organization (Premkumar, et al., 1994). Innovation-process studies emphasize the implementation stage in putting an innovation into use in an organization (Rogers, 2003; p. 402). The implementation stage determines the activities that include preparations and making adjustments to changes in organization, processes, and the technologies needed for innovation deployment (Wu & Chuang, 2009). The subsequent diffusion stage initiates the expanded use, which leads to widespread transfer for regular use in an organization (Wu & Chuang, 2009). After formal implementation, the use of the innovation has to spread within the organization in order for that innovation to provide its full benefits (Premkumar et al., 1994). Eventually, there are consequences, which are the changes that occur in an organization as a result of the adoption of an innovation (Rogers, 2003). Xu and Quaddus (2005) studied the diffusion stages of knowledge management systems (KMS) from initiation to sustained use, and reported a significant positive relationship between stages of the sequence in KMS diffusion process. Their study suggests that organization-wide implementation of KMS significantly influences the diffusion of KMS in organizations. The proposed study will examine the important connection between these three stages of the diffusion process, such as implementation, execution or practice and outcomes. It can also help gain a better understanding of the extent of implementation and practice of SCM in the apparel manufacturing organizations of Bangladesh. By examining the outcomes of SCM practice, we hope to shed more light on the SCA and competitive advantage in this industry.

2.7.3 Resource Based View

The resource-based view (RBV) conceptualizes a firm as an entity with heterogeneous resources, and firms secure sustainable competitive advantage because of their valuable, rare, inimitable, and non-substitutable nature (Wernerfelt, 1984; Barney, 1991). As stated by Wernerfelt (1984), a resource is anything that can be considered a strength of a firm. According to the RBV, firm resources include ‘‘all assets, capabilities, organizational processes, firm attributes, information, knowledge, etc. controlled by a firm that enable the firm to conceive of and implement strategies that improve its efficiency and effectiveness’’

(Barney, 1991, p. 101). The RBV suggests that a firm that effectively uses and combines these resources in a unique way may attain an advantage over its competitors (Dyer & Singh, 1998). A firm develops its internal resources into capabilities that support the management of its environment and performance improvement (Day, 1994). Capabilities refer to a firm's ability to use resources that are valuable, generally in combination or in co-presence (Amit & Schoemaker, 1993; Schendel, 1994). Capabilities include competences such as trustworthiness, effective and efficient processes, organizational flexibility, quick responses to changing customer needs, and shorter product life cycles (Jarvenpaa & Leidner, 1998; Prahalad & Hamel, 1990). The uniqueness of these resources and capabilities (i.e. strategic assets) form the core competences of a firm and eventually serve as its source of competitive advantage (Halldorsson et al., 2007). The relevance of SCM practice to a firm's competitive advantage can also be explained with resource-based theory. As such, competitive performance can be attained and sustained when the key SCM practices are valuable, rare and inimitable (Kim, 2009; Olavarrieta & Ellinger, 1997; Shang & Sun, 2004).

There are several extensions of the resource-based theory, such as institutional influences, network analysis, and the dynamic capabilities framework, (Jarvenpaa & Leidner, 1998). Oliver (1997) combines resource-based theory with institutional theory, and suggests that a firm's resource decisions are influenced by their past, and cognitive, cultural and social factors. The relational view (RV) complements the RBV, considering that critical resources may exist across firm boundaries (Dyer & Singh, 1998). The RV centers on the common benefits that can be generated from the shared resources of the collaborative partners (Cao & Zhang, 2011). Lavie (2006) extends the RBV by explaining how interconnected firms in an alliance share and combine the internal resources and external resources (which are not fully owned by the internal organization) to gain competitive advantage for the focal firm. Strategic alliances are formed in an attempt to coordinate the complementary core competencies of the participating firms on an on-going basis (Fawcett et al., 2007). Under the dynamic capabilities view, it is not sufficient for a firm to have access to resources that are needed in its processes. Firms also need to be capable of recognizing new opportunities or evolving environmental changes, and quickly responding to them (Hamel & Prahalad, 1994; Teece et al., 1997). According to Barney (1997), "if a firm's threats and opportunities change in a rapid and unpredictable manner, the firm will often be unable to maintain a sustained competitive advantage" (p. 171). Teece et al. (1997) describe dynamic capabilities as "the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments" (p. 516). This explains the rationale for building strategic partnerships with key suppliers or customers to develop valuable, unique and

socially complex capabilities (Skjoett-Larsen, 1999). Internal and external resources are thus combined to enhance the effectiveness of SCM and increase a firm's ability to face challenges from a competitive business environment. The dynamic view of the RBV sees a firm's ability to quickly respond to situational changes as their core competence, which eventually develops further competencies (Prahalad & Hamel, 1990). The RBV is complementary to the TCE, considering the resources, capabilities, and competencies within an individual firm and in the links between the firms involved in a supply chain (Halldorsson et al., 2007). It explains the inter-organizational processes that develop between supply chain partners in a long term relationship (Skjoett-Larsen, 1999). In view of the above, SCA can be seen as an externally focused concept or outcome of SCM practice (Swafford et al., 2006a), and therefore, may be considered as a business capability required in a competitive environment of changing opportunities (Shang & Sun, 2004). This study assumes that this type of dynamic capability is needed for developing supply chain agility for the apparel manufacturing firms of Bangladesh in order to adapt or respond quickly and effectively to changes in dynamic and continually fragmenting markets.

2.8 OVERALL RESEARCH GAP

Despite the proliferation of SCM literature, there is a lack of agreement on the definition, practical implementation and impact of SCM in the literature. The varying conceptualization of SCM has important implications for its implementation (Halldo´rsson, et al., 2008). Such ambiguity suggests a need to study the SCM phenomena more closely to identify the factors that can contribute to effective SCM, and to suggest how the implementation and practice of SCM can shape corporate strategy and competitive performance. This section summarizes the gaps identified in the earlier part of the literature review.

This study combines transaction cost economics (TCE) (Williamson, 1975; Williamson, 2008), diffusion of innovation theory (DIT) (Rogers, 2003), and the resource-based view (RBV) (Barney, 1991; Wernerfelt, 1984) in explaining inter-organizational relationships, and examining SCM implementation and practice, and its outcome. DIT suggests that the diffusion or practice of an innovation depends on how well it is implemented. After formal implementation, the execution or practice of the innovation has to spread within the organization in order for that innovation to provide its full benefits (Premkumar et al., 1994), however, the existing SCM literature does not differentiate between SCM implementation and practice; rather, the terms 'SCM implementation' and 'SCM practice' are used either

inclusively or interchangeably in the literature (e.g., Power, 2005). But in practice, they are quite different. There is still a gap in the literature concerning how the level of SCM implementation impacts the practice of SCM in organizations, which eventually helps them in achieving competitive advantage directly and through supply chain agility. This study attempts to fill this gap by conceptualizing SCM as an organizational innovation, and explicitly differentiating SCM implementation from SCM practice as per theory, which has been neglected so far.

The conceptual ambiguity and lack of a theoretical framework in SCM are reflected in the empirical research. Cousins et al. (2006) argue that since SCM has been researched from different disciplines and from different theoretical viewpoints which leads to richness in the field, it also results in unclear literature and overlapping constructs along with inconsistent results. Much theoretical and empirical research in SCM merely focuses either on the upstream or downstream side of the supply chain, or certain aspects of SCM, although upstream-focused processes are considered just as critical as downstream-focused processes in creating value for customers that benefit the whole supply chain (Tracey et al., 2005). Kim (2006) suggests that SCM practices need to be implemented in an integrated way to ensure their effectiveness. Only a few empirical studies have been conducted taking the entirety of supply chain into consideration, combining the downstream and upstream sides of supply chain together with internal processes (e.g., Chow et al., 2008; Tan, 2002; Li et al., 2006). This requires further investigation on the implementation and execution of various SCM practices from both downstream and upstream sides of the supply chain, along with internal processes, and testing them simultaneously.

Agility has received increased attention as one of the most important issues of contemporary SCM (Gligor et al., 2013). It is increasingly considered an important means to securing and sustaining competitive advantage in an environment of uncertainty and continuous change (Lancioni, 2000; Tan et al., 2002; Zhang, 2011). The notion of RBV suggests that firms that possess a dynamic agile capability should be able to secure competitive advantage over time. Such capability is difficult to establish, and thus, can be considered rare, valuable and hard to replicate (Fawcett, Wallin, Allred, Fawcett, & Magnan, 2011), however, there has been little empirical research addressing the impact of supply chain agility (SCA) on competitive advantage. SCA, as an outcome of SCM practice, has also received little attention in the literature. Although a few studies have examined the relationship between several individual supply chain initiatives and dimensions underlying SCA, studies examining the impact of integrated SCM practice (which comprehensively

incorporates upstream and downstream components of supply chain) on SCA are lacking. This research thus investigates the impact of SCM practice aimed at augmenting SCA of a firm. Again, previous studies (e.g., Li et al., 2006) have drawn a direct link between SCM practice and competitive advantage without considering the possible role of any intervening factor. It has been pointed out that organizations such as those in apparel manufacturing require agile capabilities to gain competitive advantage which enable them to focus on building knowledge and flexible processes in order to respond to the changes in today's dynamic marketplace environment (Swafford et al., 2006b). In such a context, the effect of SCM practice or execution on competitive advantage may remain limited if the SCM practices are not of an agile nature or do not generate the necessary agile capability for a firm, but, no research has explored the possible intervening role of SCA between these two constructs. The current research therefore fills the gap by considering SCA as a mediator between SCM practice and a firm's competitive advantage.

Despite commonalities in the conceptualization of agility, there is still ambiguity surrounding the basic SCA dimensions (Li et al., 2008; Gligor et al., 2013). Some researchers (e.g., Swafford et al., 2008; Khan & Pillania, 2008) define SCA as a unidimensional concept, while others (Braunscheidel and Suresh, 2009; Lin, Chiu, & Chu, 2006; Li et al., 2009; Gligor, Holcomb, & Stank, 2013) have operationalized it as a multi-dimensional concept. This study addresses this ambiguity by conceptualizing and measuring SCA as a multidimensional and hierarchical construct comprising four distinct dimensions which highlight the dynamic capabilities of a supply chain, enabling firms to adapt or quickly respond to environmental changes and uncertainty (Teece et al., 1997; Hamel & Prahalad, 1994; Amit & Schoemaker, 1993).

Although the extant literature suggests that supply chain relationship quality (SCRQ) is enhanced with the extent and scope of SCM practice, there is a dearth of empirical research that considers SCM practice as an antecedent of SCRQ. Again, SCRQ is considered an important ingredient enhancing SCA (Christopher, 2000; Paulraj & Chen, 2007). This implies a possible mediating role for SCRQ between SCM practice and SCA which has not yet been addressed by existing research. This study investigates the impact of SCM practice on SCRQ, the antecedent role of SCRQ on SCA, and the mediating role of SCRQ in the association between SCM practice and SCA.

This study also addresses the antecedents of SCM implementation, as there is disagreement on these factors in the literature. Various external forces and internal conditions influencing SCM implementation are explored from the extant literature, such as

organizational culture, environmental uncertainty, customer focus, inter-firm trust and relationships, and networking. Organizational culture is identified as one of the reasons for the failure of inter-organizational relationships, which may influence innovation adoption and collaboration in the context of partnering (Boddy et al., 2000), however, research that directly links an integrated SCM implementation with innovative culture is sparse. There has also not been any study to examine the effect of supportive culture on SCM implementation and practice simultaneously. Although customer focus is conceptualized as one of the key drivers of supply-chain relational capabilities and performance (Lado et al., 2011), there is a dearth of research addressing the question as to the extent which customer focus influences the implementation of SCM practices. Based on the notion of the RBV, networking may be seen as a resource that focuses on firm strengths that are embedded in the employee connections or social structure within and across the firms (Jarvenpaa & Leidner, 1998). It is argued in the literature that the implementation of an innovation or even the ability to form strategic alliances is influenced by the participation of organizational members in an informal network of relations (Frambach, 1993; Eisenhardt & Schoonhoven, 1996). However, there is no empirical study that examines the role of networking on SCM implementation. Braun (2002) points out that service firms are markedly more likely to be involved in formal and informal networking than manufacturing firms. This study thus attempts to examine the antecedent role of networking in the adoption of SCM practices in a manufacturing context, specifically in the Bangladesh apparel industry.

Efficient and effective SCM is critical in the apparel sector for achieving competitive advantage, considering the unique characteristics of its marketplace environment and supply chain complexity (Jahed & Quaddus, 2014). Nevertheless, this sector has been neglected in terms of SCM research (Bruce et al., 2004; Lee & Kincade, 2003). In the context of increased global competition, dynamic nature of marketplace environment, and its enormous importance in the economy of Bangladesh, the effective implementation and practice of SCM and achieving SCA have become critical for the apparel industry of Bangladesh. It is argued that firms such as those involved in apparel manufacturing require agile capability to gain competitive advantage by leveraging external knowledge and competencies, and developing flexible processes in order to be able to deal with the changes and uncertainty in today's environment (Swafford et al., 2006b), however, no intensive study has been conducted on SCM implementation, practice, and agility in the context of the apparel industry Bangladesh. By addressing this gap, this study is expected to contribute to a better understanding of the implementation and practice of SCM and its outcomes in terms of achieving SCA and

competitive advantage in this industry. Taking the gaps identified in the literature into consideration, an initial research model has been developed, which is shown in Figure 2.2.

2.9 INITIAL RESEARCH MODEL

This study is conducted with the objective of examining supply chain management (SCM) implementation, practice, and agility, and their effect on competitive advantage in the context of apparel industry of Bangladesh. On the basis of the extensive literature review and the gaps identified in the literature, an initial research model has been developed. Figure 2.2 presents the initial research model for the current research, depicting the relationships between the antecedents, SCM implementation, SCM practice, and the outcomes of SCM practice in the form of supply chain relationship quality (SCRQ), supply chain agility (SCA), and competitive advantage (CA). Drawing on the theoretical review, this study explores the antecedents of SCM implementation, and examines SCM practice through a three stage innovation diffusion process: implementation, diffusion or practice (i.e., execution), and consequences. This research conceptualizes SCM as an organizational innovation and SCM practice as an organizational effort to diffuse innovation within the organization. Innovation-process studies emphasize the implementation stage of putting an innovation into use in an organization (Rogers, 2003); the subsequent diffusion stage that initiates the widespread practice (Wu & Chuang 2009), and finally, the consequences or outcomes as a result of the adoption of the innovation (Rogers, 2003).

Based on the previous studies, 'SCM implementation' and 'SCM practice' are modeled as multidimensional concepts consisting of a number of dimensions, such as the strategic buyer partnership (SBP), supplier partnership (SP), information sharing (IS), information quality (IQ), lean systems (LS), and postponement (PO). The initial model includes key driving factors identified from the diverse literature. These factors are organizational culture, environmental uncertainty, customer focus, competition intensity, inter-firm trust and commitment, and networking. SCA has also been conceptualized as a multidimensional concept with four distinct dimensions: demand response (DR), flexibility (FL), integration (INT), and customer responsiveness (CR). The rationale underlying this initial research model is as follows: the antecedent factors drive a firm to implement SCM; depending on how well SCM is implemented, SCM practice within the firm will be enhanced; the level of SCM practice will impact SCRQ, SCA, and CA; SCRQ will have a direct or mediated impact on SCA; and finally, SCA will have a direct or mediated impact on the competitive advantage of the firm.

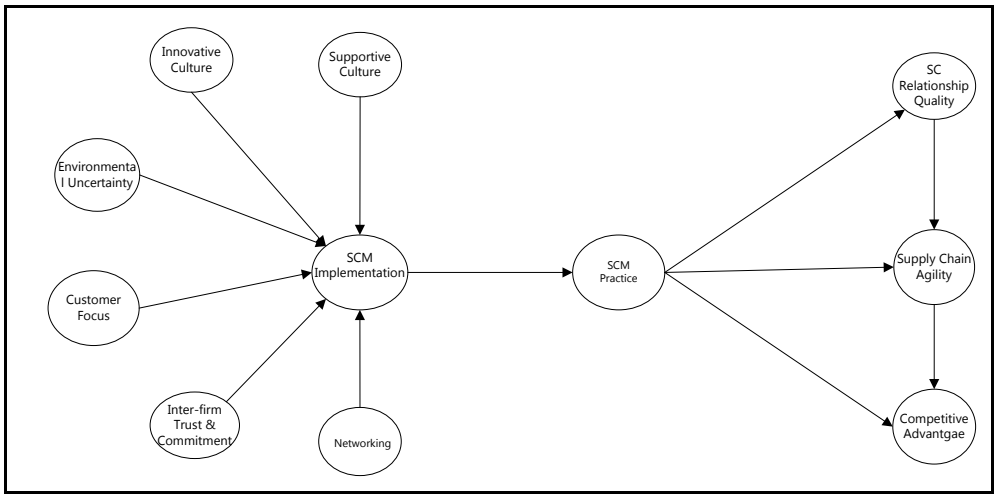


Figure 2.2: Initial Research Model

2.10 SUMMARY

This chapter has presented an extensive review of relevant literature to provide the theoretical foundation for the current research. The theoretical grounding of the study has been postulated through a review of the relevant theories, such as transaction cost economics, the diffusion of innovation theory, and the resource-based view. The critical analysis in each section has addressed the gaps in the existing literature. The constructs and their dimensions have been discussed and justified. Finally, an initial research model has been developed that depicts the dimensions of the constructs and the relationships between these constructs. The initial model will be fine-tuned and contextualized later through a field study. The next chapter will describe the research design and methodology, and the operationalization of the major phases of the research.

Chapter Three

RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter discusses the research methodology used to attain the objectives of the study. It first presents an overview of the research paradigm, followed by a justification of the paradigm adopted for this study. It then provides the rationale for the use of the mixed method in this research. Definition and the research design of the mixed method are then discussed, followed by a clear description of the research process followed in this study. There were two major stages of this study: the qualitative field study and quantitative study. The sample selection, data collection, and data analysis for each of the sequential stages are explained. Overall, this chapter presents the systemic overview of the research method and tools used for this research.

3.2 RESEARCH PARADIGM

A paradigm is a way of examining social phenomena in order to gain particular understanding and explanations of these phenomena (Saunders, Thornhill, & Lewis, 2012). According to Kuhn (1977), a paradigm is a set of assumptions, beliefs, and values shared by a community of researchers about the nature and conduct of research. These beliefs include ontological (i.e. nature of reality), epistemological (i.e. how we know what we know), axiological (i.e. the role of value in the research), rhetoric (i.e. the language of research), and methodological (i.e. the process of research) beliefs (Kuhn, 1977; Creswell, 2009). Guba and Lincoln (1994) describe a paradigm as "the basic belief system or worldview that guides the investigator, not only in choices of method but in ontologically and epistemologically fundamental ways" (p. 105). A paradigm thus reflects a research design, data collection method, and the presentation and interpretation of the findings in research.

According to Creswell (2009), there are four main research paradigms; viz., post-positivism, constructivism, advocacy/participatory and pragmatism. Guba and Lincoln classify research paradigms into five categories: positivism, postpositivism, critical theory, constructivism and participatory (Guba & Lincoln, 2005; Guba & Lincoln, 1994). On the other hand, Collis and Hussey (2009) divide the research paradigm into two main extremes: positivism and interpretivism. Orlikowski and Baroudi (1991) distinguish three different paradigms: positivism, interpretivism and critical. Generally, the two broad research

paradigms discussed in the literature are positivist and interpretivist (Creswell, 1994). Postpositivism and positivism are often related to quantitative approaches. Constructivism, advocacy/participatory, naturalism and interpretivism are often associated with qualitative approaches (Creswell & Clark, 2007).

Although there are numerous paradigms that guide research, two major paradigms, the positivist and interpretivist research paradigms, have guided most research in social science, behavioral studies, and business, specifically in supply chain management (SCM) (Marsden & Littler, 1996; Golicic et al., 2005; Hudson & Ozanne, 1988; Soni & Kodali, 2012). According to the positivist paradigm, there is only one truth, an objective reality that exists independently of human perception, and a researcher can study a phenomenon without influencing it or being influenced by it (Sale, Lohfeld, & Brazil, 2002). This paradigm relies on quantitative research based on a specific research question and hypotheses testing (Johnson & Onwuegbuzie, 2004; Creswell, 2009). It seeks to measure and analyze causal relationships between variables within a value-free framework (Denzin & Lincoln, 1994). In this scientific method, the researcher therefore begins with a theory, collects data that either supports or refutes the theory in whole or part, and then makes necessary revisions before additional tests are done (Creswell, 2009). This paradigm conforms to the traditional deductive approach to research.

In contrast, the interpretivist paradigm relies on qualitative methods and attempts to interpret the inter-subjective meanings where a phenomenon is explained through multiple explanations or realities rather than one causal relationship or one theory (Denzin & Lincoln, 1994, Neuman, 2006; Creswell, 2009). The researcher and the object of the study are interactively connected so that findings are mutually created within the context of the situation which forms the inquiry (Denzin & Lincoln, 1994; Guba & Lincoln, 1994). This paradigm is an inductive approach. The differences between the positivist and interpretivist paradigms are actually range from the ontological level to the rhetorical level (Creswell & Clark, 2011) as presented in Table 3.1.

The literature shows variation of these underlying paradigms within SCM and logistics research in term of usage. Samuel compared dominating research paradigms in the United States and Europe, and found that out of 19 US contributions, 17 employed positivist approaches while out of 16 European contributions, 9 used naturalist (interpretivist) approaches (Samuel, 1997 based on Näslund, 2002, p. 322-323). A study conducted by Burgess, Singh, and Koroglu (2006) comprising 100 randomly selected articles from the ABI Inform database revealed that logistics and SCM research are dominated by the functionalist

(positivist) paradigm. Similarly, Golicic et al., (2005) report a very low percentage of qualitative studies in SCM.

Table 3.1: Positivist vs. Interpretivist Paradigms

Assumption	Positivist	Interpretivist
Ontological	Naïve realism; reality is objective and singular	Relativism; reality is subjective and multiple
Epistemological	Researcher is independent from what is being researched	Researcher interacts with and affects the issue being researched
Axiological	Scientific study is value-free and unbiased	Scientific study is value-laden and biased
Methodological	Process of research is deductive; focus on objectives and hypotheses formulation and testing	Process of research is inductive; use different methods to obtain different perceptions of the phenomena
Rhetorical	Formal style: use of quantitative words that are based on set definitions	Informal style: use of qualitative words that evolve decisions

Adapted from Creswell and Clark, 2011, and Creswell, 2009.

The research objectives, nature and context were reviewed in order to determine the paradigm and method for this research. The positivist paradigm was considered the most appropriate for the current study since the constructs in this research model needed to be measured objectively by adopting the quantitative method to determine causal relationships among the constructs and to draw inferences about a phenomenon from the sample to an identified population.

Within the positivist paradigm, the mixed-method design has been adopted in this study for better understanding of the object of the research. The objectives of the research required exploring some of the antecedent factors of SCM implementation, developing and testing the research model comprising the links between SCM implementation, practice, and competitive performance of the firms in Bangladesh apparel industry. Most of the research and major models in SCM have been conducted in developed countries, while few studies have been conducted on certain aspects of SCM in a developing country context (Soni & Kodali, 2012). Integrative SCM research in the apparel sector is also very scanty. To study SCM and agility, theoretical dimensions and variables thus had to be adopted from other established studies, viz., economics, innovation adoption, entrepreneurship, sociology, and management research. Nevertheless, it would be quite an optimistic assumption that these dimensions and variables could effectively be utilized to deal with SCM practice in a different

context as well as in a very specific sector like apparel manufacturing industry. These factors thus needed to be verified by representatives of the apparel industry. It was also not unlikely that new factors or variables critically relevant to that particular context would be explored. The qualitative study was intended to accomplish this purpose.

Mixed methods research combining qualitative and quantitative methods is increasingly spoken about, attached to research practice, and accepted as the third major research paradigm for the broad purposes of breadth and depth of understanding and corroboration (Johnson, Onwuegbuzie, & Turner, 2007). As the business environment surrounding the logistics and supply chain phenomena is becoming increasingly complex, Golicic et al. (2005) emphasized the use of multiple approaches in SCM research, using rigorous qualitative and/or quantitative methods so as to properly illustrate, truly understand and to explain these complex phenomena. According to Naslund (2002), in order to gain extreme relevance in SCM research, both qualitative and quantitative methods need to be used. He observes that the supply chain phenomena tend to be an 'ill-structured, messy' problem particularly because they often involve several firms. Given the dynamic and complex nature of these phenomena, it is suggested that research be commenced with an inductive approach to develop in-depth understandings of these phenomena through qualitative methods, and then a deductive approach employed to test the theory/hypothesis using quantitative methods (Naslund, 2002; Golicic et al., 2005). Accordingly, this study adopted a mixed-method design involving a field study at the first stage for better understanding of the phenomenon, and examining and contextualizing the initial research model. Finally, a survey was conducted to test the comprehensive model, to improve generalizability and its explanatory power. The research design thus allowed data collection and analysis using both qualitative and quantitative methods.

3.3 RESEARCH METHOD

After evaluating the research paradigms, research objectives and context, the current study considered elements of both qualitative and quantitative methods; an approach often referred to as 'mixed method' or as the third major research paradigm (Johnson et al., 2007; Tashakkori & Teddlie, 1998). This approach is based on pragmatism which works within both positivist and interpretivist positions. As such, a combination of qualitative and quantitative approaches within different phases of the research process is considered (Tashakkori & Teddlie, 1998). Greene et al., (1989) define the mixed method as "studies that include at least one quantitative method (designed to collect numbers) and one qualitative method (to

collect words), where neither type of method is inherently linked to any particular inquiry paradigm" (p. 254). As outlined by Tashakkori and Teddlie (2003), qualitative and quantitative data collection and analysis techniques are used in either a parallel or sequential phase in mixed method research. Research applying this approach utilizes the capacity of various data collections and improves the validity of research measurements (Creswell, 2009). This is because each method, either qualitative or quantitative, has its own limitations. According to Greene, Caracelli, and Graham (1989, p. 254), a mono-method study would "inevitably yield biased and limited results". It is believed that combining both methods would compensate for their mutual and overlapping weaknesses (Greene et al., 1989) and would provide cohesive and comprehensive results (Hohenthal, 2006). Meredith, Raturi, Amoako-Gyampah, and Kaplan (1989) emphasize the importance of a plurality of research methods in operations management. They assert that the use of multiple research methods helps develop more nuances of understanding and achieve cross-validation of data from different sources. Details that one method misses can also be caught by another. Overall, qualitative research methods enhance realism (internal validity), while quantitative research optimizes control and generalizability (external validity) (Golicic et al., 2005). Both methods are thus capable of strengthening research results and contributing to knowledge on SCM.

Creswell (2009) distinguishes four types of mixed-method research design: triangulation, embedded, explanatory, and exploratory design. Triangulation involves the collection and comparing of data using both qualitative and quantitative methods so as to validate or expand quantitative results with qualitative data. Embedded design includes both qualitative and quantitative data collection, where either of the data types assumes a supplemental role within the overall design. Explanatory design collects and analyses quantitative data followed by the subsequent collection and analysis of qualitative data. Exploratory design follows the opposite sequence. It starts with qualitative data to explore a phenomenon, and then builds up to the quantitative phase.

The decision about the most appropriate mixed method for the current research was again based on the research objectives and context. As discussed in Chapter One, the objective of the current research was to explore the antecedent factors of SCM implementation and practice, the relationships among the SCM practice, agility, and competitive performance of the firms in the Bangladesh apparel industry. Based on a discussion of the theoretical framework, an initial research model (Figure 2.2) was proposed in Chapter Two. In order to test the applicability and validity of the initial model, a qualitative approach based on a field study comprising semi-structured interviews was undertaken. The

field study was important for a better understanding of the phenomenon and contextualization of the initial research model, which was then tested through the quantitative approach, based on a large scale survey to confirm its applicability and improve its explanatory power. The detail of the research process is discussed in the next section.

3.4 RESEARCH PROCESS:

The research process used in this study was carried out in a number of phases. Figure 3.1 diagrammatically presents the outline of the research process.

Step 1: Literature Review

The research commenced with an extensive review of the literature related to the phenomenon of SCM. In this phase, issues, research gaps, potential key constructs, and theories relevant to SCM practice were examined until the researcher decided on the research problem. The literature search included journals, books, seminar proceedings, case studies, working papers, and others. The extensive literature review helped the research to identify the research problem. Several research questions were then developed, on the basis of which a number of specific objectives were identified in order to have greater control of the research topic.

Step 2: Initial Research Model

Based on the review of the relevant literature, a theoretically grounded initial research model (Figure 2.2) was proposed, combining the transaction cost economics, resource-based view, and diffusion of innovation theory in explaining inter-organizational relationship, and examining SCM implementation and practice. The main purpose of the initial model was to highlight the potential key constructs and their associations and effects. The model was later refined by continuing to review the literature, and with support of the field study.

Step 3: Qualitative Field Study

The model was then examined for its relevance and appropriateness within the research context, and for its adequacy in explaining issues according to the research objectives. In view of this, a field study was carried out, interviewing ten SCM executives from apparel manufacturing firms in Bangladesh. The objectives of the interview were to search for and identify concepts and procedures that might possibly not have already been recognized

in the literature review in Chapter Two, and to assess the worthiness of the concepts identified from the literature review. The interviews were conducted using a semi-structured questionnaire which was designed with the help of the literature review. Each of the interviews was recorded and later transcribed by the researcher. The transcribed data was analyzed using content analysis.

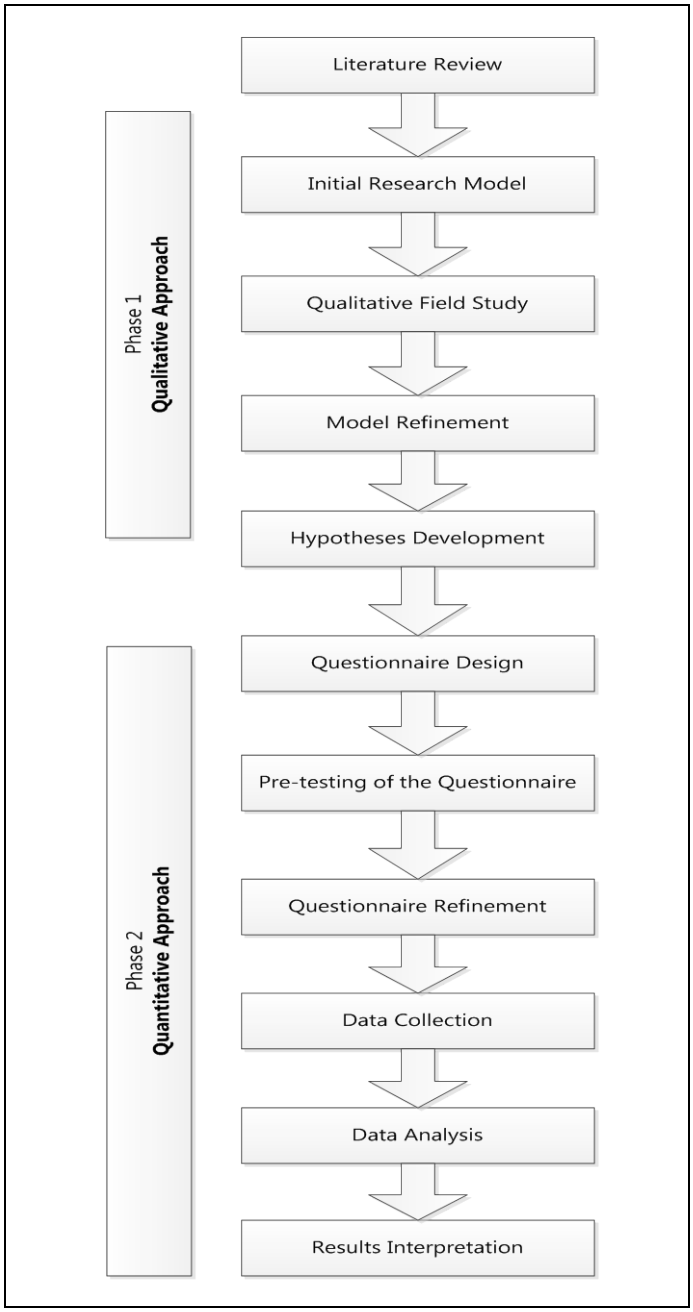


Figure 3.1: Overview of the Research Process

Step 4: Model Refinement

The initial research model was refined based on the results of the qualitative data analysis and the literature review. In this phase, the model was augmented through the necessary addition of items and/or constructs, or simplified through the elimination of duplicate or irrelevant constructs and items. A comprehensive research model was then finalized, which is presented in Chapter Four.

Step 5: Hypotheses Development

A number of hypotheses were proposed to justify the relationships among the constructs based on the comprehensive research model, past theories, and relevant research. The transaction cost economics and the resource-based theory were used together with the innovation diffusion theory to guide hypotheses development. The research hypotheses are presented in Section 5.2 of Chapter Five.

Step 6: Questionnaire Design

Following the development of the hypotheses, a tentative survey questionnaire was designed. Measurement items were adapted for the constructs from the relevant literature. Additional new items were based on the findings of the qualitative field study. The measurement items and constructs were subjected to a pre-test and a pilot test for validity and reliability before conducting the large scale survey (for details of the pre-test and pilot test, see Section 5.5 in Chapter Five and Section 6.2.3 in Chapter Six).

Step 7: Pre-testing of the Questionnaire

The tentative survey questionnaire was then pre-tested before it was widely distributed. The pre-test was conducted with five SCM executives and four academic researchers who were experts in SCM research. The pre-testing procedure involved consulting with experts in the in the relevant field to ensure that respondents could understand the questionnaire, and to identify whether there were any biasness or ambiguity in the questionnaire items. Later, a pilot study was also conducted to ensure the applicability and validity of the questionnaire.

Step 8: Questionnaire Refinement

Necessary modifications were therefore made to refine the tentative questionnaire in line with the pre-test results before the actual survey (for details of the pre-test and types of

modification made, see Section 5.5 in Chapter Five). The finalized questionnaire was then distributed to the survey respondents.

Step 9: Data Collection

The large scale quantitative data collection survey involved the executives of apparel manufacturing firms who were responsible for performing SCM related functions. Three trained business students from the University of Chittagong, Bangladesh, were employed as research assistants to assist the researcher in this survey. A sample of 296 valid responses was gathered, which was considered adequate for a partial least square (PLS)-based data analysis (for details of the sample selection, see Section 3.6.5 in Chapter Three and Section 6.2.1 in Chapter Six).

Step 10: Data Analysis

Data collected through the survey were analyzed using a PLS-based structural equation modeling (SEM) technique. A two-step procedure involving the measurement model assessment and the structural model estimation (hypotheses testing) was then used for the quantitative data analysis. The SPSS software package was also used to analyze descriptive statistics, estimate the variance inflation factor (VIF), and perform the single factor test.

Step 11: Results Interpretation

The final step of the research was the interpretation and discussion of the findings obtained from both qualitative and quantitative data analyses. This research employed two basic steps of data collection: field study and large scale survey. Details of each step are explained in the following sections.

3.5 QUALITATIVE FIELD STUDY

The first phase of the study was qualitative, where a field study was employed. The study investigated SCM phenomena in apparel manufacturing firms in Bangladesh and the resultant outcomes in terms of the firm's competitive advantage achieved through SCM practice and supply chain agility. Thus, the objective of this exploratory phase was to identify what was happening in the Bangladesh apparel industry in terms of SCM. It was important to know about the extent of SCM implementation and practice, their antecedents and impacts.

As there was limited research looking at the phenomena from a developing country perspective (Soni & Kodali, 2012), a qualitative field study was appropriate to examine the suitability of research instruments and constructs, which were mainly based on a review of literature focused on the perspective of developed countries. This phase of the study has thus contributed to the contextualization of an initial research model as well as the modification and validation of the constructs and variables identified through the extensive literature review. According to Kaplan and Maxwell (1994), it is important to obtain the viewpoints of the authentic participants in a specific social and institutional context to gain a better understanding of a phenomenon. It was thus felt that a 'pseudo case study' involving a qualitative study of a small number of participants would satisfy the objectives of the first phase of the study. Field study is often suggested as an effective method to explore existent participant viewpoints in a particular setting (Zikmund, 2003; Patton, 1999). The approach adopted in this study was the semi-structured interview.

3.5.1 Sample Selection

Sample selection in qualitative research is more often intentionally non-random, rather it is purposeful in line with the research objectives (Leedy & Omrod, 2005). The study adopted the convenience sampling technique in this exploratory stage as it was considered more appropriate for the qualitative research of this study (Devlin, 2005). This technique is more efficient for collecting information and best used for the exploratory phase of a research project (Zikmund, 2003; Cavana, Delahaye, & Sekaran, 2001). The interview participants were selected based on personal contacts. A number of criteria were considered such as firm size, types of products made, and participants' experience, participants' employment position and role in the firm. Executives, responsible for managing supply chain operations, from apparel manufacturing firms in Bangladesh and engaged in making woven and knit based products, were contacted. The approach was chosen with the aim of increasing the possibility of generalizing results and to explore patterns in terms of product category, if there were any. Attention was also given to heterogeneity of sample firms according to size. This allows better theoretical insights to be obtained, and more consistent validation of results. One participant from each firm was selected for interview based on their experience of the phenomenon and the ability to articulate their experience. The interviewees were given a clear description of the research objectives, information about their role in this study, and a copy of the interview questionnaire. The participation of the SCM executives in this study was voluntary. The qualitative study commenced with an open-ended number of

cases and ended interviewing after the 10th case, considering informational redundancy as well as theoretical saturation (Denzin & Lincoln, 2003; Strauss & Corbin, 1998).

3.5.2 Data Collection

A qualitative approach using semi-structured interviews was employed at this stage of the study. The interview is widely used and recognized as one of the most important data gathering techniques in qualitative research (Myers & Newman, 2007). There are various types of interviews in qualitative studies such as structured, unstructured or semi-structured, and group interviews (Fontana & Frey, 2000; Myers & Newman, 2007). For this study, semi-structured interviews were used to collect relevant qualitative data to explore and refine the initial research model. The informants were asked to participate in semi-structured interviews with a set of questions to explore the formal and informal practices/systems that were put in place to implement SCM in apparel manufacturing firms, their antecedent factors, and impacts on the competitive performance of firms. The questions were developed from the literature review based on the framework of the initial model. The interview appointments were arranged by telephone contact at the convenience of the interviewees. These interviews were conducted at their office premises. All interview participants were from Dhaka and Chittagong city, the two largest cities of Bangladesh, where most of the apparel manufacturing firms are located. As mentioned above, the interviewees were initially given a brief description of the research objectives, and ethical issues were addressed. During the interview session, interviewees were encouraged to express their opinion freely and allowed to seek clarification. This process of question, explanation and clarification allowed for the testing and negotiation of understanding. Each interview took approximately one hour. The interviews were recorded with permission of the participants. The recorded data was subsequently transcribed on the same day, or at the latest by the next day. It is noted that all the interviews were conducted in English, but to clarify some issues, the local language i.e., Bengali was used time to time.

3.5.3 Data Analysis

The content analysis technique was used to analyze the transcribed interview data. This technique can ascertain key factors, constructs and the links between the constructs under study. The goal of content analysis is to obtain a broad description of the phenomenon, and the result is concepts or categories describing the phenomenon (Elo &

Kyngas, 2007). It is suggested as a useful technique in exploratory research (Huberman & Miles, 1994). In this study, content analysis was performed in two phases: inductive and deductive analysis. The inductive procedure was employed to identify the themes and sub-themes explaining the factors, sub-factors, and variables through thorough analysis of the interview transcripts. Analysis was performed manually due to the simple nature of the language and the low number of individual transcripts. In addition, links between the factors and constructs were detected, and the key factors and variables were matched with the literature. The deductive procedure involved a comparison and review of the initial research model and the field study findings to assess the significant constructs and variables. The findings of the qualitative study were used in refining the initial research model and finally developing a comprehensive research model.

3.6 QUANTITATIVE STUDY

After developing the comprehensive research model based on the literature review and qualitative field study, the second phase of this research involved the confirmation (or rejection) of the factors and variables, and the determination of links among the constructs. A quantitative method was considered most appropriate for this phase, as this study was within the positivist research paradigm aimed at objectively measuring the constructs in the research model and establishing causal relationships among those constructs. The large sample and geographical dispersion of the sample units fulfilled the rationale for using a survey method. Survey provides a "quick, inexpensive, efficient, and accurate means of assessing information about the population" (Zikmund, 2003, P. 175). A questionnaire-based survey was employed in this study. Note that the quantitative study undertaken in the following sub-sections addresses the research questions as laid out in Chapter One.

3.6.1 Hypotheses and Questionnaire Development

A number of hypotheses were derived from the comprehensive research model. The constructs identified in the model and their proposed relationships were based on an extensive literature review and the results of the field study. A personally administered questionnaire approach was undertaken as the mode of quantitative data collection for this study. The questionnaire was designed based on the comprehensive research model to collect data pertaining to the identified constructs and test the relationships among the constructs. It included closed-ended questions, and the dimensions were based on previous research and field study results. The Likert scale was used to measure all questions. The

questionnaire also included demographic information about the respondents. This research adopted a six point scale in order to avoid central tendency error by the respondents (Matell & Jacoby, 1972). Central tendency bias is observed when respondents tend to give a middle answer, 'neutral' or 'neither agree or disagree', without actually meaning it. Chapter Five discusses the hypotheses development and questionnaire design further.

3.6.2 Pre-Testing the Questionnaire

Pre-testing the questionnaire before the large scale survey was important, as it would help in identifying any difficulty the respondents may have in understanding, and in determining whether there were any unclear questions (Zikmund & Babin, 2012). Malhotra, Hall, Shaw, and Oppenheim, (2006) suggest that the pre-testing of a questionnaire involving a small sample of respondents can ascertain and minimize potential problems. Before the formal survey for the quantitative study, a pre-test was thus conducted in order to contextualize the survey instrument and identify any potential problems with it. Five supply chain executives from the Bangladesh apparel industry who participated in the field study were selected to pre-test and review the questionnaire. Two academics in SCM and two doctoral research students at Curtin University were also included in this process. These personnel were experienced and knowledgeable in the supply chain area. In addition to completing the questionnaire, the respondents provided qualitative feedback on the clarity of instructions and the survey items. The results of their input were used to improve the wording, clarity and completeness of the questions and to make some context-specific adjustments. The detail of the pre-test is presented in Section 5.5 of Chapter Five and the final survey instrument is shown in Appendix D.

3.6.3 Pilot Study

After finalizing the survey questionnaire, a pilot study was conducted to obtain an overview of the applicability of the data in this research. The aim of the pilot study was not to assess the measurement or structural models through PLS software, but rather to examine the descriptive statistics and appropriateness of the questionnaire items. The test was also intended to determine the length of time it would take to complete the questionnaire. Prior to conducting the main large-scale survey, twenty five questionnaires were distributed to potential respondents from randomly selected apparel manufacturing firms for the pilot study. Modifications to the questionnaire were considered based on the results of the pilot study. The result of the pilot study is presented in Section 6.2.3 of Chapter Six.

3.6.4 Unit of Analysis

The unit of analysis refers to the level of aggregation of the data gathered, and depends on the research problem statement (Cavana et al., 2001). In this study, the unit of analysis is the firm or organization. The terms *organization* and *firm* are used in a wide sense in this study, refer to a manufacturing entity, and can be a part or division of a larger corporation or a complete company. Like the majority of SCM research (e.g., Braunscheidel & Suresh, 2009; Swafford et al., 2006) conducted in the past, this study surveyed the mid- to high-level supply chain executives from individual firms, who are generally capable of making firm's internal and external assessments involving key buyers and suppliers. This is in line with most of the past SCM research which has been entirely based on the characteristics of a single, focal firm within the supply chain and also dependent on responses from a single key respondent within the focal firm (Braunscheidel & Suresh, 2009).

3.6.5 Sample Selection

The population was defined as apparel manufacturing firms in Bangladesh. Apparel manufacturers are firms that perform all apparel-related functions, from design, through fabric purchase, and cut and sew operations, to distribution of the product to their customers (U.S. Census Bureau, 2014). There are more than 4,000 apparel manufacturing firms in Bangladesh; almost all clustered in and around the two largest cities, Dhaka and Chittagong (BGMEA, 2016). The Bangladesh Garment Manufacturers & Exporters Association (BGMEA) currently has 4363 members (excluding associate members) in their list (BGMEA, 2016). Seven hundred firms were randomly selected for the survey, based on the members' directory of the BGMEA and the list provided by the Bangladesh Export Processing Zone Authority (BEPZA), of which 308 firms responded to the survey. The list of the selected firms was limited mostly to manufacturers with more than 100 employees, since smaller firms were unlikely to engage in any sophisticated SCM (Chavez et al., 2012). Any firm with 25–99 employees or fixed assets from 5.5 to 100 Million BDT (excluding the value of land and factory), is defined as a small firm by the Industrial Policy 2010 of the People's Republic of Bangladesh. Most of the smaller firms are indirect exporters i.e., subcontractors for the larger firms. This category also includes the informal, unregistered (with the government, the national trade association of apparel manufacturers (BGMEA), or foreign brands) subcontractors, which employ on average 55 workers (whereas the average number of factory workers is 650 among the registered firms) and focus on a single production process, such as sewing, washing, dyeing, or printing (Labowitz & Baumann-Pauly, 2015). Hence,

subcontractors were excluded from the list as they did not have direct interaction with buyers and had limited involvement in the management of overall supply chain operations.

Careful selection of respondents is critical for obtaining quality data in an empirical study. In this study, the respondents were expected to have experience and the best knowledge regarding strategic planning, supply chain structure and processes, external partners, competencies, and strategic operations of their respective organizations. Based on the literature and recommendations from practitioners and academicians, it was decided to choose mid- to high-level executives from the merchandizing/procurement/logistics/ operations/sales/supply chain wings of the organizations.

Adequacy of sample size is very important to improve the representativeness or generalizability of the research outcomes (Cavana et al., 2001). This study employed a PLS based structural equation modeling (SEM) approach to test the proposed model and hypotheses. The requirement of the sample size for PLS-SEM is ten times the larger value of (a) the largest number of formative indicators measuring one construct, or (b) the largest number of independent latent variables impacting a dependent latent variable (Hair, Ringle, & Sarstedt, 2011; Chin, 1998a). Since the most complex formative constructs in this research were the '*environmental uncertainty*' and '*firm performance*', which had eight indicators each, and the largest number of independent latent variables leading to an dependent latent variable (i.e. *SCM implementation*) as predictors were six, the minimum sample size required for this study was 80 samples (8 x10). A total of 308 survey questionnaires were completed, of which 12 questionnaires were excluded due to missing data.

3.6.6 Data Collection

Prior to the distribution of the survey questionnaire, ethical approval was obtained from the Human Research Ethics Committee, Curtin University, through Protocol Approval 16-13 (Appendix E) as required. Data collection was carried out through personal administration of survey instruments at firms. Personally administered surveys are face-to-face surveys with the respondents (Frazer & Lawley, 2000). All respondents were contacted individually via telephone to make appointments for the survey. A covering letter, along with the survey instrument explaining the academic purpose and instructions for the survey were provided to the respondents. The importance of respondent independence and anonymity was emphasized. Both self-completion and surveyor-filled survey techniques were employed for a higher valid response (Hair, Black, Babin, & Anderson, 2010). The duration of the large scale survey was five months; from November 2013 to March 2014. Two final year

undergraduate students and one postgraduate student from the University of Chittagong were employed as research assistants in this survey. The research assistants had qualifications in research methods and were trained by the researcher prior to administration of the survey.

A total of 308 survey questionnaires were completed. This number indicates a 44% response rate. The data from each response was immediately input into SPSS software. The raw data showed some missing values, meaning that the respondents had either refused to answer or overlooked the question. There were twelve questionnaires that had to be discarded due to missing values or invalid responses. Finally, 296 valid responses were found usable for the analysis. The data collection met the minimum sample size (80) needed for a data analysis using the PLS based SEM technique.

3.6.7 Data Analysis Techniques

Both first and second generation statistical techniques were used in this study (Lowry & Gaskin, 2014). The first generation techniques, such as descriptive statistics, difference of means tests, factor analysis, correlations, and regressions, were used for data screening, dealing with potential non-responses and common method bias, collinearity assessment, explaining descriptive findings, and facilitating data analysis in various stages of the research. The IBM SPSS 20 statistical package was used for these purposes. The SEM, the second-generation statistical technique was used to perform the main part of the quantitative data analysis.

SEM was appropriate for analyzing the data in accordance with the proposed research model. This technique allows "researchers to answer a set of interrelated research questions in a single, systematic, and comprehensive analysis by modeling the relationships among multiple independent and dependent constructs simultaneously" (Gefen, Straub, & Boudreau, 2000, p. 3-4). There are two approaches to SEM. One is covariance-based and represents constructs through factors (CB-SEM), which is normally implemented using LISREL, AMOS, EQS, and RAMONA, and the other is components-based or least squares-based which represents constructs through components (PLS) (Lowry & Gaskin, 2014). Although most of the characteristics and advantages of CB-SEM also apply to PLS, the PLS approach differs in the objectives, statistical assumptions and the fit statistics (Lowry & Gaskin, 2014; Gefen et al., 2000). PLS was considered most appropriate data analysis technique for the quantitative part of this research due to the predictive nature of the study, its ability to handle complex models with multidimensional constructs (i.e., large numbers of manifest and latent variables), and to estimate models using both reflective and formative

constructs (Hair et al., 2011; Chin, 1998a; Barclay, Higgins, & Thompson, 1995). According to Chin and Newsted (1999), PLS is generally more suitable for studies in which the phenomenon under study is new or changing. PLS is also a nonparametric technique and, thus does not assume normality of the data, and can accommodate smaller sample sizes than other SEM techniques (e.g., covariance-based techniques such as LISREL) (Arnett, Laverie, & Meiers, 2003; Chin, 1998a). Hence, a formal analysis of data distribution (e.g., normality test etc.) was not undertaken. The data collected in this study was analyzed using the PLS technique by applying SmartPLS Version 2.0 M3 software (Ringle, Wende, & Will, 2005).

3.6.8 Partial Least Squares (PLS) Procedures

The PLS-SEM assessment involved a two-stage procedure as shown in Table 3.3: (1) assessment of the measurement model, and (2) assessment of the structural model. The details of the analysis are presented in Chapter Six. The first stage was to assess the relationships between the observed variables and the constructs to confirm that the items which represented the observed variables measured the constructs, and the second stage focused on the relationships between the constructs in the path model (Igbaria, Guimaraes, & Davis, 1995, Jarvis, Mackenzie, & Podsakoff, 2003; Hair et al., 2011).

3.6.8.1 Specification of Reflective and Formative Measurement

A measurement model specifies the relationship between latent constructs and their measurement items or indicators (Chin & Newsted, 1999). Latent constructs (also called unobservable variables) are measured by indicators or observable variables. There are two types of indicators that can be used to measure latent constructs: formative and reflective indicators. Reflective indicators are caused by the latent construct, whereas, formative indicators cause the latent construct (Chin, 1998a; Fornell & Larcker, 1981). Reflective indicators are meant to measure the same underlying dimensions and should be correlated. On the other hand, formative indicators do not necessarily share a common theme, and the latent construct is defined as a function of the formative measures (Petter, Straub, & Rai, 2007). The appropriate specification of formative and reflective constructs has been emphasized in structural equation modeling in order to improve construct validity in general and the rigor of assessments of the measurement properties of constructs (Jarvis et al., 2003; Coltman, Devinney, Midgley, & Venaik, 2008; Hair, Ringle, & Sarstedt, 2013a).

Misspecification of the relationship between a construct and its measures may result in inaccurate conclusions regarding the structural relationships between constructs (Law & Wong, 1999; Anderson & Gerbing, 1988). Jarvis et al. (2003) specify a set of criteria that can be used in deciding whether a construct should be modeled as reflective or formative: (a) direction of causality from construct to indicators, (b) interchangeability of indicators, (c) covariation among indicators, and (d) nomological net of construct indicators. A construct should be modeled as reflective if the following decision rules prevail: the direction of causality is from construct to indicators, indicators are manifestations of the construct, changes in the indicator do not cause changes in the construct, the indicators are interchangeable (i.e. dropping an indicator does not change the conceptual domain of the construct), indicators are expected to co-vary, and the nomological net for the indicators is same (Jarvis et al., 2003; Petter et al., 2007; Coltman et al., 2008). In contrast, a construct should be modelled as formative if the opposite conditions apply. Based on these decision rules, this study identified 19 first-order reflective constructs, three second-order reflective constructs, and three first-order formative constructs in the research model.

3.6.8.2 Assessment of Hierarchical and Multi-Dimensional Constructs:

Hierarchical constructs or multidimensional constructs are defined as constructs consisting of more than one dimension or facet, each of which represents some portion of the focal higher-order latent variable (Edwards 2001; Jarvis et al., 2003; Law & Wong 1999; Law, Wong, & Mobley, 1998; MacKenzie, Podsakoff, & Jarvis, 2005; Wetzels, Odekerken-Schroder, & van Oppen,2009; Petter et al., 2007). In contrast, unidimensional constructs have a single underlying dimension (Netemeyer, Bearden, & Sharma, 2003). Hierarchical constructs are defined and operationalized based on theoretical and empirical grounds (Edwards, 2001). Theoretically, the essential characteristics of these constructs have more than one unique conceptual aspects or dimension, and the elimination of any one of them would affect the conceptual domain of the construct (MacKenzie et al, 2011). Hierarchical construct modeling is seen as a way of improving theoretical parsimony and reducing model complexity (Edwards, 2001; Becker, Klein, & Wetzels, 2012; Law et al., 1998; MacKenzie et al., 2005).

Three approaches, the repeated indicator approach, the two-stage approach, and the hybrid approach, are generally suggested to estimate the parameters of the higher-order latent variables using PLS-SEM (Ringle, Sarstedt, & Straub, 2012; Wetzels, et al., 2009; Becker, et al., 2012). Using the repeated indicator approach, a second-order construct can be created that represents all the manifest variables of the underlying first-order latent variables (Becker,

et al., 2012). In this approach, the manifest variables are used twice: to estimate (1) the first-order latent variables, and (2) the second-order latent variables. One pitfall of this approach is that the same indicators are repeatedly used for both the first-order and second-order constructs, which can cause artificially correlated residuals (Becker, 2012). The repeated indicator approach is recommended when the lower-order constructs have an equal number of indicators (Chin, Marcolin, & Newsted, 2003; Ringle et al., 2012; Becker, et al., 2012). The two-stage approach was chosen for this study as the first-order constructs had unequal numbers of indicators, which might lead to biased loadings for the first-order constructs on the second-order constructs (Becker, et al., 2012; Ringle et al., 2012). Becker et al., (2012) suggest the two-stage approach when a researcher is interested only in the higher-level estimates.

The sequential latent variable score method, the two-stage approach, was followed to estimate the construct scores of second-order constructs from observed variables measuring the first-order constructs (Ringle et al, 2012; Becker et al., 2012; Wetzels et al., 2009). In this process, the first-level model was estimated with the first-order constructs in the first stage, and then the latent variable scores of the first-order constructs were used as reflective indicators of the second-order constructs in the second stage. This study estimated the three second-order hierarchical constructs, SCM implementation, SCM practice and supply chain agility, following the two-stage approach. In this process, the first-level model was estimated with the first-order constructs using the manifest variables of the underlying lower-order latent variables (e.g. demand response, flexibility, integration, and customer responsiveness) in the first stage, and then the latent variable scores of the first-order constructs were used as reflective indicators of the second-order constructs in the second stage. The process has been depicted for one of the second-order constructs, supply chain agility (SCA), in Figure 3.2.

First Stage	Second Stage

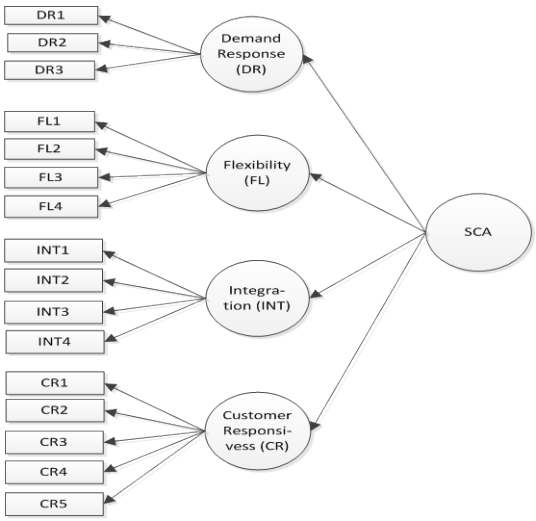
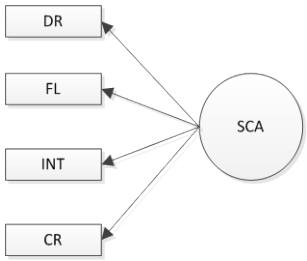

	

Figure 3.2a First-order Latent Variables of SCA	**Figure 3.2b SCA as a second-order reflective construct**
Figure 3.2a shows four first-order reflective latent variables (demand response, flexibility, integration, and customer responsiveness) of SCA which are related to their respective manifest variables (e.g. DR1, DR2, DR3, FL1, FL2 and so on).The loadings represent the first-order loadings.	Figure 3.2b shows SCA as a second-order reflective variable which is constructed by using the factor scores of the first-order latent variables (DR, FL, INT, and CR) which are used as reflective indicators. This means that first-order latent variables become indicators for the second-order latent variable in the second-stage.

Figure 3.2: Estimating Hierarchical-Reflective Constructs Using the Two-stage Approach to PLS-SEM Modeling

Figure 3.2a shows four first-order reflective latent variables (demand response, flexibility, integration, and customer responsiveness) of SCA which are related to their respective manifest variables (e.g. DR1, DR2, DR3, FL1, FL2 and so on) and Figure 3.2b shows SCA as a second-order reflective variable which is constructed using the factor scores of the first-order latent variables (DR, FL, INT, and CR) which are used as reflective indicators. This means that first-order latent variables become indicators for the second-order latent variable in the second-stage. The formation of the reflective second-order construct can be specified by the following two equations (Table 3.2). The equation for the first-order construct specifies the first-order latent variable (η_j), its indicators (y_i), loadings (Λ_y) and an error term (ε_i). The equation of the second-order construct specifies the first-order factors ((η_j) in terms of the second-order latent variables (ξ_k) and measurement error (ζ_j) for the first-order factor and second-order latent variable loadings (Γ).

Table 3.2: Estimation of Reflective Higher-Order Construct Using PLS

First-order construct	Second-order construct
$y_i = \Lambda_y \cdot \eta_j + \varepsilon_i$	$\eta_j = \Gamma \cdot \xi_k + \zeta_j$
y_i = manifest variables (*e.g., items of demand response*)	η_j = first-order factors *(e.g., demand response)*
Λ_y = loadings of first-order latent variable	Γ = loadings of second-order latent variable
η_j = first-order latent variable (e.g., *demand response*)	ξ_k = second-order latent variable *(e.g., supply chain agility)*
ε_i = measurement error	ζ_j = error of first-order factors

Table 3.3: Two-Stage Assessment Procedure of PLS Analysis

Stage	Type of Item	Type of Measurement	Acceptable Value
1. Assessment of measurement model	Reflective	*Convergent validity*	
		i. Item reliability	Item loading ≥ 0.70; 0.40 in exploratory studies
			Significance of *t*-value ≥ 1.65
		ii. Internal consistency	Calculated value ≥ 0.7
		iii. Average variance extracted (AVE)	Calculated value ≥ 0.5
		Discriminant validity	
		i. Construct level	Square root of AVE of construct > correlation between the construct and other constructs
		ii. Item level	Item loadings of construct > all other cross-item loadings of the construct
	Formative	i. Indicator weight	Indicator's weight (relative importance) and loading (absolute importance)
			Significance of *t*-value ≥ 1.65
		ii. Multicollinearity	VIF ≤ 05 or 10
2. Assessment of structural model	Reflective and formative	i. Collinearity Assessment	VIF ≤ 05 or 10
		ii. Amount of variance explained	R^2 ≥ 0.25 (weak) or 0.50 (moderate) or 0.75 (substantial)
		iii. Test of hypotheses	Significance of *t*-value ≥ 1.65
		iv. Predictive relevance	Cross-validated redundancy of Q^2 >0
		v. Power analysis	Power (1-β) > 0.80
		vi. Mediation analysis	Significance of *t*-value ≥ 1.65

3.6.8.3 Assessment of Measurement Model

In the first stage, the objective was to examine the properties of the hierarchical measurement model (first-order and second-order) in terms of convergent validity and discriminant validity for the reflective constructs. This study tested item reliability and multicollinearity for the formative constructs,.

Convergent validity

The first step in the assessment of the measurement model was to test the convergent validity of the model. Convergent validity indicates the extent to which each measurement items is converged into a theoretical construct. This was accomplished by performing the following two steps.

Item Reliability

The first step in assessing the convergent validity is to examine the item reliability. The assessment of item reliability involves an analysis which estimates the amount of variance that is due to the construct in each individual item's measure (Barclay et al., 1995). It examines how well each item is related to their respective reflective constructs, which is often referred to as simple correlation. The computed correlation results in an item loading which provides an indication of the item's strength. In PLS, item reliability of an individual item is assessed by examining its loading on the intended construct. Researchers have different opinions on the acceptable value of item loadings. Hair et al. (2011) suggest that item loadings should be higher than 0.70 with corresponding minimum significance of a *t*-value of 1.65, however, loadings of 0.40 are acceptable in exploratory research (Hair et al., 2013a). Most researchers recommend that most loadings should be at least 0.6 and ideally 0.7 or above (Chin, 1998a). Review of items with low loading is also suggested if the items are taken from a strong theoretical background (Nunnally, 1978). Low loading items are sometimes retained considering their contribution to content validity (Hair et al., 2011). This study adopted a minimum cut-off value of 0.60 for item loading taking the recommendations from the literature and exploratory nature of the study into account.

Internal Consistency

Internal consistency is an important measure in assessing convergent validity, to ensure that items measuring a construct are correlated. While item reliability is a measure of items against its constructs, internal consistency is a measure of the reliability of the

constructs (Fornell & Larcker, 1981). This study examined the reliability of internal consistency using composite reliability. Composite reliability differs from traditional measures of consistency (such as Cronbach's alpha) and is considered a better measure of internal consistency as it does not assume that all indicators are equally weighted, and is not influenced by the number of indicators (Barclay et al., 1995; Chin, 1998a). Internal consistency can be calculated using the following formula (Fornell & Larcker, 1981).

$$\text{Internal consistency} = \frac{\left(\sum \lambda_{yi}\right)^2}{\left(\sum \lambda_{yi}\right)^2 + \sum Var(\varepsilon_i)}$$

Where,

λ_{yi} = the factor loading which represents simple correlation between the item and its construct (y = construct, i = item); and

$Var\ (\varepsilon_i) = 1 - \lambda_{yi}^2$, the unique/error variance.

As a general guideline, a minimum value of 0.7 is suggested as acceptable for composite reliability (Chin, 1998b; Gefen et al., 2000; Hair et al., 2011).

Average Variance Extracted (AVE)

Average variance extracted (AVE) is another commonly used internal-consistency diagnostic for reflective constructs. AVE assesses "the amount of variance captured by a set of items in a scale relative to measurement error" (Netemeyer et al., 2003, p.153). It indicates the amount of variance shared between a construct and its corresponding items. The following formula explains the calculation AVE (Chin, 1998a):

$$\text{Average variance extracted (AVE)} = \frac{\left(\sum \lambda_{yi}\right)^2}{\sum \lambda_{yi}^2 + \sum \lambda Var(\varepsilon_i)}$$

Where,

λ = factor loading to an indicator

y = construct

i = item

$\text{Var}\ (\varepsilon_i) = 1 - \lambda_{yi}^2$

It is suggested that the AVE should be at least 0.50, as this indicates that 50% or more of the variance is explained by the measurement items of the construct (Hair et al., 2011; Chin, 1998b; Fornell & Larcker, 1981).

Discriminant Validity

Discriminant validity assesses the extent to which the constructs in a model are different (Barclay et al., 1995; Farrell, 2010). This is to determine whether any item shares more variance with other constructs than the construct it intends to measure. Two analytical procedures, average variance extracted (AVE) analysis at the constructs level, and cross loading matrix evaluation at the item level, are performed to establish discriminant validity (Barclay et al., 1995; Hair et al., 2011).

The square root of AVE is compared to the inter-construct correlations to assess the discriminant validity of the measurement model at construct level. Sufficient discriminant validity is achieved when the square root of AVE for each construct is greater than its correlation with other constructs in the model (Fornell & Larcker, 1981; Chin, 1998b; Koufteros, 1999). To assess discriminant validity at the item level, a cross-loading matrix is used to examine cross loadings for each item and compare them across all constructs. The cross-loading analysis measures the correlation of an item with respect to all constructs within the model (Chin, 1998a; Chin, 1998b). To confirm discriminant validity, an item should have higher loading value on the construct it intends to measure, than on other constructs.

Indicator Weight and Multicollinearity

Formative indicators do not necessarily correlate highly (Hair et al., 2011; Coltman et al., 2008). Convergent validity and discriminant validity thus cannot be applied. Instead, indicator weight, which describes the relative importance of each item towards the formation of the construct, is examined (Hair et al., 2011). The aim is to ensure that each item contributes towards the construct's formation. For items with very low indicator weight, the item contribution towards construct conceptualization needs to be reviewed. As suggested by Diamantopoulos and Winklhofer (2001), conceptual considerations are prioritized before any indicator is removed. In addition to assessing the weights (relative contribution), noting the statistical significance of the loadings with minimum critical *t*-value of 1.65 so as to examine the absolute contribution of the indicators to a formative latent construct is also recommended (Hair et al., 2013). Finally, multicollinearity is tested by calculating the variance inflation factor (VIF). This is done to ensure that each indicator has a distinct influence on the intended latent construct (Diamantopoulos & Winklhofer, 2001). The maximum threshold for the VIF is 5 (Hair et al., 2011) or 10 (Kleinbaum et al., 1998). Items that do not meet the requirement of multicollinearity test are thus eliminated.

The measurement model for the current research was assessed and adjusted by removing inconsistent items. This was done repeatedly until the requirement for each criterion of convergent validity and discriminant validity was achieved. Both item weight and multicollinearity were examined to detect problematic formative items. The result of these rigorous procedures was an assessment model on which the next stage of PLS analysis was based to assess the structural model.

3.6.8.4 Assessment of Structural Model

The second stage of the PLS analysis is the assessment of the structural model. The structural model consists of the hypothesized relationship between the latent constructs (Santosa, Wei, & Chan, 2005). In this stage, the assessment of the structural model involved testing the proposed hypotheses by examining the path coefficients (β), and statistical significance of t-values, and the amount of variance explained (R^2) (Santosa et al., 2005; Barclay et al., 1995). Prior to assessing the structural model, it was examined for collinearity (Hair, et al., 2013b). Predictive relevance (Q^2) (Hair, et al., 2011) and power analysis (1-β) (Cohen, 1988) were also considered in order to establish further rigor of the empirical findings.

Collinearity Assessment

The structural model should be examined for collinearity before assessing the structural model. The path coefficients may be biased if the estimation contains significant levels of collinearity among the predictor constructs. This is because the estimation of path coefficients in the structural model is based on the OLS regressions of each endogenous latent variable on its corresponding predecessor latent exogenous variables (Hair, et al., 2013b). In this study, multicollinearity was tested using VIF and tolerance values. In doing so, each set of predictor constructs were examined separately for each subpart of the structural model. Tolerance levels below 0.20 and VIF above 5.00 in the predictor constructs suggest the existence of excessive multicollinearity (Hair, et al., 2013b; Hair, et al., 2011).

Path coefficient (β) and Statistical Significance of t-value

The next test was to evaluate the relationship of the construct as hypothesized in the comprehensive research model. The statistical analysis was evaluated by assessing the path coefficient (*β*) and the *t*-value. The path coefficient (β) and the *t*-value were assessed by

means of the PLS-SEM algorithm and bootstrapping procedures, respectively, to evaluate the hypothesized relationships between the constructs (Hair, et al., 2011). The results indicate the strength and direction of the hypothetical relationship.

Amount of Variance Explained or R Squared (R^2)

An important criterion for model assessment in PLS analysis is the amount of variance explained (Barclay, 1991). The R^2 values were examined to assess the predictive power of the proposed research model of the current study (Barclay et al., 1995). This represents the extent to which the exogenous constructs explain the endogenous constructs. The value of R^2 is interpreted in a similar manner to the traditional regression model (Fornell & Larcker 1981; Barclay et al., 1995). R^2 values therefore indicate the amount of variance in the construct which is explained by its corresponding exogenous constructs. Falk and Miller (1992) suggest 0.10 as the minimum cut-off value for R^2. Again, according to Hair et al. (2011), R^2 values of 0.75, 0.50 or 0.25 for the endogenous latent variables in the structural model can be described as substantial, moderate or weak, respectively.

Predictive Relevance (Q^2):

In addition to observing the magnitude of the R-square, this study applied the predictive sample reuse technique, or Q^2, as developed by Stone (1974) and Geisser (1975) to confirm the predictive validity of the model using PLS. Predictive relevance can be seen as a type of model fit indicator, as PLS does not provide assessment of causal relationships (Ruiz, et al., 2010). This technique uses a blindfolding procedure that omits part of the data matrix and uses the resulting estimates to predict the omitted part (Hair, et al., 2011). The procedure results in the Q^2 test statistic, a measure that shows whether the model is able to adequately predict the indicators of each endogenous construct (Hair, et al., 2011; Chin, 1998). The predictive measure for a block of indicators is based on the following parameters:

$$Q^2 = 1 - \frac{\sum_D E_D}{\sum_D O_D}$$

where:

E = the sum of squares of prediction error

O = the sum of squares error using the mean for prediction

D = omission distance

Q^2 can be obtained using two different approaches, *cross-validated redundancy* and *cross-validated communality*. Hair, et al., (2013b) recommends the use of *cross-validated*

redundancy since it considers the path model estimates of both the structural model (scores of the antecedent constructs) and the measurement model (target endogenous constructs), whereas the *cross-validated communality* considers only the construct scores estimated for the target endogenous construct to predict the omitted parts of the data. An omission distance of 5-10 is suggested in estimating Q^2 (Hair, et al., 2011). A Q^2 larger than zero implies that the model has predictive relevance. As a relative measure of predictive relevance, Q^2 values of 0.02, 0.15, and 0.35 indicate that an exogenous construct has a small, medium, or large predictive relevance for a particular endogenous construct (Hair, et al., 2013b). The study uses cross-validated redundancy to estimate the predictive relevance of the research model.

Power Analysis (1-β)

Power (1-β) of a statistical test is defined as the probability of rejecting a null hypothesis (H_0), when the alternative hypothesis H_1 is true (Marx & Larsen, 2006). Put differently, power is the probability of obtaining a statistically significant result (H_1), i.e., successfully rejecting H_0 (Cohen, 1988). Significance tests that lack statistical power are of limited use, as they are unable to reliably discriminate between H_0 and H_1 (Faul, Erdfelder, Lang, & Buchner, 2007). In testing a complex research model using PLS-SEM, this study performed power analysis to validate the implications of sample size. Sample size adequacy is important for improving overall estimates and reducing standard errors (Marcoulides & Saunders, 2006). Specifically, if small sample sizes (N=20) were used in large complex models, they would not detect low-valued structural path coefficients (β=0.20) until large sample sizes (N > 150) were used (Chin & Newsted, 1999, p. 333). In cases of moderately non-normal data, a considerably larger sample size is required for a model even with highly reliable measures (Marcoulides & Saunders, 2006). With a view to ensuring rigor in the complex modeling, this study assessed power in the PLS-SEM-based estimates to confirm adequacy in the sample. Statistical power relies on the significance criteria (α) of the test, the sample size (N) of the study, and the population effect size (ES) (Cohen, 1992). In assessing the adequacy of the sample size of a large complex model, a power analysis is suggested for the portion of the model with the largest number of predictors (Chin & Newsted, 1999). In this study, G*Power 3.1.9.2, a PC-based power analysis program was used to perform the power test (post hoc) to assess the validity of statistical parameters. As a general convention, the power of a statistical test should be at least 0.80 (Cohen, 1988). High power (> 0.80) suggests a high degree of probability of obtaining significant results when the relationship is truly significant. The result of the power analysis for this study is presented in Chapter Six.

Mediation Analysis

Structural equation modeling allows researchers to examine relationships between an independent variable and a dependent variable through the inclusion of a third explanatory variable, known as a mediator variable. That is, a mediating effect is formed when a third construct interferes between two other correlated constructs. The mediation hypotheses proposed in this study were tested by applying a statistical technique suggested by Baron and Kenny (1986), and Judd and Kenny (1981). They proposed that a given variable may function as a mediator (M), if the following requirements are met: (1) a significant relationship exists between the independent or predictor variable (X) and the dependent or criterion variable (Y); (2) a significant relationship exists between X and M; and (3) in the presence of a significant relationship between M and Y, the previous relationship between X and Y ceases to be significant. (i.e. full mediation), or the strength of the relationship is significantly reduced (i.e. partial mediation).

3.9 SUMMARY

This chapter has focused on the research methodology used in this study. Comparing the current trends of research approaches being used within the supply chain management field, an appropriate research approach was chosen to guide this particular research. This chapter has also presented a systemic overview of the research method and tools used for this research. It was also explained that this research followed the mixed-method research technique. Measures used with the mixed-method approach were discussed briefly.

Chapter Four

FIELD STUDY AND COMPREHENSIVE RESEARCH MODEL[2]

4.1 INTRODUCTION

As discussed in Chapter Three, this study has adopted a mixed-method approach. A qualitative research analysis was conducted through a field study. This chapter presents the analysis of the data derived from the field study. The field study was carried out through semi-structured interviews with ten supply chain executives from apparel manufacturing firms in Bangladesh. The qualitative approach was undertaken mainly to contextualize and fine-tune the initial research model (Figure 2.2). This phase focuses on an examination of the factors and variables defined in the initial model in the current setting. As the initial research model was developed from a review of literature based on different contexts, field study was necessary to ensure the suitability and relevance of the model in the context of the apparel industry of Bangladesh. The field study also aimed to explore salient new factors and variables. In subsequent phases, the factors and variables explored were confirmed by the existing literature.

This chapter first presents an overview of the field study process, followed by the findings of the content analysis which involved inductive and deductive stages. Based on the analysis, comparison was made between the field study findings and the initial model. As a result, a refined and comprehensive research model (Figure 4.2) was developed, which is presented in the final part of this chapter.

4.2 OVERVIEW OF THE FIELD STUDY

4.2.1 Qualitative Research Paradigm

As mentioned earlier, the first phase of the study was qualitative as part of a mixed methodology where a field study was employed to explore the implementation and practice of supply chain management (SCM) practices, the antecedents, and the impacts of the SCM

---

[2] Part of this chapter was presented and published in the following conference and publication:

Jahed, M. A. & Quaddus, M. (2014). Investigating supply chain management practice, agility and competitive advantage in Bangladesh apparel Industry. In *Proceeding of the International Scientific Conference on Management & Information Science,* 159. Bali, Indonesia.

practice in the apparel manufacturing firms in Bangladesh. As there was limited research looking at the phenomena from a developing country perspective, a qualitative field study was used to examine the suitability of research instruments and constructs which were developed through the review of the literature from different contexts. This research adopted a field study-based qualitative research approach, as field study is often suggested as an effective method to explore a participant's viewpoint in a particular setting (Zikmund, 2003; Patton, 1999). This study specifically employed a multiple case-based field study approach. This approach is considered an appropriate research design when the research objective is descriptive, practice-based, and theory building, and where the critical thoughts and experiences of the phenomena are important (Benbasat, Goldstein, & Mead, 1987). In carrying out the exploratory study, the predicted factors and variables were explored, collated and modified, and other factors and variables were generated, which were then justified through the relevant literature. The findings of the field study were used to refine the initial research model and to develop a survey questionnaire for the quantitative study in the second phase of this research. The following sections present the details of the field study process.

4.2.2 Interview Questionnaire Development

Five questions were designed, based mainly on the literature, to cover the main topics of this field study. Table 4.1 presents the topics with the relevant concepts (questions). The first question explored the various formal and informal processes, systems or practices that the apparel manufacturing firms put in place to implement SCM. The second question was developed to explore the different internal (e.g., organizational culture) and external forces (e.g., environmental uncertainty, networking) that influence the implementation of SCM by firms. The third question was planned to gain insight into the supply chain relationship quality and its effects on a firm's ability to achieve competitive advantage. In order to examine the breadth and level of agility in the supply chain, the fourth question was designed to explore the various capabilities of firms and their supply chains that are required to cope with market changes and respond to them quickly and effectively. Finally, the last question was aimed was aimed at examining whether firms felt their competitive edge could be attributed to SCM practice. Probing or subsequent secondary questions within the main questions were used to derive the imperative depth and insight needed for better understanding of the responses, and to better explore the dimensionality of the topics covered in the study. The complete set of questions for the field study is attached in Appendix A. The interview guide including the questions was examined and approved by the

Human Research Ethics Committee of the Curtin University through Protocol Approval number GSB 20-12 (attached in Appendix C).

Table 4.1: Issues and Related Questions in the Field Study

Question Number	Topic	Description of the Question
1	To explore SCM practices	The different formal/informal practices/processes/ systems that the firms put in place to implement and practice SCM
2	To explore the antecedents of SCM implementation	A firm's internal and external factors that influence the implementation of SCM
3	To understand the level of supply chain relationship quality	A firm's relationship with supply chain members and its impact
4	To explore agility in the supply chain	Description and importance of the ability to respond to market changes quickly and effectively
5	To understand the competitive edge of the firm	Understanding the competitive edge of the firm and the extent to which the firm attributes this to SCM implementation and practice

Prior to the interviews, a pilot study was conducted to test the appropriateness, comprehensibility and applicability of the questions in the interview guide. Three participants were engaged in this process. Two participants were from the Bangladesh apparel manufacturing industry, and were potential participants in the field study and the other was a researcher at Curtin University. All the questions were deemed comprehensible and relevant, however, based on the feedback, some minor adjustments to the wordings of the questions were made. The pilot study also provided valuable experience, allowing the researcher to become familiar with the context of the interview questions and the interview process before conducting the actual interviews. It was found that asking questions based on participant answers was better than following the sequence of the interview questions because the participant answers included possible feedback for other questions, which led to new questions. After finalizing the interview questions based on the feedback from the pilot study, the final interviews were conducted.

4.2.3. Sample Selection

In this phase of the research, a convenience sampling technique was used to select the sample for the field study. This technique is considered more appropriate for qualitative research and provides the means to approach participants more conveniently, and to collect

information efficiently (Devlin, 2005; Zikmund, 2003; Cavana et al., 2001). The names of potential participants were gathered based on personal contacts. The participants were middle to senior level executives performing supply chain functions in manufacturing firms engaged in making woven and knit-based apparel products. The selection of the interview participants was mainly based on their knowledge and experience of supply chain functions. Attention was given to the heterogeneity of sample firms according to size and product types. This approach was chosen in order to increase the possibility of generalizing results and obtaining better insights and more consistent validation of the results. The interviewees were given a clear description of the research objectives, and information about their role in this study, along with a copy of the interview questionnaire. The participation of the interviewees in this study was voluntary. The qualitative study commenced with the idea of an open-ended number of cases and interviewing ended after the 10th case, considering informational redundancy as well as theoretical saturation (Denzin & Lincoln, 2003; Strauss & Corbin, 1998). Table 4.2 presents the profile of the interview participants in the field study.

Table 4.2: Participants' profile

Type of Firm (Apparel Products Made)	Firm Size (Number of Employees)	Participant	Position	Experience in Apparel Industry (In years)
Knit and woven	7000	P1	Manager, Sales & Merchandizing	8
Woven	6000	P2	General Manager, Sales & Marketing	20
Woven and knit	3200	P3	General Manager, Operations	15
Knit	16000	P4	Supply Chain Manager	11
Woven and knit	1150	P5	Manager, Merchandizing	9
Woven	7500	P6	Supply Chain Manager	10
Woven	8000	P7	Manager, Procurement	13
Knit	1000	P8	Assistant Manager, Merchandizing	8
Knit	2000	P9	Supply Chain Executive	7
Woven	4000	P10	Supply Chain Manager	6

4.2.4 Data Collection

A semi-structured interview method was used in this study, involving face-to-face and one-to-one interviews to gather relevant data. The interview appointments were

arranged by telephone contact at the convenience of the interviewees. These interviews were conducted at their office premises. All interview participants were from Dhaka and Chittagong city, the two largest cities of Bangladesh, where most of the apparel manufacturing firms were located. Almost eighty percent of the apparel manufacturing firms are located in Dhaka and the rest twenty percent are located in Chittagong (BGMEA, 2013). Prior to the interview sessions, the interviewees were given a brief description of the research objectives, and the ethical issues were addressed. During the interview session, they were encouraged to express their opinion freely and allowed to seek clarification. This process of question, explanation and clarification allowed for the testing and negotiation of understanding. It also helped ensure understandability for both the interviewer and the interviewee. All the interviews were conducted in English, but to clarify some issues, the local language i.e., Bengali was used time to time.

Each interview took approximately one hour. All interviews were recorded with the permission of the participants being interviewed. The recorded data was subsequently transcribed on the same day, or at the latest by the next day, so that the essence and tones of the interview would be properly reflected.

4.2.5 Data Analysis

Content analysis was used to examine and analyze the transcribed interview data, as this research is more exploratory than confirmatory in nature (Huberman & Miles, 1994; Berg, 2004). The objective was to ascertain key factors, constructs and the links among the constructs. The ten recorded interviews yielded a total of 115 pages of transcripts. A two-step process of inductive and deductive analysis (Berg, 2004; Quaddus & Xu, 2005), was used to explore and endorse the themes and sub-themes found in the raw data.

In the first phase, the inductive process started with conducting and transcribing the interviews, and analyzing the interview transcripts. Analysis was performed manually, due to the simple nature of the language and the low number of individual transcripts. The details of the transcripts were thoroughly reviewed to discover key patterns/themes. The inductive process identified the themes by using key words, which were then labeled and categorized to determine the factors corresponding to constructs. After this process, the constructs established from each interview were compared and, finally, all constructs and sub-constructs were induced into a single framework which was later compared with the initial research model in the next phase.

The second phase was the deductive analysis. In this phase, the initial research model and the field study findings were compared and reviewed to assess the significant constructs and variables. The findings from the field were then revisited to justify them according to the literature review. Finally, as a result of this process, a comprehensive model (Figure 4.2) was developed for the research. Figure 4.1 shows the steps followed in the qualitative phase of this research. The findings of the field study analysis are explained in the following sections.

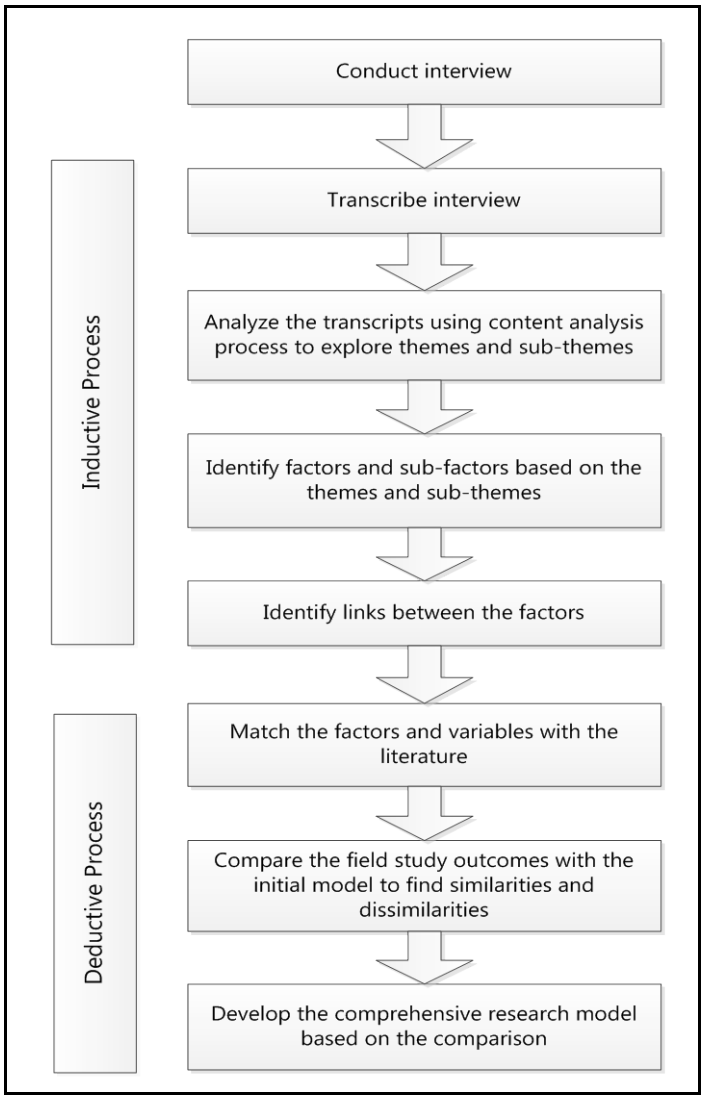


Figure 4.1: Data Analysis Process of the Field Study

4.3 FINDINGS OF THE FIELD STUDY (First Stage: Inductive Analysis)

This section presents the findings of the field study analysis, based on the first stage of content analysis. The findings are presented in three sub-sections. The first presents the findings related to supply chain management (SCM) dimensions and, the

findings related to the antecedent factors of SCM implementation and practice are discussed in the second sub-section. Findings related to outcome factors of SCM practice are presented in the third sub-section. Finally, findings with regard to the relationship among the factors are included in the third sub-section.

4.3.1 Factors and Variables

4.3.1.1 Supply Chain Management (SCM) Dimensions

Supply chain management (SCM) is implemented and practiced through a whole set of approaches, policies, and practices that integrate suppliers, manufacturers, distributors, and customers to improve the long-term performance of firms and their supply chains (Koh et al., 2007; Chopra & Meindl, 2010). These formal and informal practices, policies, approaches or systems facilitate the collaboration of a manufacturer with their suppliers and/or customers (Gimenez et al., 2012; Van der Vaart & van Donk, 2008). In the context of the Bangladesh apparel manufacturing industry, the SCM process begins with responding to the buyer's inquiry and continues through developing samples, receiving and executing orders, procuring necessary materials, manufacturing and assembly, packaging, stocking and inventory management, shipment of finished products to the buyers or their nominated locations within the agreed delivery deadline and managing after sale issues including assessing customer satisfaction. Bangladesh apparel manufacturing firms are largely dependent on their suppliers for the necessary raw materials, trims and accessories. In most cases, fabric and trims are procured from foreign suppliers. The merchandisers play an important role in confirming orders, and the time and action (TNA) plans, and in coordinating most of the activities associated with execution of the orders. The participants in the field study focused on various formal and informal practices, policies or systems in implementing and practicing SCM to the various extents within their firms. The content analysis revealed that these practices and policies are diverse, reflecting the different dimensions of SCM such as strategic buyer partnerships (N=9), supplier partnerships (N=8), information sharing (N=9), information quality (N=8), and lean operating systems (N=7). These practices are generally cross-functional in nature and many are cross-organizational, covering internal operations, and upstream and downstream supply chain processes aligned with a firm's strategic goals of improving overall performance and achieving competitive advantage. Details of the field study findings on SCM practices are presented in Table 4.3 and discussed in the following sub-sections.

Table 4.3: Dimensions and Variables of SCM

Factor	Variable	Firm									
		1	2	3	4	5	6	7	8	9	10
Strategic Buyer Partnership	Interaction with buyers to set standards for buyer requirements	√	√	√	√	√	√			√	√
	Collaboration in planning	√	√	√	√		√	√		√	√
	Periodic evaluation of buyer satisfaction	√	√	√	√	√	√	√	√		√
	Seeking to establish long term relationship		√	√	√	√		√		√	√
	Buyer-oriented capacity planning	√	√	√	√		√	√	√		
Supplier Partnership	Formal supplier selection process	√	√	√	√	√	√	√	√		
	Supplier evaluation and performance monitoring	√	√			√	√		√		√
	Suppliers engagement in planning	√	√		√		√	√	√		√
	Resolving problem jointly		√	√	√	√	√				
	Involvement in product development		√	√	√	√		√		√	√
	Striving to establish long term relationships	√		√	√	√		√	√	√	√
Information Sharing	Standard procedures for handling information exchange	√	√	√	√		√				
	Information sharing support tools	√	√	√	√	√	√	√	√	√	√
	Keeping each other informed about issues affecting them	√	√		√	√	√		√		
	Informing partners in advance of changing needs		√	√	√	√		√		√	
	Exchange of information in support of business planning	√	√	√	√		√		√		√
Information Quality	Timely information sharing	√	√	√	√	√	√	√		√	
	Accurate information sharing	√	√	√	√	√	√			√	
	Complete information sharing	√	√		√			√		√	
	Adequate information sharing		√	√	√	√				√	√
Lean System	Work study program	√	√	√	√		√	√	√		√
	Efficient utilization of machine time		√	√		√	√			√	√
	Pull production system	√	√	√		√			√	√	
	Streamlining operations, ordering and shipping processes	√	√	√	√	√	√				√
	Measures for waste elimination and potential environmental hazard reduction	√	√	√			√			√	
	Continuous quality improvement program	√	√	√	√			√			√

Strategic Buyer Partnership

Effective SCM consists of a series of partnerships, and, its implementation involves building and maintaining long-term relationships with key buyers to facilitate collaboration in the planning and execution of the supply chain operations so as to realize common goals and mutual benefits (Cooper et al., 1997; Gunasekaran et al., 2001). It is evident from the field

study that building and maintaining long-term relationship with buyers is an important focus of SCM implementation in the Bangladesh apparel industry. Participant 4, for instance, noted that:

> "*….we always try to build and maintain a long-term cooperative relationship with our buyers. It forms the base for a win-win situation which is beneficial for both of us in competing in today's global marketplace*" (P4).

Field study data revealed that the apparel manufacturing firms have implemented a number of practices in support of such strategic partnership with their buyers. Nine out of ten firms (N=9) agreed that they put a formal system in place for evaluating buyer satisfaction periodically (quarterly or bi-annually). The objective is "*to analyze the gaps between buyer requirements or expectations and actual performance*" (Participant 9), and "*to address the points that can be used to overcome the discrepancies and what proactive measures can be taken in future*" (Participant 4). The apparel industry of Bangladesh is mainly export-oriented and its supply chain is buyer dominated. Participant 2 argued that "*our operations start with our buyers as without them there is no need for suppliers of finished apparel products or materials*", and Participant 7 noted that:

> "*there are two ways of receiving orders from buyers. One is to work on the basis of the designs provided by the buyers and the other is allowing the buyers to choose from the various designs developed by our internal Research and Development team. The operation of supply chain activities starts when buyers confirm the design specifications and quantity*" (P7).

The implementation of several other key practices were revealed in the field study, such as interaction with buyers to set standards for buyer requirements (N=8), collaboration in planning (N=8), striving for long term relationships (N=7), and buyer-oriented capacity planning (N=7). For example, Participant 1 stated that:

> "*we have established the practice of determining and reviewing requirements related to end customer demands and establishing communication with our buyers. We prepare a formal plan jointly, that is, the Time & Action (T&A) plan, which guides us to carry out all the required activities within the allotted time frame according to the standards set for meeting buyer requirements*" (P1).

The field study analysis shows that five key practices related to strategic buyer partnership are common to most of the apparel manufacturing firms in Bangladesh. These are interaction with buyers to set standards for customer requirements, collaborative planning, periodic buyer satisfaction evaluation, and buyer-oriented capacity planning.

Supplier Partnership

Partnership-like relationships based on close cooperation between a manufacturer and its suppliers is the key to effective SCM. Partnership-like relationships are defined by close co-operation between manufacturers and their suppliers (Goffin et al., 2006). The adoption of a number of SCM practices related to supplier partnership was explored through the content analysis; for example, the formal supplier selection process (N=8), striving to establish long-term relationships (N=8), supplier involvement in planning (N=7), collaboration in product development (N=7), supplier evaluation and performance monitoring (N=6), and resolving problems jointly (5). As noted by participant 1,

> "*we have implemented a system as part our integrated management system for the selection and evaluation of suppliers, performance monitoring, managing procurement procedures and documentations and assurance of materials quality. The aim is to ensure that the suppliers consistently supply the fabrics or other accessories that fully meet our requirements*" (P1).

Commonly reported criteria included in the formal supplier selection process are materials quality, price, business experience, delivery lead time, existing capacity, continuous availability of materials, market reputation, and a supplier's knowledge of customer needs (Participants 1, 3, 2, 7, 4, 5, 8, 7 & 6). Regarding supplier involvement in planning, Participant 6 explained that;

> "*suppliers are significantly involved with our planning as proper execution and on-time delivery of buyers' orders depend on timely receipt of the required fabrics and other accessories from suppliers*" (P6).

Collaboration in product development emerged from the field study as an important SCM practice. For example, Participant 3 noted that:

> "*the first step in the supply chain process is developing and getting approval of sample products and necessary materials (fabrics, trims etc. which are procured from the suppliers) from the respective buyer. Thus, most of the time, there is a tripartite collaboration among apparel manufacturers, buyers and suppliers in developing sample products*" (P3).

Sometimes, suppliers need technical and financial support to achieve the required capacity and competence. The practice of such support was also evident in the field study. Participant 8 noted an instance of such support;

> "*we needed to outsource embroidery function for an order for which we paid half of the billing amount in advance so that the supplier could meet the initial financial requirement. We also provide technical support and guidance to our suppliers*" (P8).

In short, the participants felt that the practices of strategically selecting supplier and building partnership through constant monitoring of quality and delivery performance, sharing of information, collaboration in planning, quality improvement, and product development are important for effective SCM.

Information Sharing

An important practice in managing an integrated supply chain is to share information among supply-chain partners for the coordination and integration of supply chain processes and activities (Lee, 2000; Li et al., 2006). It is evident from the field study that information sharing is one of the main practices of SCM in the Bangladesh apparel industry. Most of the participants believed that the entire supply chain process requires constant communication and information sharing among all participating firms for better coordination and to reach a mutual consensus and informed decision. There was a need to implement standard ways of managing information exchange. It was found that fifty percent of the interviewed firms implemented some formal communication procedures for information sharing. In this regard, Participant 1 stated:

> "*We have a formal consultation and communication procedure that defines the responsibilities of different internal departments and our supply chain partners on information exchange, and outlines the process of communication to share information and to create awareness*" (P1).

All the interviewed firms reported that they had implemented some sort of sophisticated support tool (e.g., EDI, ERP systems) for information sharing. Some participants (Participant 2 & 6) explained that they have implemented a number of SAP application modules (ERP system) that have facilitated the integration of various internal departments; however, their systems are not externally integrated with their suppliers and buyers. The systems are extensively used to support sharing of information with the external trading partners. 'Keeping each other informed about any issues that arise' (N= 6) that might affect them, 'informing partners in advance of changing needs' (N=6), and 'exchange of information in support of business planning' (N=7) were explored as some of the other important practices related to information sharing. According to Participant 6,

> "*unpredictable and frequent changes in the design specifications by the buyers are common. In this case, we assess the progress of ongoing production and ascertain whether it is possible to accommodate these changes. Sometimes, buyers cut down on an order in the middle of production in instances where sales drop due to seasonality or trend changes in the market. In this case, we need to sort out how the unused resources and planned production capacity can be utilized alternatively. In all of these*

> *cases, all supply chain members including our internal departments, need to share information about any changes immediately*" (P6).

Similarly, Participant 5 added that in case of design changes by the buyers, "*fast and vigilant information sharing without delay to all departments is essential as the ripple effects of not sharing can be expensive*". The participants (2, 6, & 9) noted specific formats for sharing of information about all the events involved in the entire supply chain process, such as existing capacity, materials availability, expected arrival date of materials, date of sample delivery, ordering fabric for bulk production, planned cut date, production start date and order delivery date. They viewed this information as critical for their capacity planning, which also needs to be shared with their buyers regularly. The interviews also revealed a problem with current information sharing practices, in which some firms are not willing to share information they perceive to be sensitive.

Information Quality

Low quality information adds costs to supply chain operations and misleads managers, hindering the true picture of a situation and good supply chain decisions. Dimensions of practices related to information quality such as 'timely information sharing' (N=9), 'accurate information sharing' (N=7), 'complete information sharing' (N=5), and adequate information sharing' (N=6) were reported by the participants. The practice of timely information sharing was reported by the majority of the participants. According to Participant 10, one of the key aspects of successful SCM is "*accurate and real time information in order to make informed decisions*". He believed that that this practice "*will ensure every firm across the supply chain knows what is happening in real time and will also ensure all components are correctly aligned and focused on a common goal*". Regarding the implementation of such practices, Participant 1 made the same point;

> "*we have a documented policy as part of our integrated management system (IMS) to ensure the availability of the right information at the right place at the right time. The objective is to ensure self-initiated accurate information sharing with trading partners, and that all communication with buyers is complete and informative*" (P1).

In line with this, Participant 4 explained that "*the market is highly competitive and we need to share information timely to remain competitive in the market*". Again, Participant 6 opined that information is sometimes misinterpreted or distorted when it flows through the hierarchy of communication. Participant 3 attributed this problem to employee skills level and training to some extent. Both participants (6 & 3) agreed that the implementation and

proper use of the ERP system have helped them mitigate this problem. As expressed, the field study explored four important attributes of information quality in the context of apparel supply chain management, namely, timeliness, accuracy, completeness, and adequacy.

Lean Systems

Lean system utilizes minimum input to produce output while ensuring high quality by eliminating waste through continuous improvement, and maximizing or fully utilizing the activities that add value from the customer perspective (Panizzolo, 1998; Jacobs and Chase, 2014). Lean operating systems were explored in the field study as a major dimension of SCM in the apparel sector of Bangladesh, as the manufacturers believed that they "*are functioning in a market with intense competition based on cost and quality, therefore, there is no other option but improving productivity while maintaining quality*" (Participant 6). A number of lean practices were reported to have been implemented and practiced by the interviewed firms. Eight out of ten interviewed apparel manufacturing firms confirmed that they had implemented a 'work study program' as part of their lean initiatives. Slight variation in the term 'work study program' was noticed among the interviewed firms (e.g., process engineering team', 'industrial engineering team'). Under this program, a dedicated team analyzes the processes to make them more efficient and simple, with the objective of eliminating different types of waste. The participants noted a number of responsibilities held by this team, such as closely observing workers and machines, improving layout design, monitoring performance, identifying and removing any inefficiency in the processes, and finding opportunities for improvement. They argued that the adoption of this program had significantly improved efficiency in the use of worker hours and machine hours (Participants 6, 7 & 1). For example, Participant 1 commented:

> "*We have already implemented lean lines on several production floors which have helped us produce more garments as output in the least amount of time and by the least number of workers. The processes are now more efficient and require fewer production workers which save time while quality is being maintained*" (P1).

As a result of lean implementation, Participant 2 indicated that their firm was able to streamline their processes by removing duplication or non-value adding activities which resulted in a lead time reduction of one week. Seven participants reported that their firms had adopted measures to ensure the efficient utilization of machine time and reduce machine setup time. With regard to pull production systems, the participant noted: "*we have*

implemented such system which has reduced the amount of stock needed to keep in various stages of the production process". Again, he argued:

> "*…actually, one-piece flow is not applicable to apparel manufacturing as it requires a variety of items or materials. That's why we have adopted a bundling system by modifying the one-piece flow*" (P2).

A number of firms (e.g., 6 & 9) emphasized on product design stage for the efficient consumption of raw materials and intermediate components. For example, Participant 6 stated:

> "*we don't face many problems with the items that are bought as pieces and we can easily determine the number items required for an order. Fabric is the problematic one as it is bought in the measurement of yard or meter, therefore, determining the accurate consumption of fabric is challenging. We pay great attention to efficient consumption of fabrics while developing sample products and apply our own judgment from experience. We use computer software for pattern design, grading, detailing, marker layout and CAD drafting which has improved our efficiency drastically*". (P6)

The practice of continuous quality improvement programs involving suppliers was reported by six interviewed firms. Participant 2 noted:

> "*the implementation of the 'Construction without Sewing' (CWS) process, which is one of the recent innovations, has helped us introducing more sophisticated products. This process also promotes improved quality as it reduces variations among finished products through process simplification and improvement*" (P2).

Table 4.3 (as presented earlier) presents findings about the relevant factors and variables, with subsequent frequencies based on the content analysis. The analysis suggests that there are apparel manufacturing firms in Bangladesh with different levels of SCM implementation. The results of the content analysis also confirms that SCM implementation comprises a diverse set practices belonging to five distinct dimensions capturing internal operations, and downstream and upstream supply chain processes.

4.3.1.2 Findings Related to Antecedent Factors

The participants of the field study expressed their views on the factors that had influenced their firms in SCM implementation. A number of internal and external factors were evident from the field study. Details of these antecedent factors are described in the following sub-sections.

4.3.1.2.1 Internal Influence

Organizational Culture

An organizational culture may encourage or discourage the adoption of new practices. A firm is more likely to implement new system or practice if the values embedded in the system or practice fit its organizational culture (Leidner & Kayworth, 2006). The field study participants explained their opinions about the culture of their organizations and their influence on SCM implementation. Details of the findings on organizational cultural dimensions are presented in Table 4.4, and are described here.

Innovative Culture

An innovative culture is an organizational environment that supports creativity, innovative behavior, risk taking (Menon & Varadarajan, 1992), and the implementation of new ideas, practices or procedures. To remain competitive in a constantly changing marketplace environment, firms adopt new practices, systems, work methods, and strategic orientation, and encourage continuous learning and innovation among employees to achieve the strategic goals of the firm. The participants of the field study reported a number of attributes of innovative culture that they believed to be prevalent in their organizations, such as stimulating innovation (N=7), creative problem solving (N=5), risk taking (N=6), taking challenges of designing and making new products (N=7), taking challenges of adopting new practices or technologies (N=7), and responsiveness to external changes (N=6). For example, Participant 2 indicated that they work in an innovative environment and made the following statement: "*Questions such as what do we need, from whom should we procure materials, for whom are we making our products and what are their requirements, are addressed enthusiastically and by maintaining a sense of innovation*". Seven out of ten participants maintained that their organizations encourage taking challenges in designing and making new products or adopting new practices or technologies. In support of this, Participant 3 commented: "W*e develop our own, or innovate, based on the concept that we receive from our customers. In doing so, we need to take the risk of incurring costs, and market uncertainty, such as salability of the products, getting sufficient orders, competitors' movement etc.*". On the other hand, Participant 8 argued in a slightly different way;

> "*Our organization does not always encourage risk taking as the apparel industry is full of uncertainty, and so nothing much can be predicted in advance. We are a bit slow in developing new ideas on our own; however, we are keen to adopt new ideas and maintain an opportunity for any new idea that our buyers may come up with*" (P8).

Similarly, Participant 7 also believed that they "*have limited scope for being innovative*" as their supply chain operations "*are mostly buyer driven*" and they "*act according to requirements of the buyers*". He further argued: "*Given this limitation, innovative ideas are encouraged and rewarded within our organization*", however, the majority of the participants (1, 2, 3, 4, 6 & 10) associated innovative culture with the implementation of new practices and felt that an innovative environment is important as "*nothing is constant in this industry where fashion and design change frequently*" (P10). Overall, seven attributes of innovative culture were revealed from the field observations.

Supportive Culture

The supportive culture of a firm provides an atmosphere which promotes an open and harmonious environment for its people (Koberg & Chusmir, 1987) and improves their acceptability of new concepts and the implementation of innovation through mutual support and collaboration (Liao et al., 2013). The field study explored the organizational norms and values of the interviewed firms that reflected the prevalence of supportive culture in these firms. All the participants noted that cooperative relationship is highly valued in their organizations. For example, Participant 3 commented: "*Cooperative relationship is treated as important for attaining organizational goals through a concerted effort*". Participant 6 echoed:

> "*cohesiveness among employees and inter-departmental integration are very strong in our organization because of cooperative relationship. We have a friendly atmosphere where an employee is treated as a member of the family*" (P6).

Similarly, Participant 9 stated: "*Top management appreciates the efforts of the employees and shows concern for any issues faced by employees*". Seven participants confirmed that team work is encouraged in their organizations, and that participative decision making through meetings and consultations was reported as a regular practice by five informants. The majority of the participants (N=8) felt that their firms placed importance on the relationship with supply chain partners as "*cooperation among external supply chain partners is very important to achieve overall supply chain goal*" (Participant 7). Participant 7 further added: "*we do not just worry about what is happening within our organization, but also worry about our suppliers (and their suppliers) and our buyers (and the end-customers)*". Half the participants maintained that they exercise equality with internal employees as well as the buyers and the suppliers. It was also evident from the field study that the existence of a supportive culture facilitates SCM implementation and practice. For example, Participant 1

indicated that "*Implementation of any particular practice will be difficult if the environment is not supportive*". Further details are presented in Table 4.4.

Table 4.4: Dimensions of Organizational Culture

Factor	Variable	Firm									
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Innovative Culture	Stimulating innovation	√	√	√			√	√		√	√
	Creative problem solving		√		√		√		√		√
	Result-oriented			√		√					
	Risk taking	√	√	√	√		√			√	
	Taking challenges of designing and making new products		√	√	√	√	√		√	√	
	Taking challenges of adopting new practices or technologies		√	√	√	√	√			√	√
	Responsiveness to external changes		√	√			√	√		√	√
Supportive Culture	Encourage team work	√	√	√	√			√		√	√
	Participative decision making	√			√	√	√			√	
	Co-operative relationship	√	√	√	√	√	√	√	√	√	√
	Importance on supply chain partner relationship	√	√	√	√	√		√	√		√
	Promote equality		√		√		√	√		√	

4.3.1.2.2 External Influence

A number of external factors were explored as antecedents to SCM implementation. Based on the content analysis, a summary of the external antecedent factors and variables has been drawn up and is presented in Table 4.5. Details of the field study findings regarding these antecedent factors are provided.

Table 4.5: External Influencing Factors

Factor	Variable	Participant									
		1	2	3	4	5	6	7	8	9	10
Environmental Uncertainty	Fluctuation in buyer order quantity	√	√	√	√		√		√		√
	Frequent changes in product specifications	√	√	√	√	√	√			√	
	Pressure on faster order delivery				√	√		√	√		
	Uncertainty with supplier delivery performance	√	√	√	√	√	√		√	√	√
	Uncertainty with supplier quality performance			√	√	√	√	√		√	√
	Changes in production technology	√	√		√		√		√		√
	Pressure for adopting newer technology			√		√	√	√		√	√
	Intense competition	√	√	√	√		√	√	√	√	√
	Political unrest	√	√		√		√	√			
Customer Focus	Keeping close contact with the buyers		√	√	√	√	√	√		√	√
	Customer satisfaction is the main focus		√	√	√	√	√		√	√	√
	Anticipate and respond to future buyer needs		√		√	√	√		√	√	
	Reflection of customer focus in business planning	√		√	√	√	√		√		
	Following up with buyers' feedback	√		√		√	√	√		√	
Inter-firm Trust and Commitment	Importance of openness and honesty	√	√		√	√	√		√	√	√
	Importance of partner's reliability		√	√		√	√	√		√	√
	Partner's credibility in terms of capability		√	√	√	√	√	√		√	√
	Support in changed circumstances	√		√		√			√		
	Importance of trading partner's commitment	√	√	√		√	√	√	√	√	√
	Similar aims and objectives	√		√	√			√		√	
Networking	Participation in informal networks and sharing their experience and business knowledge	√	√	√	√	√	√		√	√	√
	Potential opportunities and changes are identified through networking	√	√		√	√		√			√
	Source of information about product, technology and supply sources	√	√	√		√	√	√	√		√
	Use of external knowledge within firm	√		√		√		√	√	√	√

Environmental Uncertainty

It is evident from the field study that environmental uncertainty greatly impacts the ability of apparel manufacturing firms to remain competitive in the marketplace. Different types of uncertainty related to demand, supply, technology, competition and the political environment affecting supply chain operations were exposed by the field study participants. As shown in Table 4.5, the two most frequently noted uncertainties were 'intense

competition' (N=9) and 'supplier delivery performance' (N=9). As the apparel industry is perceived to be intensely competitive (Candace et al., 2011), the uncertainty arising from competition is considered to be an important factor within the supply chain. The participants of the field study reported that competition is fierce among Bangladeshi manufacturers, as well as with manufacturers in China, Sri Lanka, India, Cambodia and Vietnam. Apparel manufacturers in these countries are the close competitors of Bangladeshi manufacturers. As a result of intense competition, most of the participants felt that competition uncertainty has challenged their firm's survival. It has significantly affected their ability to create a decent profit margin as the competition uncertainty largely derives from the competition among the apparel manufacturing countries based on cost, quality, and delivery lead time. Regarding this, Participant 7 said: "*We need to continuously strive for improving efficiency in all of the supply chain processes including procurement, production, and delivery to face the intense competition in the market*". The delivery performance of both local and foreign suppliers is a big concern for Bangladeshi manufacturers as it creates delays in production and order delivery lead time. Regarding this delay, Participant 1 opined that "*It has an extended impact on successive stages of the supply chain*". Supply uncertainty involving non-conformance of material quality and short supply causes significant problems for the apparel manufacturers. For example, Participant 2 commented:

> "*Suppliers usually develop the fabric as per our requirements based on average forecast data. When an actual order quantity is larger than the average forecast, a supplier may fall short of raw materials. Sometimes, the quality of the processed materials deteriorates due to a reduction in the use of any particular raw materials when the supplier does not have enough raw materials*" (P2).

Manufacturers are very concerned about the quality of materials procured from suppliers. Participant 5, for example, emphasizes that:

> "*We cannot always rely on supplier's own quality inspection reports. In that case, we suggest the use of a third party inspection agency for quality assurance*" (P5)

The dependence on foreign suppliers for necessary materials also increases the supply uncertainty, as rectification of wrong materials or short supply is challenging within the required lead time.

'Fluctuation in order quantity' (N=7) and 'changes in specifications' (7) are the most common causes of demand uncertainty for the interviewed firms. The participants attributed demand uncertainty to a number of factors, including fashion trends, seasonality, and demand forecast accuracy. In regard to changes in specifications by buyers, Participant 3 made the following comment:

"*No order specification can be considered final since we continue receiving changes in the design specifications of the orders from buyers even after the start of production. This often creates significant problems for the entire supply chain*" (P3).

Four participants considered 'meeting delivery time requirements' as a pressure and emphasized the timely sharing of information and effective coordination among buyers, manufacturer and suppliers to minimize the pressure on overall supply chain operations. Technology-related uncertainty, such as 'changes in production technology' (N=7) and 'pressure for adopting newer technology' (N=6) was also demonstrated in the field study. Five participants reported that political unrest (including labor unrest) has affected their production and shipping schedules. All field study participants believed that effective supply chain management can help their firms yield the expected results and provide safeguards against supply chain uncertainty.

Customer Focus

Customer focus is paramount to a firm's market success in today's business environment. Without exception, the participants of the field study were consistent in the view that a customer focus is the central element of supply chain operations in the Bangladesh apparel industry. The apparel supply chain is by and large buyer-dominated. A statement made by Participant 2 was reflective of the perception of all field study participants: "*We are driven by what the customers want and customer satisfaction is the key to our survival and success in the market*". They agreed that customer focus involves obtaining information about future customer needs and taking actions based on collected information, while perfectly satisfying current needs. Eight out ten participants (N=8) noted that achieving customer satisfaction is their main focus while six participants (N=6) indicated that they have actively put efforts into determining and responding to future buyer needs. For example, Participant 4 stated: "*we collaborate with our buyers in market research to determine future customer needs and ways of acquiring required capacity to meet those needs*". Eight participants (N=8) reported that they maintain close contact with their buyers, and six participants (N=6) indicated that customer focus is reflected in their business planning. In this regard, `Participant 6 stated:

"o*ur merchandising and design teams frequently visit different countries around the world in which our buyers operate to analyze our existing market and future market trends. We also have a subscription with WGSN which provides trend forecasting service to fashion and design industry. We get ideas from WGSN regarding trends across the globe, new developments and changes in fashion, arts, culture, consumer behavior, styles, and the latest movements in business and technology. We innovate on*

the ideas that we get from our own market study and WGSN, and develop a large number of products as seasonal collections" (P6).

Six participants indicated that they followed up their buyers' feedback. On this point, Participant 9 noted: "*We regularly seek suggestions from our buyers on how we can improve product quality, design and overall customer satisfaction*".

Inter-Firm Trust and Commitment

Building inter-firm relationships with a view to accruing mutual rewards depends on many factors, with trust and commitment being the most important. "*Relationship is all about trust… although there are many factors to consider and many formalities to follow, trust and commitment of a potential trading partner come first in business"*, said Participant 8. The field study participants explained their views on the importance of a number of factors such as 'openness and honesty' (N=8), 'reliability' (N=7), 'capability' (N=8), 'support in changed circumstances' (N=5), 'commitment' (N=9), and 'similarity in aims and objectives' (N=5) for building partnering relationships with buyers and suppliers. The statement made by Participant 7 was similar to those made by the other field study participants: *"We evaluate a prospective partner's credibility, capability, and commitment to decide whether we should build a long-term trading partnership with them*". The content analysis revealed that trust in the context of the apparel supply chain is mainly credibility based. Credibility is the rational or practical component of trust, which is based on the extent to which one party believes that the other party has the intent and required capability to perform effectively and reliably. In dealing with suppliers, manufacturers are more concerned about a supplier's ability to provide materials that fully meet their requirements and a supplier's commitment to on-time delivery. On the other hand, Participant 5 contended:

"*Sometimes, some buyers try to take advantage of us and ask for price discounts, showing some minor quality issue after receiving an order. This usually ends up as a one-time business relationship. We don't continue business with them because of a lack of partnership spirit*" (P5).

Consistent with this, Participant 9 also stated:

"*We are mostly interested in the buyers who are transparent and committed to a long mutually beneficial relationship. Buyers with a good sense of partnership are not only cooperative but also willing to share the cost of initial investment required for implementing new technology. For instance, recently, H&M, one of our major customers has offered fifty per cent of the total cost for the implementation of a new electrical wiring system, out of their concern for fire safety in our factory due to the recent and worst incident of industrial fire in the history of Bangladesh*"(P9).

Most of the participants explained that the manufacturers consider the making of relationship-specific investment in technological or specific process implementation only when there is a long-term commitment in the relationship with their trading partners.

Networking

Networking appears to be an important means of knowledge and information sharing, learning, and promoting the spread of best practices in order for organizations to improve performance and to be competitive. The field study participants shared similar experiences. Most of the participants (N=9) indicated the participation of their organizational members in informal networks and the sharing of experience and business knowledge. At times, members find information received from their networks as important for their own organizations. Six out of ten participants (N=6) explained that potential opportunities and changes are identified through networking. For example, Participant 1 noted:

> "*The idea of implementing a lean system came from our buyers. We also became aware of the results of implementing lean systems by other organizations. We get this type of information from our informal networks which have members from different organizations*" (P1).

Seven participants (N=7) considered networking an important source of ideas about new products, technology, processes, supply sources, new buyers or even new markets. For example, Participant 2 explained:

> "*We used to have a manual process of filling out a prescribed form. But one of my network members who was working for another organization in the same industry suggested we use particular software for that process which they had implemented at their organization. I passed the information to my senior management and, later, we implemented the software. The implementation of the software has helped us obtain automatic printing and real time information sharing among the relevant departments*" (P2).

The participants also believed that most of the important information may now lie outside the organization, and so they value their external sources of information and knowledge for their business growth and existence. It was also revealed from the field study that the top management of many apparel manufacturing firms in Bangladesh develops extensive personal and professional networks and uses these networks for collecting information and remaining updated on the latest developments in the market.

4.3.1.2.3 Employee Competency

From the field study, 'employee competency' emerged as an antecedent of SCM practice. The concept of SCM is centered on the collaboration and integration of key business processes across organizational boundaries (Mentzer et al., 2001; Lambert et al., 1998) and its implementation involves a number of physical, technical, managerial and behavioral components (Lambert et al., 1998). It was revealed in the field study that the sound practice of SCM requires employees to have a better understanding of the supply chain dynamic and ability to execute SCM practices and policies. The field study respondents placed high importance on employee training and education programs for the success of SCM practice. The relevant literature also recognizes the need for the training and re-training of employees in order to be able to 'excel' in SCM practice (Gowen & Tallon, 2003; Fawcett et al., 2008). When the field study respondents were asked to describe the extent of SCM practice in their firms, they noted employee competency and an internal supportive culture as the reasons for not being able to fully practice what they had implemented. For instance, Participant 3 stated:

> "*Information quality somewhat depends on the skill level of the employees. We have implemented systems and procedures for sharing information in a timely manner and accurately, however, if the concerned employees are not proficient enough to utilize the systems and procedures, the expected outcome may not be reflected or quality of the information may be hampered*" (P3).

Similarly, Participant 9 noted: "*but we cannot always practice it fully as sometimes we encounter challenges with regard to skills and supportive atmosphere*". The respondents also explained their concern for the potential consequences of lack of SCM practice. On this point, Participant 3 said: *"As a result, buyer orders may not be filled perfectly which can have a serious impact on the business relationship. It also creates misunderstanding among supply chain members*". Participant 9 also made the similar comment: "*Executing buyer orders appropriately through effectively managing the supply chain becomes difficult if we don't have enough skilled workers*". The employee competency issues that drew most attention from the field study respondents were: level of employee skills (N=7); training and education (N=7); and facilities for continual training and upgrading employee skills (N=8). Table 4.6 presents the employee competency variables derived from the content analysis. The full literature support of this construct has been presented later in Section 4.4 and 4.6, and Table 4.13.

Table 4.6: Employee Competency

Variable	Participant									
	1	2	3	4	5	6	7	8	9	10
Level of employee skills	√		√	√	√	√			√	√
Training and education		√	√	√	√	√		√	√	
Facility for continual training and upgrading employee skills	√	√	√	√	√		√	√	√	

4.3.1.3 Findings Related to Outcomes of SCM Practice

4.3.1.3.1 Supply Chain Relationship Quality

Supply chain relationship quality is important in increasing morale and cooperation among the supply chain members. The characteristics of supply chain relationship quality such as satisfaction with collaboration outcomes (N=8), increased trust (N=7), perceived outcome fairness (N=9), and willingness to collaborate in future (N=7) were evident from the field study (see Table 4.7). The participants indicated that their firms had developed and maintained close relationship with their buyers and core supply partners through the continuous practice of SCM over the years, some of whom have been working with them for many years. Consistently with this, the statement of Participant 4 was as follows:

> "*80% of our buyers are very supportive and reliable and we have been doing business with them for over 15 years. The trust that has been built over the years has influenced the mutual commitment to meeting each other's requirements*" (P4).

Participant 6 also made a similar statement:

> "A *relationship does not grow in a day rather it grows through working together for a period of time and ongoing communication, assessments and sharing of rewards of each other's efforts. Responding to the requests out of the terms and conditions becomes easy when the parties are happy with their relationship. For example, a request to develop and send a sample product within a day or expediting an order delivery is honored in a cooperative relationship*" (P6).

Participant 10 described supply chain relationship quality as a 'sustained relationship', differentiating it from a 'long-term' one, and believed that in a sustained relationship all parties involved are committed to the relationship, allowing all to benefit from a greater degree of visibility and trust. This view was consistent in the field study as nine out of ten participants emphasized fairness in collaboration outcomes among the partners. In this respect, Participant 3 stated: "*this* [*fairness in business dealings*] *is how trust among the partners increases and partners work for mutual benefit by sharing the risks and rewards of the*

relationship". The majority of the participants explained their satisfaction with each other's commitment, talked about a number of instances (e.g., rise of material cost, need for improving capacity or any other unexpected incidents) in which they provided support for each other, and showed willingness to continue collaborative relationships. The responses of the field study participants regarding supply chain relationship quality issues are shown in Table 4.7.

Table 4.7: Supply Chain Relationship Quality

Variable	Participant									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Satisfaction with collaboration outcomes	√	√		√	√		√	√	√	√
Increased trust	√		√	√		√	√	√		√
Perceived outcome fairness	√	√	√	√	√		√	√	√	√
Willingness to collaborate in future	√	√			√	√		√	√	√

4.3.1.3.2 Supply Chain Agility

In today's dynamic, complex and competitive business environment, firms within a supply chain should work together to leverage complementary competencies to attain success and competitive advantage, specifically when working in an industry like the apparel industry. The apparel industry is characterized by a trend of increased global sourcing, intense competition, shorter product lifecycle, market volatility and high demand uncertainty (Bruce et al., 2004; Agarwal et al., 2007). Such characteristics were also found in the field study. For example, Participant 5 said:

> "*We are in the fashion business. The market is volatile. Our product lifecycles are short. In a typical season, almost two-thirds of our buyers' orders are new. Changes in repeat orders are also very common*"(P5).

Consistent with this, Participant 2 commented: "*We are in customer driven industry. Therefore, we have to provide what our customers want in order to satisfy them with the newest fashion*". The field study participants felt that most of the uncertainties were due to fashion trends, seasonality, the accuracy of demand forecast, and fierce competition based on cost, quality and fast delivery. Regarding the challenge of meeting buyer demands in such a dynamic and competitive environment, Participant 9 stated:

> "*Unfortunately, our supply chain lead time is very long. It takes 2 to 3 months to get the fabrics from our suppliers as we are heavily dependent on foreign suppliers. Then, making, warehousing and logistics require another month or more. So, the lead time*

for Bangladeshi manufacturers is higher than that of the manufacturers in other competing countries" (P9).

Apart from the longer lead time, market uncertainty creates further challenges for the apparel manufacturers. On this point, Participant 1 said: "*Our challenges are to face market volatility and to improve responsiveness by reducing lead time*". The field study findings suggest that the nature of the industry requires Bangladeshi apparel manufacturers to be agile. Agility in a supply chain entails not only responding to changes in market conditions but also taking advantage of these changes to maintain competitiveness (Candace et al., 2011). The participants emphasized the importance of achieving agility and its necessity in their industry, and acknowledged the role of the continued practice of SCM in achieving agility. A number of indicators reflecting the capabilities leading to different dimensions of supply chain agility were explored from the content analysis, such as demand response (N=6), flexibility (N=8) , integration (N=8), and customer responsiveness (N=7). Table 4.8 summarizes the results of the content analysis.

Table 4.8: Factors and Variables of Supply Chain Agility

Factor	Variable	Firm									
		1	2	3	4	5	6	7	8	9	10
Demand Response	Ability to capture market change information	√		√	√	√	√		√	√	√
	Ability to forecast market demand		√		√	√		√	√		√
	Ability to leverage supply chain partners' competencies	√	√	√	√	√		√			√
Flexibility	Capability of handling various product specifications and order sizes		√	√		√	√			√	√
	Rapidly adjusting production capacity in response to demand changes	√	√	√		√	√				√
	New product development	√		√		√	√		√	√	
	Back-up resources/capacity	√	√		√	√			√		√
Integration	Communication and coordination among all functions in the firm	√	√	√	√	√	√				√
	Real-time data on location and status of raw materials, parts, finished goods	√	√		√	√					√
	Ability to rapidly exchange information with supply chain partners	√	√	√	√	√		√	√		√
	Amount of joint planning activities	√	√		√	√			√		
Customer Responsiveness	Responsiveness to changes in buyer requirements		√	√	√	√	√			√	√
	Priority on improving customer service		√	√		√		√		√	√
	Improving delivery reliability	√	√	√	√	√	√		√	√	
	Short order fulfilment time	√	√		√	√		√		√	
	Fast buyer response time	√	√	√	√	√	√		√	√	

It can be seen from Table 4.8 that supply chain agility demonstrates the capabilities of demand response, flexibility, integration and customer responsiveness, which are important to apparel manufacturers for their success in a dynamic and intensely competitive market. It is also evident from the field study that achieving agility in a supply chain requires the use of all of these capabilities in an integrated way in collaboration with supply chain partners.

Demand Response

Demand response refers to the ability to predict and handle changes in marketplace demand (Braunscheidel & Suresh, 2009). The field study participants felt the need for effective demand management in which demand sensing and demand response planning are closely connected. The participants noted some capabilities, such as the ability to capture market change information (N=8), ability to forecast market demand (N=6), and ability to leverage supply chain partner competencies (N=7) in order to be able to respond to market changes in a timely manner. These demand response capability factors are important, as they help apparel manufacturers plan and prepare for effective responses for marketplace changes. In this regard, Participant 5 made the following statement:

> "*Prediction is crucial here. The ability to predict worldwide market trends, future opportunities and probable threats or market uncertainties, and the ability to identify the areas that a company needs to improve are the keys to surviving in today's market which is fast changing and competitive. Prediction and full preparation based on prediction need to be the focus*" (P5).

The participants talked about collaboration with buyers and suppliers in forecasting demand and emphasized the need for immediate dissemination of such forecasts or market change information along the supply chain. In their opinion, forecasting is equally important for materials suppliers, and considered a crucial factor affecting the demand response capability of the supply chain. Good forecasting is essential for filling buyer orders within the lead time, as well as to respond to the sudden demands of buyers.

Flexibility

Flexibility is necessary in an apparel supply chain to cope with changes and uncertainties (Lee & Kincade, 2003; Pettit, Croxton, & Fiksel, 2013). Based on the content analysis, several capabilities related to flexibility were explored, such as the ability to handle various product specifications and order sizes (N=6), rapidly adjust production capacity in response to demand changes (N=7), new product development (N=6), and backup capacity

(N=6). The field study participants emphasized having flexible operations and quick adjustment capacity in order to respond to rapid and frequent changes in product design and variation in order quantity. With regards to changing fashion trends, Participant 5 said: *"We greatly promote innovation in product designs with great variety*". Regarding flexibility in operations, Participant 3 stated:

> "*We have to adjust fast to allow operational flexibility. So, we try to set up more sophisticated machines capable of handling various design, make the process flexible and train our operators so that they can efficiently handle machines and process changes for different product designs*" (P3).

Use of overtime to increase capacity in meeting sudden increases in orders was also noted by the field study participants. In reference to this, the statement made by Participant 6 can be cited here: "*Capacity planning needs to be done carefully and requires continuous adjustment as there are huge seasonal variations in demand in different regions of the world, such as Europe, USA and Asia largely in Japan and China*". Similarly, Participant 10 commented: "*We have worked on improving volume flexibility as we have heaps of seasonality in our business*". The ability to quickly develop sample products is also considered important in the face of uncertainty arising from fierce competition. For example, Participant 5 illustrated this by saying:

> "*We have established a huge product development facility. With this facility, we can make a sample product within a very short time immediately after receiving an inquiry from our buyer. We have capacity to make a non-wash type sample product and send it to our buyer within 24 hours*" (P5).

A number of participants stressed the need for back-up capacity to face volatility in demand or any other uncertain events. Participant 5 explained about the practice of having a contingency plan that guides them in the event of any disruption, including that to political unrest. He indicated that they have multi-location facilities within the country as well as outside the country (in Vietnam and China) which enable them to shift their operations to another location when they face unpredictable events. One firm was reported to have a 'composite plant' where they made many of the required materials, such fabric, thread, packaging, labels and some elastic (P4). As a result, they can quickly adapt to changes in market demand. With regard to this, Participant 4 claimed: "*This type of own backward linkage allows operational flexibility and provides the potential for a fast response to changing market demand*". Participant 8 noted the use of contract manufacturers in case of larger orders.

Integration

Integration of the supply chain facilitates a coordinated and quick response to market demand. The field study participants believed that the benefits of pursuing SCM practices or policies will not accrue unless integration is achieved. According to Participant 6, "*There is nothing more important than effective communication and integration as there are many departments involved in executing our supply chain activities*". Communication and coordination among all internal functions (N=7), real time data on the location and status of materials and finished goods (N=5), the ability to rapidly exchange information with supply chain partners (N=8), and more joint planning activities (N=5) were supported by the field study participants, as shown in Table 4.8. It is evident that internal communication and coordination and the ability to rapidly exchange information with supply chain partners were supported by most of the participants. Relating to this, Participant 3 stated:

> "*To adjust production with changing needs we require information regarding details of the changes, and inventory of different items procured from suppliers, and we need to share this information with our internal departments and external suppliers. Proper communication and coordination are important for responding to demand changes quickly*" (P3).

Consistent with this, a remark of Participant 1 was as follows:

> "*Being capable of quickly responding to unpredictable market changes requires effective communication and the integration of various processes among the supply chain partners. Communication is vital as it enables members of the supply chain to react and prepare themselves quickly*" (P1).

About the ability to capture real time data and information exchange, Participant 2 said:

> "*We use ERP software to ensure accuracy and timely sharing of information. The scanning system has helped us ensure accuracy and efficiency in capturing data. Goods at any point can therefore be easily traced with our system*" (P2).

The participants also reported mutual understanding and a great many joint planning activities with supply chain partners in responding to market demand.

Customer Responsiveness

Customer responsiveness is an important capability in increasing competitiveness in the apparel industry (Chan & Chan, 2010; Christopher et al., 2004). It is all about becoming quick as well as correct in responding to customer needs (Meehan & Dawson, 2002). The field study participants confirmed this notion: for example,

"*Quick response to customer needs and changing demands gives us advantage over our competitors*" (P5).

"*We won't survive in the market if we can't satisfy our customer requirements competitively. We have specific target performance scores to achieve in rendering quick response, on-time delivery and on-time processing*" (P2).

"*None can actually survive if they are not capable of responding to changes in market demand*" (P9).

Most respondents agreed that customer responsiveness is one of the important outcomes of SCM practice enhancing supply chain agility, and is also essential for achieving competitive advantage. The customer responsiveness issues that drew the most attention from the participants were: responsiveness to changes in buyer requirements (N=7), priority in improving customer service (N=6), improving delivery reliability (N=8), short order fulfillment time (N=6), and fast buyer response time (N=8). With regard to the capability of quickly and effectively responding to changing buyer requirements, Participant 5 noted:

"*After receiving an order we decide on the operations or parts which can be completed before going for bulk production. There are critical operations for many products for which we need to plan separately and start the operation of that critical part in advance, then we can feed that part to the production line for final assembly. This type of operation is advantageous for us as it helps in utilizing our capacity more efficiently and allows flexibility to adopt last minute changes in the design specifications from our buyers. Then we can predict the type and extent of changes that may come later from our buyers and respond accordingly*" (P5).

4.3.1.3.3 Competitive Advantage

The Bangladesh apparel manufacturing sector is a major player in the global apparel market. Almost all the manufacturers are export-oriented, serving numerous international brands all over the world, however, they are under tremendous pressure to improve their performance and competitiveness in today's highly dynamic and competitive market environment, in order to maintain their current position and increase their presence globally. In such a context, achieving competitive advantage was identified by the field study participants as one of the main expectations of the implementation and practice of SCM. A number of aspects related to competitive advantage were explored from the content analysis, including cost or price (N=7), ability to compete based on quality (N=10), dependable delivery (N=8), product customization (N=7), innovativeness in response to changing customer demands (N=5), and fast product development (N=5) (details are presented in Table 4.9). Although all the field study participants stated that their firms were sensitive to cost, three admitted that their firms were not concerned about offering

competitive price as their focus is more on high-end fashion products. For example, Participant 2 reported: "W*e usually make high-end apparel for the world's top brands*", and Participant 3 stated: *We charge relatively high prices for many of our products compared to other manufacturers because of our commitment towards quality*". Again the statement made by Participant 3 was reflective of the views of a few other participants:

> "*We cannot consider the price as a single factor for competitiveness. There is always a trade-off between price and quality*" (P3).

Most of the participants agreed that aggressive competition in the market put continual pressure on them to improve cost efficiency in order to be able to offer competitive prices while maintaining quality standards. The field study participants perceived product quality and order delivery performance to be the main sources of competitive advantage. They all placed emphasis on product quality. For example, Participant 2 noted:

> "*Quality is our top most priority. We are making high quality products with an AQL (Acceptable Quality Limit) of below 1% (defect rate) for any order quantity involving several production runs where as the industry average is 2.5%*" (P2).

Similarly, Participant 3 noted: "*We are well recognized for product quality among the buyers some of whom are the world's prominent apparel brands*". The participants suggested that a manufacturing firm can survive in the business only when they can meet buyer demands for quality and on-time delivery. In the pursuance of quality, apparel manufacturers need to obtain approval for a sample product, as well as the materials to be used to make the product. Non-conformance of the final bulk production to the approved sample product and materials is a big concern for them as the buyers may not accept the products if such quality issues exist. As the life cycle of the apparel products is short, both buyers and manufacturers continually seek to improve delivery lead time. The importance of meeting order delivery time requirements was reflected in the statements made by the participants:

> "*We can retain our buyers only when we are capable of satisfying their demands on time*" (P1).
>
> "*We are highly committed to rendering on-time delivery of buyer orders*" (P5).
>
> *"…besides, we are very reliable in timely delivery*" (P3).
>
> "*We are largely dependent on foreign suppliers. As a result our lead time is relatively long and so improving delivery lead time has always been a challenge for us in competing with the manufacturers in other countries*" (P8).

The majority of the participants considered product customization ability a source of competitive advantage, and half the field study participants talked about innovativeness in

response to changing customer demands, and fast product development as contributing factors to their firm's competitiveness. For example, Participant 5 stated:

> "*Despite being relatively new in the industry, we are highly competitive in terms of product development and innovation. We attract high-end customers by providing a faster response to their changing needs with well-equipped sample product development facility*" (P5).

Overall, the participants emphasized supply chain management in securing competitive advantage through meeting customer demands effectively and efficiently.

4.3.1.3.4 Firm Performance

Firm performance emerged as the ultimate desired outcome of implementing and practicing SCM. The relevant literature supports the role of SCM practice in improving firm performance (Li et al., 2006; Tan et al., 2002). A number of financial, operational and market-based performance measures were explored from the field study, such as sales growth, profit margin, return on investment, growth in return on investment, production efficiency, market share, buyer retention, and overall competitive position. Six participants agreed that their sales are gradually increasing, while three participants reported an increase in the market share of their firms. Some of the statements of the participants were as follows:

> "*Our business is increasing day by day*" (P3).

> "*Our apparel export is increasing*" (P5).

> "*The number of orders is increasing day by day. We hold third position in the world in jeans products manufacturing*" (P7).

Five participants described their firms experiencing a positive return on investment, while only two participants indicated a growth in return on investment in their firms. Although the field study participants related sales growth to profitability, only four firms saw an increase in profit margins. They attributed low profit margins to a number of factors, including intense competition from domestic and international markets, and increases in wages, utility costs and material costs. Most of the participants considered buyer retention a success of their supply chain operations. Improvements in production efficiency and overall competitive position were also noted as important indicators of firm performance. For example, Participant 7 said: "*We seek to maximize both the efficiency and effectiveness of our supply chain operations in satisfying customers with quality products and services while keeping costs down*". Based on the above quotations and the content analysis results, Table 4.9 illustrates the various aspects of competitive advantage and firm performance, reflecting the

expectations the field study participants have of SCM practice. The full literature support of this construct has been presented later in Section 4.6 and Table 4.15.

Table 4.9: Competitive Advantage and Firm Performance

Factor	Variable	Firm									
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Competitive Advantage	Competitive price	√	√	√	√		√	√	√		√
	Ability to compete based on quality	√	√	√	√	√	√	√	√	√	√
	Dependable delivery	√	√	√		√		√	√	√	√
	Product customization	√	√	√	√	√	√		√		
	Innovativeness in response to changing customer demands	√	√			√	√			√	
	Fast product development		√	√		√	√	√			
Firm Performance	Market share		√	√				√			
	Return on investment	√	√	√		√		√			√
	Growth in return on investment			√				√			
	Buyer retention	√	√	√		√	√	√			
	Sales growth		√	√		√	√	√	√		
	Profit margin	√		√		√		√			
	Production efficiency	√	√	√		√	√	√			
	Overall competitive position	√	√	√		√	√	√			

4.3.2 Relationships among the Factors

The matrix (Table 4.10), showing the relationship among the factors, is a quick and precise illustration of the explored relationships between the factors derived from the qualitative analysis. The development of relationships among the factors was considered important during qualitative analysis (Xu, 2003). In addition to the literature, the relationships derived from the field study lay the foundation for developing hypothesized relationships among the constructs.

Table 4.10: Relationships among the Factors

Relationship	Participant									
	1	2	3	4	5	6	7	8	9	10
Innovative culture → SCM implementation	√	√	√	√	√		√	√		
Supportive culture → SCM implementation		√		√	√			√		√
Supportive culture → SCM practice	√		√	√		√			√	
Environmental uncertainty → SCM implementation	√	√	√	√	√		√	√	√	√
Customer focus → SCM implementation	√	√	√		√	√			√	√
Inter-firm trust and commitment → SCM Implementation	√	√	√	√	√	√		√	√	
Networking → SCM implementation	√	√		√			√	√		
SCM implementation → SCM practice	√	√	√		√	√			√	√
Employee competency → SCM practice	√		√	√	√	√		√	√	√
SCM practice → Supply chain relationship quality	√	√	√			√	√		√	
SCM practice → Supply chain agility		√	√	√	√		√	√		√
SCM practice → Competitive advantage	√	√	√	√	√		√	√		√
SCM Practice → Firm performance	√	√	√	√	√		√	√		√
Supply chain relationship quality → Supply chain agility	√	√	√		√	√		√		√
Supply chain agility → Competitive advantage	√		√		√		√	√	√	√
Supply chain agility → Firm performance	√			√	√		√	√	√	√
Competitive advantage → Firm performance	√		√		√	√		√	√	

Table 4.10 was developed from the findings of the in-depth analysis of the interview transcripts, presented in the previous sections. The table established the relationship between the factors derived from the field study findings. For example, the notion of 'environmental uncertainty → SCM implementation' represents the influence of environmental uncertainty on a firm's SCM implementation. Almost all participants either directly or indirectly indicated that environmental uncertainty had a direct influence on SCM implementation in their firms. Participant 3, for example, stated:

> "*Nothing is constant in the apparel industry. Changes in customer demands, supply uncertainty and aggressive competition make things difficult for us, but, filling an order requires an efficient response from the entire supply chain*" (P3).

Similarly, Participant 1 explained: "*Proper supply chain management can provide safeguards against supply chain uncertainties and help yield expected results*" indicating the relationship between environmental uncertainty and SCM implementation.

Where a relationship could not be determined from the direct comments of the field study participants, a detailed data analysis was carried out. The relationship between

organizational culture and SCM implementation was observed from the comments made regarding SCM implementation by the participants: "*You have to take the challenges of today's environment. {.....} it depends on how you value the adoption of new systems or practices in your organization*" (P2) and "*It relates to how supportive my environment is*" (P6). These comments reveal the importance of innovative culture and supportive culture, respectively, which have been perceived as antecedent factors for SCM implementation. Similarly, other antecedent factors, such as customer focus, inter-firm trust and commitment, and networking, were explored from the field study.

The identification, from the content analysis, of the relationship between SCM implementation and practice is worth mentioning. Most of the field study participants directly or indirectly confirmed that the practice of SCM depends on its implementation. For example, Participant 2 said: "*You need to implement a system or practice first in order to be able to use or practice it*". Participant 5 made the same point by saying: "*Practice needs proper implementation*". He added:

> "*We have implemented an informal policy of sharing information in a timely manner and accurately, but we cannot practice it fully as we encounter challenges with regard to insufficient support tools and formal procedures*" (P5).

Another Participant casually commented:

> "*As I noted before, there are a number of factors driving the implementation of SCM practices and policies….and again, I can't say that we can fully practice what we have implemented although we try to do so*" (P9).

As well as implementation, most of the participants attributed this inability to 'employee competency' and absence of a 'supportive culture'. Thus, it can be objectively inferred that well implementation of SCM practices and polices dictates SCM practice in an organization which is further enhanced by employee competency and an internal supportive culture.

Table 4.10 shows that a number important relationships in SCM practice, supply chain relationship quality (SCRQ), supply chain agility (SCA), competitive advantage (CA) and firm performance (FP), were explored through the content analysis. The field study findings indicate that SCA is achieved through continuous practice of SCM practices and policies such as collaboration with buyers and suppliers, a greater level of information sharing and information quality, and lean operating practices. In line with the relationship between SCM practice and SCA, Participant 3 noted: "*Our long-term collaborative relationship with our supply chain partners, and increased level of information sharing practices have helped us improve response capability and increase agility in supply chain*". In agreement with this,

Participant 10 noted: "*We have to continually improve our processes to react faster according to the market necessity*". The participants agreed on the positive impact of agility on their supply chain, as the nature of the apparel industry requires them to search for ways of coping with changes in the market and demand. In achieving SCA, they explained the importance of SCRQ. For example, Participant 8 stated: "*The trust that has been built over the years has influenced our mutual commitment for prompt support in responding to changing market needs*" indicating the relationship between SCRQ and SCA. Regarding the relationships between SCM practice and CA, and SCM practice and FP, the statements made by Participant 7 and 3 are worth mentioning:

> "*To survive in the competition, we need to continuously seek to minimize the cost of manufacturing and improve supply chain efficiency. SCM practice has become crucial for our survival in this industry*" (P7).

> "*We work on a number of brands with huge variety. We need to maintain a long and complex supply chain as it involves a large number of supply chain partners located in different parts of the world. Thus, effective SCM is vital for achieving and maintaining competiveness in the industry. If it is not practiced properly, the supply chain fails in attaining its goals*" (P3).

4.4 COMPARISON BETWEEN FINDINGS OF THE FIELD STUDY AND THE INITIAL MODEL (Second Stage: Deductive Analysis)

At this stage, a comparison between the findings of the field study and the initial research model was conducted in order develop a comprehensive model. This section highlights the factors which either evolved from the field study or were different to those in the existing literature. Most of the variables in the field study were supported by the literature, as discussed in Chapter Two.

This stage begins comparing the initial model with the field study findings. Based on the comparison, all constructs corresponding to SCM implementation, SCM practice, supply chain agility, the antecedents of SCM implementation, and outcomes of SCM practice were verified. The relationships among the constructs were also reviewed. This assessment confirmed the applicability of the initial model within the context of the current research. Further analysis was then carried out in the next step.

In the next step, all the constructs and sub-constructs in the research model were assessed, along with their relationships, in accordance with the field study and literature review. Most of the factors and variables pointed out by the field study participants were supported by the literature (See Table 4.11 to Table 4.15). Most of the constructs, except

'postponement', considered in the initial research model were also supported by the field study outcome. It is important to note that the literature review identified SCM dimensions in six sub-constructs such as 'strategic buyer partnership', 'supplier partnership', 'information sharing', 'information quality', 'postponement', and 'lean systems' (see Chapter Three), however, the field study confirmed the five dimensions of SCM, except 'postponement'. According to the field study, the practices of 'postponement' appeared to be less prevalent among apparel manufacturers in Bangladesh. Participant 2 noted:

> "*A buyer order is confirmed after finalizing product design and approval of a product sample and needed materials. There is thus no scope for delaying the design process as it dictates what materials need to be made available and what processes will be required to fulfill the order*" (P2).

According to Participant 3, "*Postponement is practiced in the fabrics manufacturing (textile industry), where the dyeing of fabrics or garments is delayed until they receive order confirmation from the apparel manufacturer*". Again, there was one exception (Participant 4), who reported the practice of 'postponement' in their 'composite knit plant' where knit fabrics are produced for their own apparel products manufacturing unit. The main focus of the current research is on SCM practices implemented and executed to manage the supply chain processes with immediate suppliers and customers by the knit- and woven-based apparel manufacturing firms. As postponement was reported to be practiced in few composite knit plants and textile industry (fabrics manufacturing), not in finished apparel manufacturing firms, the 'postponement' sub-construct was excluded from the comprehensive research model considering the scope of current research as well as the generality of such practice within the research context.

Two new constructs and some variables appeared in the field study which were later included in the comprehensive research model: 'employee competency' as an antecedent construct of SCM practice and 'firm performance' as an ultimate measure of the impacts of SCM practice. Although no question had formally been incorporated in the semi-structured questionnaire, these two new factors appeared significantly throughout the conversations with the participants during the field study. The relevant literature also recognizes the importance of 'employee competency' for the success of SCM practice (Fawcett et al., 2008; Pandey et al., 2012; Chang & Chong, 2013), and supports the role of SCM practice in improving firm performance (Li et al., 2006; Tan et al., 2002). 'Employee competency' and 'firm performance' were thus considered important factors and added to the current comprehensive model (see Figure 4.2).

In the final step, the constructs and dimensions as obtained from the previous step were justified in the light of the existing literature. Tables 4.11 to 4.15 present the literature support for each variable under the corresponding constructs and sub-constructs. Finally, a comprehensive research model was developed, combining the appropriate findings of the field study and the initial model. Figure 4.2 illustrates the comprehensive model.

4.5 JUSTIFICATION OF THE FINDINGS IN THE LITERATURE

With support from the literature, this section provides the justification for the selected constructs, sub-constructs, and variables derived from the field study. The selected variables, factors and sub-factors in the field study were separated and clustered on the basis of commonality and consistency, and are also supported by the existing literature. This justification thus establishes the adequacy and competency of each construct and related variables in the existing literature. Tables 4.11 to 4.15 present the factors and the variables that have been finalized and the relevant support from the literature.

Table 4.11: Sub-factors and Variables of Supply Chain Management

Sub-factor	Variable	Source
Strategic Buyer Partnership	Interaction with buyers to set standards for buyer requirements	Tan et al. (1998), Chen and Paulraj (2004), Li et al. (2005), Paulraj, Chen, and Lado (2012)
	Collaboration in planning	Lopes de Sousa Jabbour, Gomes Alves Filho, Backx Noronha Viana, and José Chiappetta Jabbour (2011), Monczka et al. (1998), Field study
	Periodic evaluation of buyer satisfaction	Paulraj et al. (2012), Li et al. (2005), Chavez et al. (2012), Field study
	Seeking to establish long term relationship	Kotzab et al. (2006), Mentzer et al. (2001), Field study
	Buyer-oriented capacity planning	Field study, Lopes de Sousa Jabbour et al. (2011)
Supplier Partnership	Formal supplier selection process	Shin, Collier, and Wilson (2000), Spekman et al. (1998); Vonderembse and Tracey (1999), Field study
	Supplier evaluation and performance monitoring	Field study, Krause (1997), Shin et al. (2000), Pikousová and Průša (2013)
	Suppliers engagement in planning	Li et al. (2005), Monczka et al. (1998), Field study
	Resolving problem jointly	Li et al. (2005), Field study
	Involvement in product development	Li et al. (2005), Field study
	Striving to establish long term relationships	Chen and Paulraj (2004), Li et al. (2005), Field study
Information Sharing	Formal communication procedure to share information and create awareness among SC partners	Basnet, Corner, Wisner, and Tan (2003), Kotzab et al. (2011), Field study
	Information sharing support tools	Fawcett et al. (2008), Kuo-Chung and Li-Fang (2004), Field study
	Keeping each other informed about issues affecting them	Chen and Paulraj (2004), Li et al. (2005), Monczka et al. (1998), Field study
	Informing partners in advance of changing needs	Li et al. (2005), Monczka et al. (1998), Field study
	Exchange of information in support of business planning	Li et al. (2005), Field study
Information Quality	Timely information sharing	Cao and Zhang (2011), Li et al. (2005), Monczka et al. (1998), Field study
	Accurate information sharing	Cao and Zhang (2011), Chavez et al. (2012), Li et al. (2005), Monczka et al. (1998), Field study
	Complete information sharing	Cao and Zhang (2011), Chavez et al. (2012), Li et al. (2005), Monczka et al. (1998), Field study
	Adequate information sharing	Lee and Kim (1999), Chavez et al. (2012), Li et al. (2005), Monczka et al. (1998), Field study
Lean System	Work study program	Adebayo (2007), Field study
	Efficient utilization of machine time	Khan and Pillania (2008), Li et al. (2005), Shah and Ward (2007), Field study
	Pull production system	Li et al. (2005), Shah and Ward (2007), Field study
	Streamlining operations, ordering and shipping processes	Li et al. (2005), Field study
	Measures for waste elimination and potential environmental hazard reduction	Hong, Dobrzykowski and Vonderembse (2010), Shah and Ward (2007), Womack and Jones (2010), Field study
	Continuous quality improvement program	Hong et al. (2010), Li et al. (2005), Shah and Ward (2003), Field study

Table 4.12: Antecedent Factors of SCM Implementation

Factor	Variable	Source
Innovative Culture	Stimulating innovation	Wallach, 1983; O'Cass, and Ngo, 2007a; Field Study
	Creative problem solving	Wallach, 1983; O'Cass, and Ngo, 2007a; Field study
	Result-oriented	Wallach, 1983; Field study
	Taking challenges of designing and making new products	Wallach, 1983; Baird, et al., 2011; Field study
	Taking challenges of adopting new practices or technologies	Wallach, 1983; Baird, et al., 2011; Field study
	Responsiveness to external changes	McDermott and Stock, 1999; Field study
Supportive Culture	Encourage team work	Wallach, 1983; Deshpandé et al., 1993; Baird et al., 2011; Field study
	Participative decision making	McDermott and Stock, 1999; Deshpandé et al., 1993; Field study
	Co-operative relationship	Wallach, 1983; Baird et al., 2011; Field study
	Importance on supply chain partner relationship	Wallach, 1983; Winklhofer et al., 2006; Field study
	Promote equality	Wallach, 1983; Field study
Environmental Uncertainty	Fluctuation in buyer order quantity	Wong et al. (2011), Buvik and Grønhaug (2000), Field study
	Frequent changes in product specifications	Tang and Rai (2012), Chen and Paulraj (2004), Auh and Menguc, (2006), Field study
	Pressure on faster order delivery	Field study
	Uncertainty with supplier delivery performance	Wong et al. (2011), Li and Lin (2006), Field study
	Uncertainty with supplier quality performance	Chen and Paulraj (2004), Li and Lin (2006), Field study
	Changes in production technology	Wong et al. (2011), Chen and Paulraj (2004), Field study
	Pressure for adopting newer technology	Chen and Paulraj (2004), Field study
	Intense competition	Tang and Rai (2012) Menguc, Auh, and Shih (2007), Buvik and Grønhaug (2000), Field study
	Political unrest	Field study, Chowdhury and Quaddus, 2015; Jahed and Uddin, 2007
Customer Focus	Keeping close contact with the buyers	Zhang, Linderman, and Schroeder (2012), Field study
	Customer satisfaction is the main focus	Narver and Slater (1990), Chen and Paulraj (2004), Paulraj et al. (2012), Field study
	Anticipate and respond to future buyer needs	Paulraj et al. (2012), Chen and Paulraj (2004), Field study
	Reflection of customer focus in business planning	Paulraj et al. (2012), Chen and Paulraj (2004), Field study
	Following up with buyers' feedback	Chen and Paulraj (2004), Narver and Slater (1990), Paulraj et al. (2012), Zhang et al. (2012), Field study
Inter-firm Trust and Commitment	Importance of openness and honesty	Li and Lin (2006), Vijayasarathy (2010), Ha et al. (2011), Premkumar et al. (2005), Field study
	Importance of partner's reliability	Petersen et al. (2005), Min and Mentzer (2004), Field study
	Partner's credibility in terms of capability	Ganesan (1994), Ha et al. (2011), Field study
	Support in changed circumstances	Liu et al. (2011), Min and Mentzer (2004), Field study
	Importance of trading partner's	Petersen et al. (2005), Vijayasarathy (2010), Li and

	commitment	Lin (2006), Field study
	Similar aims and objectives	Li and Lin (2006), Mentzer et al. (2011), Field study
Networking	Participation in informal networks and sharing their experience and business knowledge	Field study, Wenger and Snyder (2000), Lesser and Storck (2001), Jeon, Kim, and Koh, (2011b)
	Potential opportunities and changes are identified through networking	Field study, Rana and Sørensen (2013)
	Source of information on product, technology and supply sources	Du Plessis (2008), Chenhall, et al. (2011), Field study
	Use of external knowledge within the firm	Wu et al. (2007), Field study

Table 4.13: Employee Competency Factors

Variable	Source
Level of employee skills	Chin, Rao Tummala, Leung, and Tang (2004), Kotzab et al. (2011), Field study
Training and education	Field study, Zhang et al. (2012), Bowersox, Closs, and Stank (2000)
Facility for continual training and upgrading employee skills	Field study, Zhang et al. (2012), Berg et al. (2011), Gowen III and Tallon (2003)

Table 4.14: Supply Chain Agility Factors

Factor	Variable	Source
Demand Response	Ability to capture market change information	Khan and Pillania (2008), Pettit et al. (2013), Li et al. (2009), Field study
	Ability to forecast market demand	Chiang et al. (2012), Braunscheidel and Suresh (2009), Lopes de Sousa Jabbour et al. (2011), Field study
	Ability to leverage supply chain partners' competencies	Chiang et al. (2012), Braunscheidel and Suresh (2009), Field study
Flexibility	Capability of handling various product specifications and order sizes	Swafford et al. (2006a, 2008), Kim (2009), Braunscheidel and Suresh (2009), Yang (2014), Field study
	Rapidly adjusting production capacity in response to demand changes	Chavez et al. (2012), Qrunfleh and Tarafdar (2013), Swafford et al. (2006a), Field study
	New product development	Field study, Khan and Pillania (2008), Qrunfleh and Tarafdar (2013), Swafford et al. (2006a, 2008), Field study
	Back-up resources/capacity	Pettit et al. (2013), Qrunfleh and Tarafdar (2013), Field study
Integration	Communication and coordination among all functions in the firm	Kim (2009), Field study
	Real-time data on location and status of raw materials, parts, finished goods	Pettit et al. (2013), Braunscheidel and Suresh (2009), Kim (2009), Field study
	Ability to rapidly exchange information with SC partners	Khan and Pillania (2008), Field study
	Amount of joint planning activities	Chen and Paulraj (2004), Braunscheidel and Suresh (2009), Field study
Customer Responsiveness	Responsiveness to changes in buyer requirements	Chavez et al. (2012), Qrunfleh and Tarafdar (2013), Swafford et al. (2006a, 2008), Braunscheidel and Suresh (2009), Field study
	Priority on improving customer service	Braunscheidel and Suresh (2009), Swafford et al. (2006a, 2008), Field study
	Improving delivery reliability	Braunscheidel and Suresh (2009), Swafford et al. (2006a, 2008), Field study
	Short order fulfilment time	Kim (2009), Swafford et al. (2006a), Field study
	Fast buyer response time	Kim (2009), Field study

Table 4.15: Supply Chain Relationship Quality, Competitive Advantage, and Firm Performance

Factor	Variable	Source
Supply Chain Relationship Quality	Satisfaction with collaboration outcomes	Jap (2001), Liu et al. (2009), Wagner,Eggert, and Lindemann (2010), Field study
	Increased trust	Li (2006), Fynes et al. (2008), Field study
	Perceived outcome fairness	Jap (2001), Field study
	Willingness to collaborate in future	Jap (2001), Wagner et al. (2010), Field study
Competitive Advantage	Competitive price	Li et al. (2006), Field study
	Ability to compete based on quality	Min and Mentzer (2004), Kim (2009), Li et al. (2006), Field study
	Dependable delivery	Chavez et al. (2012), Kim (2009), Li et al. (2006), Field study
	Product customization	Li et al. (2006), Field study
	Innovativeness in response to changing customer demands	Li et al. (2006), Field study
	Fast product development	Qrunfleh and Tarafdar (2013), Li et al. (2006), Field study
Firm Performance	Market share	Flynn et al.(2010), Kim (2009), Qrunfleh and Tarafdar (2013), Li et al. (2006), Field study
	Return on investment	Kim (2009), Qrunfleh and Tarafdar (2013), Li et al. (2006), Flynn et al.(2010), Field study
	Growth in return on investment	Jitpaiboon (2005), Field study
	Buyer retention	Flynn et al.(2010), Kim (2009), Field study
	Sales growth	Flynn et al.(2010), Li et al. (2006), Qrunfleh and Tarafdar (2013), Field study
	Profit margin	Kim (2009), Qrunfleh and Tarafdar (2013), Li et al. (2006), Field study
	Production efficiency	Jitpaiboon (2005), Field study
	Overall competitive position	Qrunfleh and Tarafdar (2013), Li et al. (2006), Field study

4.6 THE COMPREHENSIVE RESEARCH MODEL

As discussed previously, a comparison was made between the initial research model and the findings of the field study to justify the selected constructs and variables. This section now puts forward a comprehensive model for the current research. Figure 4.2 illustrates the comprehensive research model.

The comprehensive research model argues that achieving competitive advantage requires effective implementation and sound practice of supply chain management (SCM) practices and policies. There are a number of antecedent factors that drive a firm to implement SCM: organizational culture, environmental uncertainty, customer focus, inter-firm trust and commitment, and networking. The model also argues that, depending on how well SCM is implemented, SCM practice within a firm will be enhanced. The field study identified two other factors, supportive culture and employee competency, that further enhance SCM practice in a firm. SCM is reflected in five dimensions: strategic buyer partnership, supplier partnership, information sharing, information quality, and lean systems. The outcome constructs of SCM practice are supply chain relationship quality, supply chain agility, competitive advantage and firm performance. The model argues that SCM practice should be able to improve agility in the supply chain in order to secure and sustain competitive advantage in the apparel market. SCM practice and supply chain relationship quality are depicted as the prerequisites of supply chain agility in this model. Supply chain agility is reflected and measured by demand response, flexibility, integration, and customer responsiveness. It was evident from the field study that 'firm performance' is the ultimate expected outcome of SCM practice. All the constructs and sub-constructs in this model have been discussed in Chapter Two, except the newly generated constructs (i.e., employee competence, and firm performance) from the field study.

Two new constructs, 'employee competency' and 'firm performance' were derived from the field study, and have been included in the comprehensive model. According to the field study, employee competency emerged as antecedent of SCM practice. Employee competency refers to the knowledge, skills or abilities that employees need to perform their jobs most effectively (Cardy & Selvarajan, 2006). These abilities or attributes enable them to perform their jobs in such a way that it leads to a firm's success in executing or practicing SCM practices across the organization. The success of SCM practice depends on a number of physical, technical, managerial and behavioral components, such as planning and control methods, workflow structure, organizational structure, communication and information flow, management methods, leadership structure, and culture and attitudes (Lambert et al., 1998).

Supply chain managers, along with other employees of a firm, therefore need the appropriate attitudes and skills for the execution of supply chain strategies and practices (Fawcett et al., 2008). Davis and Spekman (2004) recognize that most supply chain managers lack the skills or mind-set necessary for working in an extended enterprise environment. Berg et al., (2011) identify inadequate employee skills as one of the challenges for the Bangladesh apparel sector. They emphasize structured in-house training for both workers and middle management, and the improvement of management skills for top and middle management. In a similar vein, the field study participants explained that after implementation, employee competence, comprising better understanding, the appropriate skills and the right attitudes, becomes important to promote the sound practice of SCM. Continuous training and education thus need to be provided to employees for the success of SCM implementation in the firms. The assurance of such facilities has the potential to generate unique competencies (i.e., resources), enabling firms to secure competitive advantage.

Firm performance was derived as an outcome construct of SCM practice from the field study. Firm performance refers to how well a firm accomplishes its market and financial goals (Yamin, Gunasekaran, & Mavondo, 1999; Li et al., 2006; Ho, 2008). SCM is primarily aimed at increasing productivity and reducing inventory and order cycle time in the short-term, and its strategic long-term goals are to improve customer value/satisfaction, market share and profitability for all members of the supply chain (Tan, 2001; Mentzer et al., 2001). As such, SCM is mainly concerned with improving efficiency (i.e., cost reduction) as well as effectiveness in a strategic context (i.e., creating customer value) so as to realize improved competitiveness which, eventually, enhances profitability (Min & Mentzer, 2004). The overall effectiveness of SCM should thus be measured by such performance.

Figure 4.2 illustrates the comprehensive and final testable model, which was developed in the following sequence. An initial research model (Figure 2.2) was developed; then contextualized and confirmed by the findings of the field study. Two new constructs (employee competency, and firm performance) were extracted from the field study. SCM implementation and SCM practice have both measurement components and antecedent factors. A sub-construct of SCM (i.e., postponement) was not found to be prevalent in the context of the current research. Finally, by comparing the initial model and the field study findings, the comprehensive and final testable model (Figure 4.2) was developed. 'Firm size' as a control variable is also used to control its extraneous effects while testing the comprehensive model.

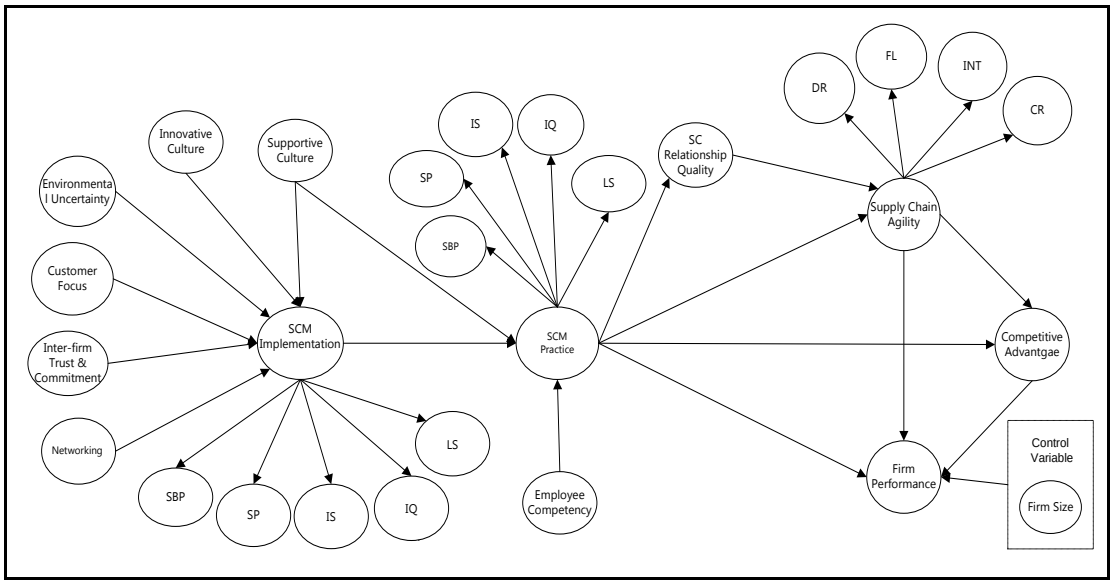


Figure 4.2: The Comprehensive Research Model

4.7 SUMMARY

This chapter has presented the findings of the qualitative field study based on content analysis and has proposed a research model. The primary objective of the field study was to test the applicability of the initial research model proposed earlier, and to explore the dimensionality of related constructs and develop a comprehensive research model in the light of the field study findings and the review of the relevant literature. Qualitative data was generated from ten interviews with supply chain executives from ten different apparel manufacturing firms in Bangladesh. The content analysis technique was employed in the inductive and deductive stages to analyze the qualitative data. Factors, sub-factors and variables were explored, which were then further scrutinized in the light of the literature. Relationships among the factors were established. A comprehensive research model was then developed based on the initial model and the field study findings. This model demonstrates the dimensions and structural relationships between the antecedents, SCM implementation and practice, and outcomes in the context of the apparel manufacturing industry of Bangladesh. In the next chapter (Chapter Five), hypotheses are developed from this comprehensive research model, which are then examined using a quantitative approach in Chapter Six.

Chapter Five

HYPOTHESES AND QUESTIONNAIRE DEVELOPMENT

5.1 INTRODUCTION

This chapter presents the development of the hypotheses and quantitative research instruments based on the comprehensive research model (Figure 4.2). The model was initially developed from the literature review which was then contextualized through a qualitative field study analysis. This chapter first presents the development of hypotheses. The hypotheses describe the relationships between the constructs as proposed in the model. Following the proposition of the research hypotheses, the subsequent sections present the development of the survey instruments used to test these hypotheses.

5.2 RESEARCH HYPOTHESES

Hypotheses have been developed in this section. Please note that all hypotheses are in the form of influencing a dependent variable by an independent variable. They are not causation hypotheses.

5.2.1 Organizational Culture

5.2.1.1 Innovative Culture and SCM Implementation

Organizational culture is a key factor influencing innovation adoption in organizations (e.g., Liu et al., 2010; Khazanchi et al., 2007; Leidner & Kayworth, 2006; Mello & Stank, 2005; McDermott & Stock, 1999). The innovative culture of an organization encourages the adoption of new ideas, innovations, business practices, procedures, products, and processes (Benitez-Amado et al., 2010). It is identified as a catalyst for innovation, and its lack inhibits innovation in organizations (Wang & Ahmed, 2004). The dominants attributes of this culture such as creativeness, innovation, and external orientation are often emphasized in developing the capability of organizations in responding to the changing requirements of the external environment (Roh, Hong, & Park, 2008).

Firms with innovative culture are typically outcome-oriented (O'Reilly, Chatman, & Caldwell, 1991) and expected to focus on adopting new and more effective business practices as a means of improving their competitive advantage. Baird et al., (2011) find significant positive relationships between the implementation of total quality management

(TQM) practices with outcome orientation and the innovation dimensions of organizational culture. They argue that innovative organizations tend to be more willing to adopt innovative practices like TQM. Braunscheidel, Suresh, and Boisnier (2010) argue that the adoption of innovative practices such as augmented information sharing with key supply chain partners, integration of major inter-firm processes, and new product development in collaboration with key suppliers and customers, may enhance a firm's external integration with its key supply chain partners. They also claim that such integration enables the firm to obtain external support and additional resources. Beugelsdijk, Koen, and Noorderhaven (2006) point out that firms with an innovative orientation tend to possess superior alliance capabilities and individuals within these firms are passionate about building strong relationships with partnering firms. Overall, the different attributes of an innovative culture make an organization more open to strategic partnership with key suppliers and customers (Sambasivan & Yen, 2010). An innovative culture also stresses not only the creation of external environmental awareness to effectively capture changing customer needs, but also building the ability to respond to these changes. Taken together, innovative culture tends to be adaptive and externally oriented, as it stresses innovation and nurtures the internal ability of an organization to adopt new management approaches, practices, procedures, and strategic changes (O'Cass & Ngo, 2007b). Therefore, it can be argued that firms with an innovative culture are more likely to implement SCM practices. Impact of innovative culture on SCM implementation is also supported by resource based theory. According to the RBV, organizational culture can be a strategic resource (Barney, 1986), hence, it is desirable that it has some outcome on firm's ability to implement and integrate innovative practices in a competitive situation (Barney, 1986; Barney, 1991). The field study findings also echo the importance of innovative culture in implementing SCM practices and policies. In line with these arguments, this study proposes that:

Hypothesis H1: *Innovative culture has a significant positive influence on SCM implementation*.

5.2.1.2 Supportive Culture, and SCM Implementation and Practice

Wallach (1983) described supportive culture as trusting, equitable, encouraging, relationship-oriented, and collaborative. The firms place a premium on teamwork, participation, and fairness. These values influence employee involvement in teamwork, participation in decision making, and engagement in free communication (Hartnell et al., 2011), and therefore, should facilitate the implementation of new practices with the

organization. Firms with a culture that focuses on teamwork, stress internal integration which embraces practices such as the use of cross-functional teams, and formal and informal communication within the organization (Naor, Goldstein, Linderman, & Schroeder, 2008; Pagell, 2004). Jaskyte (2004) reports that the more a team-oriented culture is emphasized within an organization, the more supportive this can be of the organization advancing toward procedural innovation. This view is supported by the findings of an empirical study conducted by Baird et al. (2011) which identifies the cultural dimension of teamwork/respect for people as a key influencing factor in implementing and enhancing the use of TQM practices. Prajogo and McDermott (2011) pointed out that a culture with belief in teamwork, participation and empowerment plays an important role in pursuing process improvement and the implementation of new process technologies.

Jobnoun and Sedrani (2005) investigated several dimensions of culture in UAE manufacturing companies, and found TQM practices such as customer focus and continuous improvement to be closely correlated with a people-oriented culture which promotes teamwork, participation, and a mentoring leadership in organization. Khalil et al. (2006) stressed the creation of a supportive culture along, with strategy development and the adoption of IT tools to enhance the implementation of knowledge management. Based on a recent study of organizational culture, Liao, Hu, Chen, and Lin (2013) suggest that organizations should emphasize their supportive culture in order for employees to be able to improve their acceptance of new concepts and the achievement of innovation in various aspects, such as products, procedures, management and strategies, through mutual support and collaboration.

Kasouf and Celuch (1997) examined relationship orientation on the perceived importance of inter-firm relationships (with suppliers and customers) in the context of automotive original equipment manufacturers. They reported that firms with a high relationship orientation perceive faster technological change in the industry. This suggests that firms operating in a dynamic environment place more importance on inter-firm relationships, and therefore, are encouraged to develop collaborative relationships with trading partners (Winklhofer, Pressey, & Tzokas, 2006). This is also consistent with the findings of the field study in this research, where the participants recognized the pressure to continually review opportunities for implementing newer production technology and processes in order to remain competitive in the apparel industry. Building collaborative relationships with key buyers and suppliers can be an important way of seeking external support and resources (Braunscheidel et al., 2010). In short, a supportive culture involves

attributes that reflect cultures of trust, openness, and collaboration, which are highly relevant for a firm when building strategic partnerships with key buyers and suppliers, and implementing cross-organizational SCM practices. In other words, a supportive atmosphere will encourage internal employees to accept the adoption of SCM practices and improve their ability to practice them appropriately. From RBV perspective, it can be argued that supportive culture as a resource (Barney, 1986; Zahra, Hayton, & Salvato, 2004). will shape organizational success in SCM implementation and practice (Barney, 1991). Therefore, it is hypothesized that:

Hypothesis 2a: *Supportive culture has a significant positive influence on SCM implementation*.

Hypothesis 2b: *Supportive culture has a significant positive influence on SCM practice*.

5.2.2 Environmental Uncertainty and SCM Implementation

Among other factors, environmental uncertainty has been identified as a force that drives a firm to adopt and practice SCM practices. Paulraj and Chen (2007) argue that environmental uncertainty takes on a critical role in the implementation of strategic supply management initiatives. Organizations need to coordinate supply chain processes more closely in order to be responsive to changing market trends. Fawcett et al. (2008) point out that a number of forces, such as increasingly demanding customers, higher rival intensity, and shifts in channel power, drive changes in management practice toward supply chain collaboration. Demand uncertainty may create pressure on a firm to build up a closer relationship with its suppliers to better meet with market demands (Premkumar, 2000). Customer demand for faster and reliable delivery of products also requires close coordination within the firm and with its suppliers (Richey et al., 2009). Competitive intensity is another potential external environmental factor that plays an important role in SCM implementation. The adoption and diffusion of new ideas and practices tends to be more rapid under high competitive intensity (Williams, 1994). Mentzer et al. (2000) argue that technological changes drive firms to form partnerships to support the adoption of new technology or new product development to meet customer needs, as these changes are largely beyond the control of individual firms. Under these circumstances, the implementation of SCM practices appears to be a viable option for firms as a means of

efficient and effective resource allocation in order to secure and sustain competitive advantage (Richey et al., 2009).

Marketplace uncertainty requires greater flexibility at the level of individual firms and supply chains, which in turn requires a closer relationship with suppliers (Mentzer, et al., 2001). In an environment with low uncertainty, firms benefit from the leveraging of existing competencies (Zhang, Linderman, & Schroeder, 2012). In contrast, in an environment of high uncertainty, firms internalize fewer resources and capabilities; rather than implement various SCM practices such as strategic supply chain partnership, information sharing, and lean system to enhance flexibility at the level of individual firms and supply chains, improve operational efficiency, and, eventually, reduce uncertainty risk by leveraging the resources and competencies of the trading partners (Cao & Zhang, 2011; Li, 2002; Mentzer et al., 2001).

TCE supports the notion of integration or quasi-integration in an uncertain market environment (Williamson, 1985). Uncertainty arising from bounded rationality or the self-interested behavior of partners and changes in environmental conditions enhances the need for integration (Fynes et al., 2004). Co-operation, teamwork and the timely sharing of information among firms in a supply chain will reduce transaction costs (Hobbs, 1996). Supply chain collaboration supports firms in reducing opportunism and monitoring costs (which are inherent in market transactions) by means of mutual trust and process integration (Croom, 2001; Cao & Zhang, 2011). It increases the likelihood that trading partners will act in the greater interest of the partnership. SCM assists firms in avoiding internalization, an activity which may not be aligned with their core competencies (Cao & Zhang, 2011), positioning each firm in the supply chain to do what it does best, spreading the risks of asset ownership, and minimizing market risk through enhanced co-ordination and communication (Ellram, 1993). In line with the above arguments, this study suggests that the implementation of SCM helps firm reduce transaction costs, benefit from economies of scale, tap into knowledge sources that exist outside the firm's boundaries, and in turn, reduce the risks associated with environmental uncertainty.

This field study agrees with the findings of previous literature. Most of the field study participants claimed that competition based on quality and speed of delivery forces them to implement new and improved processes and practices to eliminate waste in terms of resource use, time, effort, and inventory. They need to work closely with trading partners to cope with the changes in market demand, technology, and the supply market. The need to build cooperative relationships is also increased by the frequent political turmoil in the

country, which greatly affects their ability to deliver customer orders in a timely manner. Based on the above discussion, it is hypothesized that:

Hypothesis H3: *Environmental uncertainty has a significant positive influence on SCM implementation.*

5.2.3 Customer Focus and SCM Implementation

Customer satisfaction is central to any business operation, because, to survive and remain competitive in the marketplace, firms need to continuously create and deliver superior value to its customers. Customer focus emphasizes understanding customer expectations and guides firms in managing business operations efficiently and effectively to create superior value, and, therefore, is considered as a unique resource according to the resource-based view (Li, Chau, & Lai, 2010; Hsieh, Tsai, & Wang, 2008; Liu et al., 2013). This view supports that customer focus as a unique intangible resource (Barney, 1991; Hunt & Morgan, 1995) leads to competitive advantage by encouraging supply chain integration (Liu et al., 2013), adoption of supply chain relational capabilities (Lado et al., 2011), and implementation of SCM practices (Sila, Ebrahimpour, & Birkholz, 2006).

Customer requirements and market conditions are dynamic in nature. To competitively address the opportunities and threats that arise from marketplace dynamism may require apparel manufacturing firms to seek out external resources and competencies among their key buyers. The coordinated integration of firm resources in creating superior value for target customers is closely related to customer focus (Narver & Slater, 1990). Richey et al. (2009) maintain that quickly responding to fast-changing customer demands in a more reliable way requires close coordination within a firm and with its suppliers, and the implementation of supply chain integration. Liu et al. (2013) reports that customer-orientation strengthens the impact of supply chain integration on a firm's operational coordination and performance. In a study based on US manufacturing firms, Lado et al. (2011) empirically document the role of customer focus in adopting supply chain relational capabilities such as the adoption of long-term relationships, collaborative communication, use of cross-functional teams, and the involvement of supply chain members in creating strategic value for customers and other stakeholders. They suggest that the adoption of these capabilities allows supply chain members to attain competitive advantage. Similarly, Sila et al. (2006) point out the need for a customer-focused corporate vision within the

organization, in implementing SCM practices effectively across the supply chain, both upstream and downstream.

The supply chain for Bangladesh apparel manufacturers is mainly buyer driven. These firms are export-oriented and they strive to build a long-term profitable relationship with their key buyers by creating and offering superior value, given the competition and market dynamism. In this context, it is advisable for a firm to embrace a customer focus, which in turn, influences the implementation of SCM practices. Therefore, it is hypothesized that:

Hypothesis H4: *Customer focus has a significant positive influence on SCM implementation.*

5.2.4 Inter-firm Trust and Commitment and SCM Implementation

A significant source of uncertainty for a firm lies in the relationships with its trading partners (Premkumar et al., 2005). Transparency, openness, and trust provide basic foundations for partnering relations and offset the uncertainty and risks associated with inter-firm business relationships (Khan & Pillania, 2008; Lehtonen, 2014). In the absence of these intangibles, a collaborative partnership can be neither built nor sustained (Fawcett et al., 2012; Pulles, Veldman, Schiele, & Sierksma, 2014). Accordingly, the implementation of today's increasingly complex and integrative SCM practices may continue to pose significant management challenges in the absence of inter-firm trust and commitment.

TCE sees trust as a substitute for costly control and coordination mechanisms (McDermott, Khalfan, & Swan, 2004). In a relationship of high trust, partners are more willing to take risks, and share information and resources without the fear of opportunistic behavior by the other party (Pulles et al., 2014; Fawcett et al., 2007; Kwon & Suh, 2005). The presence of trust supports the creation of a congenial working atmosphere for the partnering firms, because it reduces risk and uncertainty, improves the reliability of contracts, and encourages inter-firm cooperation (Wu et al., 2014). The commitment of partners further enhances cooperative activities, and facilitates informative transactions (Ryu, So, & Koo, 2009). Durach, Wieland, and Machuca (2015) consider leadership commitment the key to enforcing planning initiatives in building supply chain robustness.

Mentzer et al. (2001) emphasize trust, commitment, mutual understanding and organizational compatibility in terms of goals, objectives and operating values in connecting organizations within a supply chain network. They identify trust and commitment as essential

requirements for successful long-term relationships which are an important element of SCM implementation. Ha, Park, and Cho (2011) investigated two forms of trust, affective trust and trust in competency, and found that affective trust has a significant influence on information sharing, collaboration and risk/benefit sharing between buyer and supplier, while trust in competence positively influences collaboration in joint decision making and risk/benefit sharing. According to Wu and Chuang (2010), a transaction atmosphere with mutual trust and commitment between partners may play an important role in facilitating the diffusion of e-SCM. The field study findings also support the role of inter-firm trust and commitment in SCM implementation. Based on the above arguments, it is hypothesized that:

Hypothesis H5: *Inter-firm trust and commitment has a significant positive influence on SCM implementation*.

5.2.5 Networking and SCM Implementation

Networking is one of the key value-seeking activities in forming strategic partnerships with key trading partners (Bamford, Gomes-Casseres, & Robinson, 2003). Some researchers (e.g., Chenhall et al., 2011; Noteboom, 1999) claim that informal connections and contacts in inter-firm exchanges facilitate innovation, as innovative firms seek external sources of complementary cognition and competencies. This supports knowledge sharing and learning (Praise & Casher, 2003), and pursuing collaboration with potential customers and suppliers in innovation adoption (Chenhall et al., 2011). Cousins and Menguc (2006) maintain that socialization enhances the buyer-supplier relationship and facilitates the supply integration process. Wenger and Snyder (2000) suggest that this type of forum drives business strategy and serves as an ideal way of sharing and promoting the spread of best practices across an organization. As a supply chain is a strategic network that works cooperatively towards achieving a common goal (Hart, 2004), participating firms must put a set of compatible SCM practices in place for better realization of the overall supply chain objectives. According to Rogers (1991), a firm's adoption of an innovation may be influenced by the number of other interconnected organizations in their business environment that have already implemented the innovation. Frambach (1993) argues that the possibility of an organization implementing an innovation increases with its members' extensive participation in informal networks. In addition, an organization's absorptive (i.e. learning) capability, which reflects its ability to evaluate, adopt, and strategically leverage external knowledge, may influence the extent of innovation adoption and implementation (Cohen & Levinthal, 1990; Wu et al., 2007).

In the context of this study, networking can be seen as a resource of the firm (Barney, 1991). Accordingly, the RBV supports the networking – SCM implementation link. Networking facilitates inter-organization learning (Cousins & Menguc, 2006) and knowledge sharing, which in turn facilitates the adoption of innovation. Cao and Zhang (2011) argue that firms facing uncertain environments strive for greater supply chain collaboration to leverage the knowledge of their customers and suppliers. Based on the theoretical rationale, it can be argued that the implementation of SCM practices is enhanced by utilizing the process of networking as a resource or capability. It was also revealed from the field study that the top management in Bangladeshi apparel manufacturers develops extensive personal and professional networks and uses these networks to keep track of latest developments in the market. Rana and Sørensen (2013) point out that apparel manufacturers in Bangladesh learn about the export markets and serve these markets through local, as well as international, networks or contacts. Based on the discussion above, the following hypothesis is posited:

Hypothesis H6: *Networking has a significant positive influence on SCM implementation*.

5.2.6 SCM Implementation and SCM Practice

According to the diffusion of innovation perspective, the implementation stage deals with putting SCM practices in every functional unit of the organization, at the following stage, everyone in the organization is expected to practice them, and such 'practice' can be assessed by the extent of use or execution of such systems/practices. Innovation-process studies stress the implementation stage of putting an innovation into practice in an organization (Rogers, 2003). After formal implementation, the use or practice of the innovation has to spread within the organization in order for that innovation to provide its full benefits (Premkumar et al., 1994). The subsequent diffusion stage initiates the expanded use which results in widespread transfer for regular use in an organization (Wu & Chuang, 2009). The 'practice' or 'diffusion' stage reflects the assimilation of SCM practices by an organization, and is apparent in the widespread use of these practices or systems (Rogers, 2003). The actual practice of these practices by an organization attests to the precedence of the implementation stage (Ahire & Ravichandran, 2001). SCM practice within an organization will thus likely be enhanced, depending on how well these practices or systems are implemented.

As mentioned in Chapter Two, in general and for specific applications, various stages of the diffusion process have been proposed in a number of previous studies. In these models, the process generally starts with the initiation stage and ends with the diffusion stage. For example, Kwon and Zmund (1987) developed a six-stage model for the innovation implementation process, of initiation, adoption, adaptation, acceptance, use, and assimilation. In the context of knowledge management system (KMS) diffusion in Australia, Xu and Quaddus (2005a, 2005b) studied diffusion stages of the innovation process, and the results of the study indicate that the organization-wide implementation of KMS significantly affects the diffusion of KMS in organizations. From a technological diffusion perspective, Cooper and Zmud (1990) define 'IT implementation' as "an organizational effort directed toward diffusing appropriate information technology within a user community" (p. 124). They suggest that the implementation of a technology's key elements ought to be employed to assess the level of use of that technology. Kotzab et al. (2011) point out that adoption of joint business processes leading to SCM execution depends on the presence of some organizational and technical requisites, reflecting the internal and external, joint SCM conditions. The SCM literature (e.g. Lambert et al. 1998; Lambert et al., 2004; Kotzab et al., 2006; Kotzab et al., 2011; Teller, Kotzab, & Grant, 2012) stresses the integration of key business operations across organizations in measuring SCM implementation performance, however, such integration cannot be achieved if the proposed SCM practices are not well implemented and practiced within the organization and across the supply chain. The field study findings also supported the importance of the implementation stage to promote sound SCM practice. The above arguments lead to:

Hypothesis H7: *The level of SCM implementation has a significant positive effect on the level of SCM practice.*

5.2.7 SCM Practice and Employee Competency

When implementing a new system or practice, employees or users need to be trained to understand and execute that system or practice (Chang & Chong, 2013). Mentzer et al. (2001) assert that firms implement SCM by establishing various management practices which allow them to act or behave in accordance with the SCM philosophy. SCM implementation involves breaking down functional silos (Holdorson, 2008) and the integration of core processes across organizational boundaries (Power, 2005). Thus, its implementation necessitates changes in organizational structure, technologies, planning and control methods, workflow structure, communication and information flow, management

methods, leadership structure, and culture and attitudes (Wu & Chuang, 2009; Lambert et al., 1998). Supply chain managers, along with the other employees of a firm, need appropriate attitudes and skills for the execution of supply chain policies and practices (Fawcett et al., 2008). The mere implementation of SCM practices may not have significant impact if the firm's employees do not have competences to execute them properly. Firms need to consider skill requirements, and improving employee competency through training and education, to ensure effective SCM practice after implementation.

SCM practices and total quality management (TQM) practices have many similarities. Training and education are considered essential for the successful implementation of TQM practices (Reed, Lemak, & Mero, 2000; Shenawy, Baker, & Lemak, 2007). In the TQM literature, training is seen not only as a means of teaching the required skills, but also as a vehicle for communicating a philosophy which requires a permanent change in employee attitudes and behaviors (Reed et al., 2000; Jun, Cai, & Shin, 2006). In the same way, after implementation, the sound practice of SCM requires new skills and enhanced employee competency. Continuous training and education need to be provided to employees for the success of SCM implementation in firms. The assurance of such facilities has the potential to generate unique competencies (i.e., resources), enabling firms to secure competitive advantage (Barney, 1991). SCM literature also recognizes employee training as an important human resource (HR) practice to support a commitment-focused relationship environment, and improve supply chain practices and performance (Pandey, Bhattacharyya, & Kaur, 2012; Othman, & Abdul Ghani, 2008; Shub, & Stonebraker, 2009). Berg et al., (2011) identify inadequate employee skills as one of the challenges for the Bangladesh apparel sector. They emphasize structured in-house training for both workers and middle management, and the improvement of management skills for top and middle management. Similarly, the field study participants explained that after implementation, employee competence comprising better understanding, appropriate skills and the right attitude becomes important for promoting the sound practice of SCM. Therefore it is hypothesized that:

Hypothesis H8: *Employee competency has a significant positive effect on SCM practice*.

5.2.8 SCM Practice and Supply Chain Relationship Quality

The notion of the RBV suggests that various dimensions of SCM with their own constituent practices can be viewed as resources. In Apparel industry, these resources enable firms to achieve desirable outcomes (Barney, 1991; Halldorsson et al., 2007). Firms implement

and execute various SCM practices to integrate and better manage the complementary resources and processes of supply chain partners that enable them to achieve goals and outcomes beyond each firm's individual reach. Firms in the supply chain context seek to maintain long-term relationship behaviors to enhance shared benefits among supply chain members (Su, Song, & Dang, 2008). High quality supply chain relationships are based on increased levels of trust, satisfaction, coordination, communication, joint actions, mutual investment, and the mutual integration of needs, where partners are familiar with each other's operational procedures and performance expectations (Naudé & Buttle, 2000; Fynes, Burca, & Mangan, 2008). With the amount and scope of collaborative activities/practices, it is expected that firms within a supply chain turn out to be more effective partners in a relationship. For example, information sharing is generally considered a precondition for making trust possible, thus, allowing a long-term collaborative relationship to be maintained and strengthened (Lee and Kim, 1999; Ming, Grabot, & Houé, 2014; Ren, Ngai, & Cho, 2010; Fawcett, Wallin, Allred, Fawcett, & Magnan 2011). Mohr and Spekman (1994) point out that information sharing and being knowledgeable about each other's business helps participating members in a supply chain to maintain a longer-term relationship. The research conducted by Kwon and Suh (2005) shows that information sharing practices primarily reduce the uncertainty behavior of supply chain partners, which, in turn, enhances the degree of trust. It also reveals that the degree of commitment toward maintaining a valued long-term relationship is strongly connected to the degree of trust. The empirical evidence suggests that active participation, more frequent information sharing, and information quality positively contribute to the quality of relationships among supply chain partners (Lee & Kim, 1999; Jharkharia & Shankar, 2004; Henderson, 1990; Li, Lin, Wang, & Yan, 2006). The field study also supported the findings of the literature review. The participants pointed out that the relationship with their supply chain partners had been strengthened through the continued practice of different SCM practices and policies. For example, Participant 6 stated: "*A relationship does not grow in a day, rather it grows through working together for a period of time and ongoing communication, assessments and sharing of rewards of each other's efforts…*" Based on the discussion above, it is hypothesized that:

Hypothesis H9a: *SCM practice has a significant positive effect on supply chain relationship quality.*

5.2.9 SCM Practice and Supply Chain Agility

Developing partnerships and close relationships with both suppliers and customers is at the core of SCM, and provides the basis for the execution of various SCM practices. As a result, firms develop their capability of creating, integrating, and leveraging knowledge and resources across the supply chain, which enables them to reduce supply chain uncertainty and speed up their response to market changes (Yang, 2014; Cao & Zhang, 2011). The literature suggests that well practiced SCM will result in improved supply chain flexibility and integration, and thereby, improved supply chain responsiveness (Vickery, Jayaram, Droge, & Calantone, 2003; Kim, 2006; Frohlich & Westbrook, 2001). Kotzab et al. (2006) measured supply chain implementation performance on the basis of the integration of internal and external business processes. The practice of information sharing across the supply chain is critical to achieving such integration (Lee, Kwon, & Severance, 2007). Yang (2014) suggested that firm's sophistication in using IT to facilitate information sharing and operational collaboration between buyers and suppliers has a positive effect on supply chain agility (SCA). Khan and Pillania (2008) provide empirical evidence supporting the importance of effective strategic supplier partnership and supplier evaluation practices in enhancing SCA of the manufacturing firms. Yusuf et al. (2014) argue that agility is built on leanness, and therefore firms need to implement lean practices in their operations before they can achieve agility. Lean operating systems focus on cost reduction practices, while improving quality by managing inventory effectively, reducing set-up time, and employing continuous improvement techniques across the supply chain (Qrunfleh & Tarafdar, 2013; Jacobs & Chase, 2014), which enable firms to improve their flexibility and speed in response when fulfilling customer needs (Yusuf et al., 2004). Based on the arguments above, it is hypothesized that:

Hypothesis H9b: *SCM practice has a significant positive effect on supply chain agility.*

5.2.10 SCM Practice and Competitive Advantage

Firms seek to enhance competitive advantage through SCM practice which enables them to effectively coordinate internal functions and the external operations of suppliers, customers, and other supply chain members. The advantages can be significant, as SCM practices impact important competitive dimensions including product quality, customization, availability, costs, order-to-delivery cycle time, and customer services (Tracey et al., 2005; Min & Mentzer, 2004; Jin et al., 2013). Effective SCM is extremely important in order for

manufacturers to be able to assimilate customer expectations, and to integrate, as well as effectively manage, heterogeneous resources and the competences of the supply chain members, to fulfil customer demand in the most effective and efficient way. SCM practices are the formal means of achieving such goals.

According to resource-based theory, competitive performance can be attained and sustained when the implemented and executed SCM practices are valuable, rare, and inimitable (Kim, 2009; Olavarrieta & Ellinger, 1997; Shang & Sun, 2004). When firms form a strategic partnership to accomplish both current and future goals (Gansesan, 1994), it is highly likely that strategic partnering will result in a relationship exclusiveness which may not be easily imitable (Mentzer et al., 2000). Jin et al. (2013) argue that investment of supply chain partners in technologies exclusive to another partner creates an exclusive buyer-supplier relationship which differentiates the firm from its competitors. This implies that strategic partnership with buyers and suppliers enables a firm to realize competitive advantage. The benefits that firms receive from long-term strategic relationships with customers include enhanced product development effectiveness, faster time to market for new products, improving production stability, lowering costs, and helping to justify investments in product and process technologies (Campbell & Cooper, 1999; Fawcett et al., 2007). Strategic supplier partnerships improve the quality of supplier operations, as well as the quality of items being supplied (Graham et al, 1994), while enhancing a manufacturer's performance in terms of constant improvement in quality levels, cost reductions, delivery reliability and enhancing new product development (Goffin, et al., 2006). Information sharing reduces demand uncertainty in the supply chain, and inventory costs in the process of matching supply with demand (Frohlich, 2002). It also helps firms pursue low cost production and the delivery of products to customers through improved coordination among the supply chain partners (Lin, Huang, & Lin, 2002). Information quality has been argued to contribute to improved quality, reduced costs and cycle time, improved flexibility, and fast new product development time (Monczka et al., 1998; Chavez et al., 2012). Crute, Wickham, Johns, and Graves (2008) assert that lean practices may be the source of competitive advantage as they enable firms to exceed customer delivery expectations, leading to enhanced customer satisfaction. Practices of lean operating systems aim to streamline and simplify processes across the value chain by eliminating non-value-added steps (e.g., rework, waiting time) which drive improvements in quality, cost, and productivity (Collier & Evans, 2014).

Although, Asian countries are recognized for the low cost and better quality of their products (Banomyong, 2010), geographical distance greatly affects their ability to reduce

delivery lead time. Any reduction in the lead time will reduce the overall cost of delivering goods (Banomyong, 2010) and, thus, result in improved customer satisfaction. It is argued that effective SCM supports firms in reducing the delivery lead time by accelerating sourcing and delivery processes, and the logistics functions across all supply chain partners (Jie, Parton, & Cox, 2007). The literature is confirmed by the findings in the field study. Most of the field study participants agreed about the relationship between SCM practice and competitive advantage. For example, Participant 3 noted: "*….effective SCM is vital for achieving and maintaining competiveness in the industry. If it is not practiced properly, the supply chain fails in attaining its goals*". Accordingly, from all the above arguments, the current study expects the following hypothesis:

Hypothesis H9c: *The level of SCM practice has a significant positive effect on competitive advantage.*

5.2.11 SCM Practice and Firm Performance

SCM primarily aims to increase productivity and reduce inventory and order cycle time in the short term, and its strategic long-term goals are to improve customer value/satisfaction, market share and profitability for all members of the supply chain (Tan, 2001; Mentzer et al., 2001). A number of studies have attempted to empirically link SCM practice to firm performance. A study of 196 firms by Li et al. (2006) established that higher levels of SCM practice can lead to improved market and financial performance. Kim (2009) reported a significant relationship between the level of SCM practice and firm performance. In a study conducted in the Taiwan information-related industries, Ou, Liu, Hung, and Yen (2010) find that SCM practices such as customer focus, management leadership, supplier management, human resource management, quality data and reporting, process management, and design management impact a firm's internal contextual factors, which in turn positively influence firm performance. Ryu et al.'s (2009) empirical evidence shows the necessity of supply chain collaboration in improving the both the operational and firm performance of supply chain partners. The study of Wiengarten et al. (2012) revealed that the performance impacts of several collaborative supply chain practices (i.e., information sharing, incentive alignment, joint-decision making) significantly varies with the quality of information that is shared across the supply chain. Liu et al. (2013) find that information sharing has a positive effect on a firm's operational performance. On the other hand, Ou et al.'s study of SCM practices (2010) reports a significant positive association between operational performance and financial performance. Shah and Ward (2003) confirm that the

implementation of lean practices substantially contributes to the operating performance of plants in terms of manufacturing cycle time, scrap and rework costs, worker productivity, unit manufacturing costs, and customer lead time. The principle of lean systems is to reduce cost through waste elimination and continuous improvement which will eventually reduce the cost of products and improve customer value propositions, hence generating more profits.

The resource-based view of firms suggests that a firm's competitive economic performance is essentially due to its possession or control of hard-to-imitate resource combinations (Morash & Lynch, 2002; Kim, 2009), that is, the firm's ability to integrate internal and external resources and competencies determines its competitive performance. The diffusion of innovation theory also suggests that the impact of an innovation depends on the extent to which it is used or practiced within the organization. Therefore, it is hypothesized that:

Hypothesis H9d: *The level of SCM practice has a significant positive effect on firm performance*.

5.2.12 Supply Chain Relationship Quality and Supply Chain Agility

The relationship between the supply chain partners is considered an important ingredient for achieving supply chain agility (SCA) (Christopher, 2000). Major attributes of the supply chain relationship quality (SCRQ) include high levels of trust, satisfaction, commitment, coordination, communication, joint planning activities, mutual investment, bonds, and the mutual integration of needs (Naudé & Buttle, 2000). Kown and Suh (2005) point out that processes of supply chain integration are inherently uncertain and risky, and may often arise from the interaction between the supply chain partners in areas such as inter-firm trust, ineffective communication, and the alignment of organizational cultures. They argue that inter-firm commitment, which is based on a high degree of trust, is the key to achieving success in supply chain integration. Khan and Pillania (2008) found that higher levels of trust among supply chain members improve the SCA of firms. When a high level of trust exists in a relationship, the partners are motivated to make relation-specific investments which serve as exit barriers, and these may be either tangible (e.g., property) or intangible (e.g., knowledge) (Naudé & Buttle, 2000). Pandy and Garg (2009) identify the buyer-supplier relationship as one of the enablers of agility in SCM. Overall satisfaction with the existing collaboration reinforces trust and commitment in a supply chain relationship, which, in turn, increases the willingness of the partners to engage in future collaboration (Aurier & N'Goala,

2010). Guazente (2003) maintains that the satisfaction of the supply chain members encourages greater cooperation.

Under conditions of volatile demand and competition intensity, which are common features of the apparel industry, firms need to continuously monitor market shifts and forecasting accuracy, and manage the relationship accordingly (Fynes et al., 2004; Fynes, De Burca, & Voss, 2005). These firms are more likely to need to modify their products continually in order to satisfactorily respond to changing customer requirements (Fynes et al., 2005). Empirical evidence provides support for a greater need of effective supply chain relationships for the firms operating in markets with volatile demand and high competition intensity (Fynes et al., 2004; Fynes et al., 2005).

The outcomes desired by manufacturers from improved inter-organizational relationships include achieving greater flexibility, reduced cycle time within supply chain processes, and less obsolete inventory (Handfield & Bechtel, 2002). These contribute to improved supply chain responsiveness, which is defined as the supplier's ability to quickly respond to buyer needs. Empirical evidence also suggests that SCRQ has a positive impact on supply chain performance in terms of delivery, flexibility and customer responsiveness (satisfaction) (Fynes et al., 2004; Handfielda & Bechtel, 2002; Fynes et al., 2008). Salvador, Forza, Rungtusanatham, and Choi, (2001) found that buyer-supplier interaction on the issues of material flow and quality has significant temporal impacts in terms of delivery speed and reliability. The field study also supports the role of SCRQ for SCA. For example, Participant 8 stated: "*The trust that has been built over the years has influenced our mutual commitment for prompt support in responding to changing market needs*" indicating the relationship between SCRQ and SCA. The above arguments lead to the follow hypothesis:

Hypothesis H10: *Supply chain relationship quality has a significant positive effect on supply chain agility.*

5.2.13 Supply Chain Agility and Competitive Advantage

A firm's supply chain agility (SCA) refers to the ability of a firm, internally, and in collaboration with its key customers and suppliers, to adapt or respond quickly and effectively to changes in market demands (Lee, 2004; Baramichai, et al., 2007; Braunscheidel & Suresh, 2009). Barratt and Oke (2007) pinpoint the firm resources and capabilities that would lead to enhanced performance by means of improved visibility and are likely to provide sustainable competitive advantage for a supply chain. Enhanced information

visibility, and operational and market knowledge assist integrated supply chain partners in being more responsive to changing market demands, and uncertainty stemming from changes in competition, supply sources, technology, and regulations (Kim, 2009; Li et al., 2008). Empirical evidence suggests that firms with the ability to quickly capture demand information, and master change and uncertainty can derive competitive advantage through innovation, proactivity, speed of response, and delivery reliability, without compromising on quality (Yusuf et al., 2014).

An integrated supply chain streamlines business processes and reduces lead time, enabling a firm to take on a proactive approach in adjusting and implementing its strategies throughout the supply chain ahead of its competitors when opportunities arise (Wu et al., 2006). According to Yusuf et al. (2004), building external competence through supply chain integration to facilitate seamless flows of resource coalitions is necessary to enhance competitive performance. Their study also reveals that SCA has a significant impact on cost leadership. Integration in the supply chain is argued to be positively associated with several areas of operational performance, such as cost advantage, product quality, delivery, and production flexibility (Wong et al., 2011; Kim, 2009). Manufacturing firms with a high degree of flexibility are capable of responding to customer demand for a wide range of products without affecting product quality or lead time. According to Christopher, Lowson, and Peck (2004), flexible and higher velocity supply chains are more likely to be competitive than the lower-cost supply chain in the fashion markets. Jin et al. (2013) have shown that a manufacturing firm's flexibility strongly affects its competitive advantage. Bernardes and Hanna (2009) identify responsiveness as one of the most important capabilities necessary for manufacturing firms to achieve a competitive advantage in markets influenced by international competition, shorter product lifecycles, and increasingly demanding customers. The resource-based view suggests a firm's dynamic capability of integrating, building, and reconfiguring internal and external competencies to address marketplace changes is a source of competitive advantage (Teece et al., 1997). The literature is also supported by the findings of the field study. The majority of field study participants agreed on the relationship between SCA and a firm's competitive advantage. Given these arguments, it is hypothesized that:

Hypothesis H11a: *Supply chain agility has a significant direct positive effect on the competitive advantage of firms.*

5.2.14 Supply Chain Agility and Firm Performance

Apparel markets are synonymous with continuous change; as such, business performance is largely dependent on the flexibility and responsiveness of firms (Christopher et al., 2004), because firms need to respond quickly to changes in the market and consumer conditions (Olivia & Watson, 2011). A firm's ability to understand and adapt to change, or even demand forecast, is critical for its long-term survival (Upton, 1994; Ralston, Blackhurst, Cantor, & Crum, 2015), and in the short term, affects the competitive position of the firm and may have effect on its costs, inventory expenses, and overall profitability (Sánchez & Pérez, 2005; Peng, Verghese, Shah, & Schroeder, 2013). A number of studies have linked various dimensions of supply chain agility (SCA) to firm performance, and reported a positive association between them. Ralston et al., (2015) show that demand response positively impacts a firm's operational and financial performance. Yusuf et al. (2014) examined several dimensions of oil and gas SCA, and reported that 'cooperating to compete', 'mastering to change and uncertainty', and 'leveraging the impact of people and information' have positive effect on business performance. Several empirical studies have demonstrated a positive relationship between supply chain integration and performance (e.g., Flynn et al., 2010; Lee et al., 2007; Gimenez et al., 2012; Kim, 2009). Droge, Jayaram, and Vickery (2004) empirically confirmed that a firm's internal integration has an effect on financial performance, while external integration with customers and suppliers positively influences market share. In this study, the joint application of internal and external integration practices was also shown to have a synergistic effect on firm performance. Gimenez et al. (2012) indicated that supply chain integration increases performance in complex supply environments where customer orders are characterized by variability in mix, volume and product specifications. Qrunfleh and Tarafdar (2013) argue that greater supply chain responsiveness will result in improved firm performance. The majority of the field study participants were also in agreement with the notion that various agile capabilities are essential for a firm's long-term market and financial performance. Taking all the arguments, evidence, and the dynamic capabilities perspective of the RBV together, it is hypothesized that:

Hypothesis H11b: *Supply chain agility has a significant positive effect on firm performance*.

5.2.15 Competitive Advantage and Firm Performance

Firms strive to develop competitive capabilities in one or more of the competitive dimensions (e.g., cost, quality, innovation, flexibility, quick response, and delivery reliability),

which allows them to go beyond customer expectations and improve both market and financial performance (Tracey et al., 2005; Mentzer et al., 2000; Jacobs & Chase, 2014). Firms that are capable of finding and leveraging cost advantages from all sources in the value chain (Collier & Evans, 2014) are able to increase sales, profit margin and market share. Again, firms offering premium quality products generally have larger market shares, and can charge premium prices, which allow them to increase profit margin sales and return on investment (Li et al., 2006; Kim, 2006). Higher quality leads to higher productivity and lower costs (Jacobs & Chase, 2014), which eventually leads to improved market share and overall competitive strength in the long run. Product innovation and short time-to-market can place a firm to enjoy the advantages of being first in the market, which include better sales volume and market share (Li et al., 2006). In today's environment, quick response to customer demand is considered one of the most important sources of competitive advantage (Collier & Evans, 2014), and enables firms to increase customer satisfaction and improve further market performance (Tracey et al., 1999). Drawing on the RBV of the firm, Raduan, Jegak, Haslinda, and Alimin (2009) assert that achieving competitive advantage allows a firm to earn economic rents or above-average returns. These arguments suggest the following hypothesis:

Hypothesis H12: *Competitive advantage has a significant positive effect on firm performance*.

5.2.16 Hypotheses Related to Mediation Effects

This research investigates the mediating role of supply chain relationship quality (SCRQ) and supply chain agility (SCA) in the association between the SCM practice and SCA, and SCM practice and firm's competitive advantage respectively. A construct may be said to function as a mediator to the extent that it accounts for the relationship between the independent and dependent variables (Baron & Kenny, 1986). Based on logical and objective deductions from the extant literature and support from the field study, this study draws two hypotheses related to mediation effects of SCRQ and SCA.

5.2.16.1 The Mediating Role of Supply Chain Relationship Quality between SCM Practice and Supply Chain Agility

SCM practice may not guarantee the development of agile capability to the extent required for effectively and quickly responding to market demand changes. According to

Paulraj and Chen (2007), firms increase agile capability with enhanced strategic buyer-supplier relationships. In a well-established relationship of longer duration, which is based on stable ties, supply chain partners are more knowledgeable about each other's operational procedures and performance expectations, and better able to share and leverage each other's resources and competencies in responding to changing market demands (Fynes et al, 2008). Ryu et al. (2009) contend that in 'genuine' partnerships, partners not only commit to each other but also tend to change their behavior to realize the supply chain goals. A long-term quality relationship may amplify the positive effect of process alignment which enables firms to reduce lead times, minimize order-fulfilment errors, lower coordination costs, and improve market responsiveness (Tang & Rai, 2012). Similarly, Fawcett et al. (2011) argue that since proactive information sharing can strengthen the relationships among the supply chain members and increase the ability to coordinate value-added activities and exploit unique collaboration opportunities, firms with a strong information-sharing culture gain competitive capabilities through improved operational performance and customer responsiveness. This leads to enhanced competitive capability in the context of a competitive marketplace with changing customer demands. Fynes and Burca (2005) assert that when markets change rapidly, firms need to be able to share information quickly, and as such sound SCRQ should facilitate improved performance in a turbulent marketplace. According to Srinivasan et al. (2011), SCRQ as a relational resource may impact a firm's competitive capability by promoting greater partner commitment, enhanced information/knowledge exchange, and coordination. Since SCRQ is considered an important constituent of the integration of supply chain processes across the supply chain, SCA as the outcome of well-practiced SCM is expected to be further enhanced with the presence of high SCRQ. Against this backdrop, it can be hypothesized that:

Hypothesis H13: *Supply chain relationship quality mediates the relationship between SCM practice and supply chain agility.*

5.2.16.2 The Mediating Role of Supply Chain Agility between SCM Practice and Competitive Advantage

Although some researchers (e.g., Li et al., 2006; Paulraj, Chen, & Lado, 2012) have drawn a direct link between SCM practice and competitive advantage or firm performance, the mediating role of supply chain agility (SCA) is likely to be more prevalent in this relationship. Kim (2009) argues that a firm's success in achieving the desired results from the execution of SCM practices may be affected by the extent and effectiveness of supply chain

integration. She describes the role of integration as that of strategic 'levers' that enable SCM practices to increase the likelihood of a firm's intended success. It has also been pointed out that to gain competitive advantage, firms such as those in apparel manufacturing require agile capability which enables them to focus on developing the knowledge and flexible processes needed to react to the changes in today's dynamic and competitive marketplace (Swafford et al., 2006b). In this marketplace environment, SCM practice may not provide significant competitive advantage if the SCM practices are not of an agile nature or do not generate the required agile capability for the firm. Thus, it can be argued that SCA not only acts as an antecedent of a firm's competitive advantage, but also plays a mediating role between SCM practice and competitive advantage. The mediating role of SCA or its several individual factors is also demonstrated in different research settings. Kim's (2009) research on Korean and Japanese manufacturing firms indicates the intervening role of supply chain integration in enhancing the relationship between SCM practice and competitive capability. Jin et al. (2013) report a significant indirect effect of suppliers' dedicated technologies on competitive advantage through a manufacturing firm's flexibility. Swafford et al. (2008) found that SCA mediates the relationship between information technology integration and a firm's competitive business performance. Similarly, Wu et al. (2006) confirmed the mediating role of several SCA capabilities (i.e. information exchange, coordination, activity integration, and SC responsiveness) in the relationship between IT alignment and marketing and financial performance. Vickery, Droge, Setia, and Sambamurthy (2010) found that agility completely mediates the relationship between supply chain information technologies and/or supply chain organizational initiatives and firm performance. Empirical evidence also suggests that SCM practices have an indirect impact on competitive advantage through supply chain responsiveness (Thatte, Rao, & Ragu-Nathan, 2013). This study therefore expects that SCM practice can significantly enhance a firm's competitive advantage through the mediating effect of SCA. Accordingly, it is hypothesized that:

Hypothesis H14: *Supply chain agility mediates the relationship between SCM practice and competitive advantage.*

5.2.17 Control Variable: Firm Size

The size of the firm may influence firm performance. Larger firms are more likely to adopt sophisticated SCM practices and generate agile capability than smaller firms, because these firms possess the resources and competences necessary to integrate the SCM practices more effectively (Wu et al., 2006). Larger firms may also be in a better position to realize

performance gains attributable to their scale efficiencies or higher potential for organizational synergy (Rai, Patnayakuni, & Seth, 2006; Tanriverdi, 2006). The current study therefore specifies firm size as a control variable, and hypothesizes that firm size will have an effect on firm performance.

5.3 HYPOTHESES AT A GLANCE

Overall, nineteen hypotheses (including the hypotheses related to mediation effects) have been developed based on the comprehensive model. The comprehensive model consists of the factors and variables explored from both the literature review and the field study. Table 5.1 presents all hypotheses, as developed above. Figure 5.1 illustrates the hypotheses in the comprehensive research model.

Table 5.1: Summary of the Hypotheses

Hypothesis	Link	Hypothesis Statement
H1	IC → SCMI	Innovative culture has a significant positive influence on SCM implementation.
H2a	SC → SCMI	Supportive culture has a significant positive influence on SCM implementation.
H2b	SC → SCMP	Supportive culture has a significant positive influence on SCM practice.
H3	EU → SCMI	Environmental uncertainty has a significant positive influence on SCM implementation.
H4	CF → SCMI	Customer focus has a significant positive influence on SCM implementation.
H5	ITC → SCMI	Inter-firm trust and commitment has a significant positive effect on SCM implementation.
H6	NT → SCMI	Networking has a significant positive influence on SCM implementation.
H7	SCMI → SCMP	The level of SCM implementation has a significant positive effect on the level of SCM practice.
H8	EC → SCMP	Employee competency has a significant positive effect on SCM practice.
H9a	SCMP → RQ	SCM practice has a significant positive effect on the supply chain relationship quality.
H9b	SCMP → SCA	SCM practice has a significant positive effect on supply chain agility.
H9c	SCMP → CA	The level of SCM practice has a significant positive effect on competitive advantage.
H9d	SCMP → OP	The level of SCM practice has a significant positive effect on firm performance.
H10	RQ → SCA	Supply chain relationship quality has a significant positive effect on supply chain agility.
H11a	SCA → CA	Supply chain agility has a significant direct positive effect on the competitive advantage of firms.
H11b	SCA → OP	Supply chain agility has a significant positive effect on firm performance.
H12	CA → OP	Competitive advantage has a significant positive effect on firm performance.
H13	SCMP → RQ → SCA	Supply chain relationship quality mediates the relationship between SCM practice and supply chain agility.
H14	SCMP → SCA → CA	Supply chain agility mediates the relationship between SCM practice and competitive advantage.

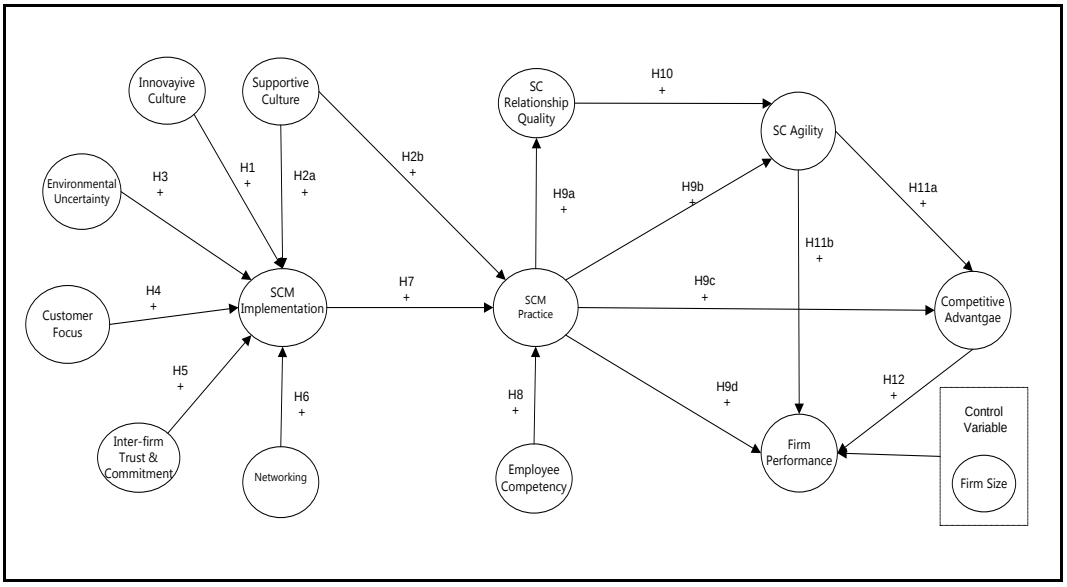


Figure 5.1: The Hypothesized Research Model

Note that PLS was used for data analysis which deals with smaller sample size. Hence, the hypotheses shown in Table 5.1 can easily be analyzed using the chosen technique. This issue of sample size adequacy has been addressed in Section 6.2.2 of Chapter Six.

In order to test these hypotheses, a set of questions was developed. The next section provides details of the development of the questionnaires.

5.4 QUESTIONNAIRE DEVELOPMENT

In order to collect the survey data to test the research hypotheses, a questionnaire (Appendix C) was developed. The developed questionnaire was approved by the Human Research Ethics Committee of the Curtin University through Protocol Approval number 16-13 (Appendix D). The following section presents the details of the development of the questionnaire.

5.4.1 Overview of the Questionnaire

The questionnaire was developed based on past research and relevant literature, theoretical support and the field study outcomes to conduct the final survey for this research. It was designed to test the research hypotheses according to the comprehensive research model as shown in Figure 4.2. Attention was paid to the design of its format, which made it easier for the respondents to understand and answer, and to avoid response bias.

The questionnaire developed was subjected to a pre-test for necessary refinement. The pre-test procedure has been detailed in the Chapter Three. The final questionnaire comprised an initial section of demographics followed by 96 Likert-style items. Among the 96 questionnaire items, 74 items were operationalized as reflective and the remaining 22 items as formative, based on the set of criteria suggested by Jarvis et al. (2003). Details of the reflective and formative measurement decision criteria were discussed in Section 3.6.8.1 of Chapter Three. As mentioned in Chapter Three, a six point Likert scale was adopted for this research in order to avoid central tendency error by the respondents (Matell & Jacoby, 1972). There were eight sections in the questionnaire in accordance with the focus of this study. The first section sought information about the demographic background of the firms and respondents. In the main part of the questionnaire, which consisted of seven sections (Sections 2–8), the focus was to measure the antecedents of SCM implementation and practice, and the outcomes of SCM practice in terms of supply chain relationship quality, supply chain agility, competitive advantage, and firm performance. The following sub-sections present the details of the development of the questionnaire.

5.4.2 Measurement Instrument Development

5.4.2.1 Questionnaire Section 1: General Information

The objective of this section was to gain information about the demographic background of the respondents and their firms involved in this research. The demographic details included the firm's details (i.e., types of products being manufactured, number of machines deployed, employment size, annual sales, and number of years in business) and the respondent's details (job title, job function, and number of years worked for the firm). Table 5.2 presents the demographic items used and the related references.

Table 5.2: General Information Items

Item	Variable	Measure
GI1	Types of products	Types of products firm makes
GI2	Number of machines	Number of sewing machines deployed in the firm
GI3	Employment size	Number of fulltime employees in the firm
GI4	Annual sales	Average annual sales of the firm
GI5	Number of years in business	Number of years the firm has been in business
GI6	Job title	Job title of the respondent
GI7	Job function	Present job function(s) of the respondent
GI8	Experience	Number of year(s) the respondent has worked for the firm

Among the eight questions in the general information section, three questions (GI1, GI6, and GI7) used nominal scales (categories with no implied order), and the other five questions (GI2, GI3, GI4, GI5, and GI8) used ordinal scales (categories in an order). It should be noted here that GI2, GI3, and GI4) measured the size of the firm using three different measures: number of sewing machines deployed, number of fulltime employees in the firm, and average annual sales. In the context of this study, the total number of full-time or equivalent firm employees was used as a measure of firm size in examining its impact as a control variable on the ultimate outcome construct (i.e., firm performance) of the comprehensive research model. This is consistent with past research (e.g., Chiang et al., 2012; Auh & Menguc, 2006) that used this item to determine the size of a firm.

5.4.2.2 Questionnaire Sections 2 and 4: Antecedents

The main focus of Sections 2 and 4 of the questionnaire was to identify and measure the influence of the antecedent factors of SCM implementation and practice. More specifically, the questions measured the influence of organizational culture (i.e., innovative culture, and supportive culture), environmental uncertainty, customer focus, inter-firm trust and commitment, networking, and employee competency. For this section, the six-point Likert scale was designed as: 'strongly disagree' (1), 'disagree' (2), 'somewhat disagree' (3), 'somewhat agree' (4), 'agree' (5), and 'strongly agree' (6). This scale indicates the extent to which the respondents agree or disagree with the statement concerning the firm's internal and external factors influencing the implementation and practice of SCM.

Questionnaire Section 2.1

This section included the measurement items related to organizational culture. As discussed earlier, the present study utilized the innovative (organizations featuring an environment supportive to innovative behavior, creativity, challenging, and adaptive) and supportive (organizations featuring a more open and harmonious atmosphere with high level of support, team work, equity, participation, and relationship orientation) dimensions of organizational culture to examine their antecedent role in SCM implementation and practice. To measure organizational culture, ten items were adapted from the instrument developed by Wallach (1983) and other relevant literature (McDermott & Stock, 1999; Baird, Jia Hu, & Reeve, 2011; O'Cass & Ngo, 2007a). All these items were confirmed and contextualized by the field study. The respondents were asked to indicate the extent to which they agreed or

disagreed with each of the statements related to questionnaire items that describe the beliefs and underlying values shared in their firm. Both dimensions of organizational culture were operationalized as reflective constructs because the indicators are the manifestations of the constructs and they are expected to co-vary (Jarvis et al., 2003). This is also supported by previous research (e.g., Lau & Ngo, 2004; Chenhall, et al., 2011; Bontis, 1998; Benitez-Amado et al., 2010). Table 5.3 presents the measurement items related to organizational culture.

Table 5.3: Measurement Items of Organizational Culture

Dimension	Item	Statement	Sources
Innovative Culture	IC1	We encourage innovative idea generation within our organization	Wallach, 1983; O'Cass, and Ngo, 2007a; Field Study
	IC2	We encourage creative problem solving within our organization	Wallach, 1983; O'Cass, and Ngo, 2007a; Field study
	IC3	We take challenges in designing and making new products	Wallach, 1983; Baird, et al., 2011; Field study
	IC4	We take challenges in adopting new processes or technologies	Wallach, 1983; Baird et al., 2011; Field study
	IC5	We are responsive to external environmental changes	McDermott and Stock, 1999; Field study
Supportive Culture	SC1	We encourage teamwork in problem solving	Wallach, 1983; Deshpandé et al., 1993; Baird et al., 2011; Field study
	SC2	We encourage participative decision making	McDermott and Stock, 1999; Deshpandé et al., 1993; Field study
	SC3	We believe in co-operative relationships (helping each other)	Wallach, 1983; Baird et al., 2011; Field study
	SC4	We believe that relationships with trading partners are important to us	Wallach, 1983; Winklhofer et al., 2006; Field study
	SC5	We believe in equitable treatment of all employees and firms in the supply chain	Wallach, 1983; Field study

Questionnaire Section 2.2

This section includes the measurement items related to the antecedent factors of SCM implementation which are mainly external sources of influence on the firms. In measuring the external influences, the respondents were asked to indicate the extent of their agreement with each statement about the environment of their firm. Table 5.4 presents the items related to these antecedent factors, namely, environmental uncertainty, customer focus, inter-firm trust and commitment, and networking.

Environmental uncertainty was conceptualized as a composite measure of the extent of change and unpredictability of the customer demands, supplier performance, technological development, competition, and political environment, based on the relevant literature and field study findings. As depicted in Table 5.4, all measurement items, except EU3 and EU8, were adapted from the literature and confirmed by the field study. The item related to political unrest (EU8) was extracted from the field study and then justified by the support of context-specific literature (Chowdhury & Quaddus, 2015; Jahed & Uddin, 2007). Item EU3 (pressure of buyer delivery time requirements) was mainly considered from the field study. The indicators of environmental uncertainty were operationalized as formative because the items caused the constructs and were defining characteristics of the construct (Jarvis et al., 2003). The items were not interchangeable and dropping of an indicator might alter the conceptual domain of the construct (Jarvis et al. 2003; Petter et al., 2007). Previous studies (for example, Buvik & Grønhaug, 2000; Ogan, 2010; Chan, Sabherwal, & Thatcher, 2006; Auh & Menguc, 2006) used formative scales for this construct. As a whole, the environmental uncertainty construct was measured by eight items as shown in Table 5.4.

Customer focus involves having sufficient understanding of customer expectations to be able to continually create superior value for them (Narver & Slater, 1990). The customer focus construct was measured by items CF1 to CF5, as shown in Table 5.4. All these items were obtained from the earlier works of Chen and Paulraj (2004), Narver and Slater (1990), Paulraj et al. (2012), and Zhang et al. (2012). These items were then confirmed by the field study findings. In measuring the construct, the items were operationalized as reflective following the decision rules of Jarvis et al. (2003). Past studies (e.g., Auh & Menguc, 2006; Menguc et al., 2007) also operationalized this construct as reflective.

Inter-firm trust and commitment were assessed with items primarily derived from the literature. All these items were then confirmed by the field study findings. The items of the inter-firm trust and commitment construct (i.e., ITC1 – ITC6) measured the extent of openness and integrity, reliability, credibility, commitment, and understanding of the supply chain objectives between the respondent firm and its trading partners. The indicators of inter-firm trust and commitment were operationalized as reflective, as the items were manifestations of the construct and were expected to co-vary (Jarvis et al., 2003). This operationalization is in line with other studies, such as Vijayasarathy (2010), and Wittmann, Hunt, and Arnett (2009), which have empirically examined inter-firm trust and commitment. The items and the source of reference are listed in Table 5.4.

Table 5.4: Measurement Items and Related Statements of Environmental Uncertainty, Customer Focus, Inter-firm Trust and Commitment, and Networking

Dimension	Item	Statement	Sources
Environmental Uncertainty	EU1	Our buyer order quantity fluctuates continually	Wong et al. (2011), Buvik and Grønhaug (2000), Field study
	EU2	Buyers frequently change their product order specifications	Tang and Rai (2012), Chen and Paulraj (2004), Auh and Menguc, (2006), Field study
	EU3	Buyer delivery time requirements put pressure on us	Field study
	EU4	We need to follow up with our suppliers to ensure on time delivery of raw materials	Wong et al. (2011), Li and Lin (2006), Field study
	EU5	We need to closely monitor our suppliers to ensure their material quality	Chen and Paulraj (2004), Li and Lin (2006), Field study
	EU6	We need to follow newer technology to remain competitive	Wong et al. (2011), Chen and Paulraj (2004), Field study
	EU7	Competition in our industry is high	Tang and Rai (2012) Menguc et al. (2007), Buvik and Grønhaug (2000), Field study
	EU8	Political unrest affects our delivery schedule	Field study, Chowdhury and Quaddus, 2015; Jahed and Uddin, 2007
Customer Focus	CF1	We are in close contact with our buyers	Zhang et al. (2012), Field study
	CF2	Buyer satisfaction is our main focus	Narver and Slater (1990), Chen and Paulraj (2004), Paulraj et al. (2012), Field study
	CF3	We anticipate and respond to the evolving needs of customers	Paulraj et al. (2012), Chen and Paulraj (2004), Field study
	CF4	Buyer focus is reflected in business planning	Paulraj et al. (2012), Chen and Paulraj (2004), Field study
	CF5	We follow up with our customers for quality and delivery performance feedback	Chen and Paulraj (2004), Narver and Slater (1990), Paulraj et al. (2012), Zhang et al. (2012), Field study
Inter-firm Trust and Commitment	ITC1	We believe that our trading partners are open and honest in dealing with us	Li and Lin (2006), Vijayasarathy (2010), Ha et al. (2011), Premkumar et al. (2005), Field study
	ITC2	We feel that our trading partners are reliable	Petersen et al. (2005), Min and Mentzer (2004), Field study
	ITC3	We think that our partners have the required knowledge and capability to do business with us	Ganesan (1994), Ha et al. (2011), Field study
	ITC4	We believe that our trading partners will be willing to offer us assistance and support in changed circumstances	Liu et al. (2011), Field study
	ITC5	Our trading partners keep their promises to us	Petersen et al. (2005), Vijayasarathy (2010), Li and Lin (2006), Field study
	ITC6	We and our trading partners have a similar understanding of the aims and objectives of the supply chain	Min and Mentzer (2004), Li and Lin (2006), Mentzer et al. (2011), Field study
Networking	NT1	Informal networks help in sharing experience and business knowledge among the participants	Field study, Wenger and Snyder (2000), Lesser and Storck (2001), Jeon et al. (2011b)
	NT2	Informal networks provide information about market changes and opportunities	Field study, Rana and Sørensen (2013)
	NT3	We receive updates on products, technology and supply sources through networking	Du Plessis (2008), Chenhall, et al. (2011), Field study
	NT4	Our firm evaluates and use external knowledge	Wu et al. (2007), Field study

Networking is a social process where a group of organizational members voluntarily participates in creating and sharing their implicit as well as explicit knowledge (Jeon et al., 2011; Wenger & Snyder, 2000; Braun, 2002). As shown in Table 5.4, four items (NT1 – NT4) were used to measure this construct. All these items were obtained from the literature and the field study findings. Networking was considered a construct with reflective indicators as per the decision rules of Jarvis et al. (2003), which is also consistent with the previous studies of Chenhall et al. (2011), and Tsang, Nguyen, and Erramilli (2004).

Questionnaire Section 4: Employee Competency

Employee competency refers to the knowledge, skills or abilities that employees need to perform their jobs most effectively (Cardy & Selvarajan, 2006). As described in the field study analysis, the construct 'employee competency' was derived primarily from the qualitative analysis. Employee competency was not in the initial research model, however, during the field study analysis, employee competency emerged as a new construct which has direct and positive influence on a firm's success in practicing SCM. The items for measuring employee competency were mainly generated from the field study; however, support from the relevant literature was also ascertained. Employee competency here measures the level of employee skills, and the training facilities available in the firm that support the sound practice of SCM. Table 5.5 presents the items related to 'employee competency'.

Table 5.5: Measurement Items of Employee Competency

Item	Statement	Sources
EC1	The overall level of employee skills are sufficient for executing supply chain management practices	Chin et al. (2004), Kotzab et al. (2011), Field study
EC2	Training and education for employees with regards to supply chain management are adequate	Field study, Zhang et al. (2012), Bowersox et al. (2000)
EC3	We have the facility for continual training and upgrading employee skills	Field study, Zhang et al. (2012), Berg et al. (2011), Gowen III and Tallon (2003)

5.4.2.3 Questionnaire Section 3: SCM Implementation and Practice

The objective of this section was to measure supply chain management (SCM) implementation and practice. The higher-order constructs 'SCM implementation' and 'SCM practice' were measured by five dimensions, strategic buyer partnership, supplier

partnership, information sharing, information quality, and lean system. 'SCM implementation' was measured by the extent to which SCM practices were implemented by putting formal or informal procedures, policies, processes or systems in place, and 'SCM practice' was assessed by the extent of practice or the execution of such practices incorporating SCM. An identical set of items was used to measure both the extent of 'SCM implementation' and 'SCM practice' by letting the respondents specify each item on a six-point Likert scale with endpoints of 'none or to a little extent' (1) and 'to a very great extent' (6). This is consistent with Qrunfleh (2010) who used an identical set of items to simultaneously measure SCM practices and supporting information technology applications in enhancing the success of those practices. Each of the SCM dimensions was operationalized as reflective, as the items were manifestations of the construct and were expected to co-vary (Jarvis et al., 2003).

The measurement items for strategic buyer partnership, supplier partnership, information sharing, information quality, and lean system constructs were mostly adapted or adopted from the existing scales found in previous SCM research. These items were then confirmed by the field study findings. Some items used in this study were motivated by the field study, and also justified according to the relevant literature. Altogether, 26 items were selected to measure the five dimensions of SCM (see Table 5.6).

A strategic buyer partnership is the long-term relationship between a firm and its buyers, designed to leverage the operational and strategic competences of each participating firms in realizing significant ongoing benefits (Li et al., 2006; Li et al., 2005). As shown in Table 5.5, five items (SBP1 – SBP5) were used to assess this construct. In selecting the items, this study focused on the field study findings. Four of these items (SBP1 – SBP4) were primarily adapted from past research (e.g., Kotzab et al., 2006; Li et al., 2005; Lopes de Sousa Jabbour et al., 2011; Mentzer et al., 2001; Paulraj et al., 2012) and were confirmed by the field study. The item 'buyer oriented capacity planning' (SBP5) was derived from the field study and was supported by the relevant literature.

Supplier partnership comprised six items that focused on the supplier selection process, performance monitoring and evaluation, collaboration in planning and goal- setting activities, joint problem solving, involvement in product development, and establishing long-term relationships. The two items i.e., SP1 and SP2, were primarily devised from the field study, and then supported by the relevant literature (see Table 5.6). Four items (SP3 – SP6) were adapted from previous research (Chen & Paulraj, 2004; Li et al., 2005, Paulraj et al., 2012) and confirmed by the field study.

Table 5.6: Measurement Items of SCM Implementation and Practice

Dimension	Item	Statement	Sources
Strategic Buyer Partnership	SBP1	Interaction with buyers to set standards for buyer requirements	Chen and Paulraj (2004), Li et al. (2005), Paulraj et al. (2012), Field study
	SBP2	Collaboration with buyers in planning	Lopes de Sousa Jabbour et al. (2011), Field study
	SBP3	Periodic evaluation of buyer satisfaction	Paulraj et al. (2012), Li et al. (2005), Chavez et al. (2012), Field study
	SBP4	Striving to establish long term relationships with buyers	Kotzab et al. (2006), Mentzer et al. (2001), Field study
	SBP5	Buyer oriented capacity planning	Field study, Lopes de Sousa Jabbour et al. (2011)
Supplier Partnership	SP1	Supplier selection process	Field study, Petersen et al. (2005), Shin et al. (2000), Spekman et al. (1998)
	SP2	Supplier performance monitoring and evaluation	Field study, Krause (1997), Shin et al. (2000), Pikousová and Průša (2013)
	SP3	Collaboration with suppliers in planning and goal- setting activities	Li et al. (2005), Field study
	SP4	Problem solving jointly with suppliers	Li et al. (2005), Field study
	SP5	Involvement of key suppliers in product development	Chen and Paulraj (2004), Li et al. (2005), Field study
	SP6	Establishing long term relationships with suppliers	Chen and Paulraj (2004), Paulraj et al. (2012), Field study
Information Sharing	IS1	Formal communication procedure to share information	Field study, Basnet et al. (2003), Kotzab et al. (2011), , Field study
	IS2	Information sharing support technologies	Field study, Kuo-Chung and Li-Fang (2004)
	IS3	Keeping each other informed about the events/issues that may affect other partner	Chen and Paulraj (2004), Li et al. (2005), Monczka et al. (1998), Field study
	IS4	Informing partners in advance of changing needs	Li et al. (2005), Monczka et al. (1998), Field study
	IS5	Information exchange that helps development of business planning	Li et al. (2005), Field study
Information Quality	IQ1	Timely information sharing among the trading partners	Cao and Zhang (2011), Li et al. (2005), Monczka et al. (1998), Field study
	IQ2	Accurate information exchange among the trading partners	Cao and Zhang (2011), Chavez et al. (2012), Li et al. (2005), Monczka et al. (1998), Field study
	IQ3	Complete information exchange among the trading partners	Cao and Zhang (2011), Chavez et al. (2012), Li et al. (2005), Monczka et al. (1998), Field study
	IQ4	Adequate information exchange among the trading partners	Lee and Kim (1999), Chavez et al. (2012), Li et al. (2005), Monczka et al. (1998), Field study
Lean Systems	LS1	Work study program to improve operational efficiency	Field study, Adebayo (2007)
	LS2	Efficient utilization of machine time (e.g. using SMV, reducing set-up time between product changeovers)	Khan and Pillania (2008), Li et al. (2005), Shah and Ward (2007), Field study
	LS3	Buyer order based production system	Li et al. (2005), Shah and Ward (2007), Field studys
	LS4	Streamlining operations, ordering and shipping processes	Li et al. (2005), Field study
	LS5	Controlling operational activities to eliminate waste	Field study, Hong et al. (2010), Shah and Ward (2007), Womack and Jones (2010)
	LS6	Continuous quality improvement program	Hong et al. (2010), Li et al. (2005), Shah and Ward (2003), Field study

The information sharing construct was focused on the communication of critical and proprietary information among the supply chain partners. Five items were used to measure this construct. Two items, 'formal communication procedure' (IS1) and 'information sharing support technologies' (IS2), were derived from the field study and then justified through the relevant literature, and the other three items (IS3 – IS5) were adapted from previous research (see Table 5.6 for the items and their sources of references).

Information quality was assessed by timeliness, accuracy, completeness and the adequacy of the information shared among the supply chain partners. Four items adopted from previous research (Cao & Zhang, 2011; Chavez et al., 2012; Li et al., 2005, Monczka et al., 1998) were used to measure this construct, and had been validated and previously shown to be reliable by these researchers. These items were then validated by the field study findings.

Lean systems comprise the practices of waste (cost, time, etc.) elimination in manufacturing systems through continuous improvement and maximizing or fully utilizing the activities that add value from a customer perspective. Six items (LS1 – LS6) were used to measure this construct. All items except LS1 were either adapted or adopted from the existing literature (see Table 5.6). Each of these items was compared with the field study findings to ensure their validity. The item 'work study program' (LS1) was primarily derived from the field study while also being supported by the relevant literature (see Table 5.6).

5.4.2.4 Questionnaire Section 5: Supply Chain Relationship Quality

Supply chain relationship quality (SCRQ) refers to the overall assessment of the strength of the current relationships among the supply chain partners. The present study adapted Jap's (2001) conceptualization of relationship quality and measured the SCRQ construct through four reflective items, namely, the extent of a firm's perceived satisfaction with the collaboration, increase in trust, perceived outcome fairness and willingness to collaborate in the future. Table 5.7 presents the measurement items and their references.

Table 5.7: Measurement Items of Supply Chain Relationship Quality

Item	Statement	Sources
SCRQ1	We are satisfied with the outcomes from the collaboration with trading partners	Jap (2001), Wagner et al. (2010), Field study
SCRQ2	Our trust in our trading partners has increased over the years	Field study, Li (2006), Wagner et al. (2010)
SCRQ3	The benefits of collaboration with trading partners have been fair	Jap (2001), Field study
SCRQ4	We would be willing to work with our trading partners again in the future	Jap (2001), Wagner et al. (2010), Field study

5.4.2.5 Questionnaire Section 6: Supply Chain Agility

Supply chain agility (SCA) refers to the capability of a firm, internally and in collaboration with its key suppliers and buyers, to respond in a speedy manner to a changing marketplace environment. In this study, the higher-order construct SCA was built upon four first-order constructs of demand response, flexibility, integration, and customer responsiveness. All these constructs were operationalized as reflective as per the decision rules of Jarvis et al. (2003). Such operationalization is also consistent with the previous research (e.g., Braunscheidel & Suresh, 2009; Merschmann & Thonemann, 2011). In assessing these constructs, 16 items were selected, by referencing both the literature review and field study findings. Demand response reflects the ability of a firm in collaboration with its supply chain partners to anticipate or handle changes in marketplace demand. The demand response construct was measured by three items, the ability to forecast changes and opportunities, market demand, and the ability to leverage supply chain partner competencies in responding to market demands. Flexibility reflects the ability to adapt and respond to changes in customer demand. Flexibility items addressed a firm's ability to provide a wide range of products, quickly adjusting capacity, fast product development, and having backup capacity. Integration was defined as the extent to which business processes within a firm, and with its customers and suppliers, are coordinated. Four items in this construct examined the level of inter-functional coordination, real-time data on inventory, the ability to rapidly exchange information, and the amount of joint planning activities with supply chain partners. Finally, customer responsiveness was reflected by promptness and adequacy in responding to customer needs. This construct comprised five items focusing on responsiveness to changes in buyer requirements, improving customer service, delivery reliability, order fulfilment time, and prompt buyer response time. Table 5.8 details the measurement items and their related references.

Table 5.8: Measurement Items of Supply Chain Agility

Dimension	Item	Statement	Sources
Demand Response	DR1	Our supply chain is capable of forecasting changes and opportunities in a timely manner	Khan and Pillania (2008), Pettit et al. (2013), Li et al. (2009), Field study
	DR2	Our supply chain is capable of forecasting market demand	Chiang et al. (2012), Braunscheidel and Suresh (2009), Lopes de Sousa Jabbour et al. (2011), Field study
	DR3	We are able to leverage our partners' competencies to respond to market demands	Chiang et al. (2012), Braunscheidel and Suresh (2009), Field study
Flexibility	FL1	We are able to provide a wide range of products (different features, sizes, colors)	Swafford et al. (2006a, 2008), Kim (2009), Braunscheidel and Suresh (2009), Yang (2014), Field study
	FL2	We are able to quickly adjust capacity in response to changes in customer demand	Chavez et al. (2012), Qrunfleh and Tarafdar (2013), Swafford et al. (2006a), Field study
	FL3	We have the ability to quickly develop new product samples	Field study, Khan and Pillania (2008), Swafford et al. (2006a, 2008), Field study
	FL4	We have backup capacity of materials, equipment, and workforce to quickly increase production if needed	Pettit et al. (2013), Qrunfleh and Tarafdar (2013), Field study
Integration	INT1	There is a high level of communication and coordination between all functional departments in our firm	Kim (2009), Field study
	INT2	We have real-time data on the location and status of supplies and finished goods	Pettit et al. (2013), Braunscheidel and Suresh (2009), Kim (2009), Field study
	INT3	Our supply chain is able to quickly exchange information	Khan and Pillania (2008), Field study
	INT4	There are many joint planning activities with supply chain partners	Chen and Paulraj (2004), Braunscheidel and Suresh (2009), Field study
Customer Responsiveness	CR1	We respond quickly and effectively to changing requirements of design specifications	Chavez et al. (2012), Qrunfleh and Tarafdar (2013), Swafford et al. (2006a, 2008), Field study
	CR2	Improving our level of customer service is a high priority	Braunscheidel and Suresh (2009), Swafford et al. (2006a, 2008), Field study
	CR3	Improving delivery reliability is a high priority	Braunscheidel and Suresh (2009), Swafford et al. (2006a, 2008), Field study
	CR4	We have a short order-to-delivery cycle time	Kim (2009), Swafford et al. (2006a), Field study
	CR5	We have fast buyer response time	Kim (2009), Field study

5.4.2.6 Questionnaire Section 7: Competitive Advantage

The main focus of this section of the questionnaire was to identify and measure the extent of a firm's competitive advantage as a result of SCM practice and supply chain agility.

To measure a firm's competitive advantage, six items were selected based on previous research (e.g., Min & Mentzer, 2004; Li et al., 2006; Chavez et al., 2012; Kim, 2009) and the field study data. These included the ability to offer competitive prices, higher quality, delivery dependability, the ability to provide customized products, responding to customer demands for new features, and fast product development. The measurements for the competitive advantage construct were modelled as formative as per the decision rules of Jarvis et al. (2003). Previous studies, such as Jin et al. (2013), Navarro et al. (2010), and Chai et al. (2011), also noted and used these items as formative indicators. Table 5.9 presents the details of these six measures and their references.

Table 5.9: Measurement Items of Competitive Advantage

Item	Statement	Sources
CA1	We offer competitive prices	Li et al. (2006), Field study
CA2	Our buyers perceive our products as being of higher quality	Min and Mentzer (2004), Kim (2009), Li et al. (2006), Field study
CA3	We provide dependable delivery	Chavez et al. (2012), Kim (2009), Li et al. (2006), Field study
CA4	We provide customized products to meet buyer needs	Li et al. (2006), Field study
CA5	We respond well to buyer demands for "new" features	Li et al. (2006), Field study
CA6	We have fast product development time	Qrunfleh and Tarafdar (2013), Li et al. (2006), Field study

5.4.2.7 Questionnaire Section 8: Firm Performance

Firm performance refers to how well a firm accomplishes its market and financial goals. As described in the field study analysis, 'firm performance' was derived primarily from the qualitative analysis as an outcome construct of SCM practice and supply chain agility. Based on the relevant literature and the field study findings, firm performance was measured in this study using perceptual items with respect to market share, return on investment, buyer retention rate, sales growth, growth in return on investment, profit margin on sales, reduction in per unit production time, and overall competitive position. These indicators have been widely used in previous research (Li et al., 2006; Kim, 2009; Flynn et al., 2010; Vickery et al., 2010; Qrunfleh & Tarafdar, 2013). As per the decision rules of Jarvis et al. (2003), this study operationalized the firm performance construct as formative. Prior research has also supported the modeling of firm performance as formative (Auh & Menguc, 2006;

Carmen & María José, 2008; Menguc et al., 2007; Merschmann & Thonemann, 2011; Podsakoff, Shen, & Podsakoff, 2006; Rai et al., 2006; Tippins & Sohi, 2003; Tsang et al., 2004). The measurement items of firm performance and the sources of reference are listed in Table 5.10.

Table 5.10: Measurement Items of Firm Performance

Item	Statement	Sources
FP1	Market share	Flynn et al.(2010), Kim (2009), Qrunfleh and Tarafdar (2013), Li et al. (2006), Field study
FP2	Return on investment	Kim (2009), Qrunfleh and Tarafdar (2013), Li et al. (2006), Flynn et al.(2010), Field study
FP3	Buyer retention rate	Jitpaiboon (2005), Field study
FP4	Sales growth	Flynn et al.(2010), Kim (2009), Field study
FP5	Growth in return on investment	Flynn et al.(2010), Li et al. (2006), Qrunfleh and Tarafdar (2013), Field study
FP6	Profit margin on sales	Kim (2009), Qrunfleh and Tarafdar (2013), Li et al. (2006), Field study
FP7	Reduction in per unit production time	Jitpaiboon (2005), Field study
FP8	Overall competitive position	Qrunfleh and Tarafdar (2013), Li et al. (2006), Field study

5.5 PRE-TESTING OF THE QUESTIONNAIRE

Before the formal survey for the quantitative study was conducted, the questionnaire was pre-tested to ensure the clarity of the questions and that the measurements captured the desired information. Five supply chain executives from the Bangladesh apparel industry who participated in the field study were selected for pre-testing and a review of the questionnaire. These personnel were experienced and knowledgeable in the supply chain area. Two academics in SCM and two doctoral research students familiar with the constructs used in this research were also included in this process. The respondents were asked to review and comment on the question content, wording, understandability, sequence, format and layout, and instructions. By incorporating their feedback, some adjustments were made to the questionnaire to improve the wording, clarity and completeness of the individual questions. Some context-specific adjustments were also made based on the results of their input. For example, an original question item related to the 'lean systems' construct was 'pull production system', which some respondents suggested should be changed to 'buyer-order based production system'. During this process, some question items were considered redundant, and thus omitted from the final questionnaire. For example, two of the question

items related to 'environmental uncertainty' construct were 'competition in our industry is high' and 'there are many other manufactures providing similar products'; these items appeared very similar, hence these were revised. In addition, the instructions were clarified further. The final survey questionnaire can be found in Appendix D.

5.6 SUMMARY

This chapter has presented the hypotheses that were derived from the final research model presented in Chapter Four. Overall, nineteen hypotheses were developed to describe the relationships among the constructs as proposed in the comprehensive research model (Figure 4.2). The subsequent sections of this chapter presented details of the development of the questionnaire for the large scale survey. In testing the developed hypotheses, the questionnaire was developed based on both the past literature and the field study findings. A total of ninety-six items, excluding the general information items, were developed for the questionnaire. The process of pre-testing the survey questionnaire was also discussed in the final section of this chapter. The following chapter will discuss the administration of the formal survey for the quantitative data analysis.

Chapter Six

SURVEY AND QUANTITATIVE DATA ANALYSIS

6.1 INTRODUCTION

This chapter presents the quantitative data analysis procedures, and reports on the results. Specifically, the chapter provides an overview of the large-scale survey administration and the findings of the descriptive analysis, measurement model, structural model and extended model with mediating effects and the effects of control variables. As discussed in Chapter Three, this study applied PLS based structural equation modelling (SEM) using SmartPLS Version 2.0 M3.

The chapter starts with an overview of the survey, then, the findings of the descriptive analysis of the survey are presented. The next section presents the findings of the SEM model estimations using PLS (measurement model) followed by the findings of the structural model assessment with the results of the hypotheses testing. The ensuing section provides the results of the mediation analysis and the chapter is summarized in the last section.

6.2 OVERVIEW OF THE SURVEY

The large-scale survey was administered using the instrument developed in the previous chapter to collect data for the study. Since the main focus of the study is supply chain management (SCM), the targeted respondents were supply chain professionals, and high-level corporate executives, as these personnel were deemed to have the best knowledge in the supply chain area. The following gives details of the process, describing sample selection, data collection, pilot study, assessment of non-response and common method biases.

6.2.1 Sample Selection and Survey Administration

The large-scale survey was conducted among apparel manufacturing firms in Bangladesh. The firms were selected based on the members directory of the Bangladesh Garment Manufacturers & Exporters Association (BGMEA), and the list provided by the Bangladesh Export Processing Zone Authority (BEPZA). From these two sources, 700 firms

were randomly selected. The selected firms were limited mostly to manufacturers with more than 100 employees, since smaller firms were unlikely to engage in any sophisticated SCM (Chavez et al., 2012). Contract manufacturers were also excluded from the list as they did not have direct interaction with the buyers, and had limited involvement in the management of overall supply chain operations.

The selection of respondents was considered important for obtaining quality data, and the respondents were expected to have adequate and appropriate knowledge of the areas of the survey (Quesada, 2004). In the case of this study, the respondents chosen needed to have experience and knowledge of operations and management in the supply chain in their firms. It was thus decided to choose merchandizing, purchasing, operations, sales, logistics, supply chain directors/managers/executives, and high level corporate executives as the respondents for this study, because their job functions enable them to gain a working knowledge about downstream, internal, and upstream supply chain operations and management.

This study adopted the personally administered survey format (Frazer & Lawley, 2000) which allowed the researcher to distribute the questionnaires directly to the respondents. All respondents were contacted individually via telephone to make appointments for the face-to-face survey. By applying this approach, the researcher was able to explain the importance of the survey and to clarify any ambiguities or to address any concerns the respondents might have. The importance of respondent independence and confidentiality in completing the questionnaire was emphasized. Although the approach was time consuming, it was expected to increase the number of subjects willing to respond. Two final year undergraduate students and one postgraduate student were employed as research assistants to assist the researcher in this survey. The research assistants had qualifications in research methods. They were also trained in the data collection procedure by the researcher prior to distribution of the questionnaires.

6.2.2 Response Rate

Low response rates have long been a major concern in research surveys (Moulton et al., 2008). In order to obtain a higher response rate, different techniques suggested by various researchers were utilized. These included involving and accepting support from government officials of the BEPZA and alumni members of the University of Chittagong, who had reached top management positions in the targeted firms, building rapport with the

respondents, explaining the importance of the study, offering the survey results, a promise of anonymity, assurance of confidentiality of the responses, and the attachment of a cover letter explaining the purpose of, and instructions for, completing the survey. To increase credibility, the Curtin University logo was included on the cover letter.

Adequacy of sample size is important to improve the representativeness or generalizability of the research outcomes. The required sample size for PLS-SEM is ten times the larger value of (a) the largest number of formative indicators measuring one construct, or (b) the largest number of independent latent variables impacting a dependent latent variable (Hair et al., 2011; Chin, 1998a). Since the most complex formative constructs in this research were the '*environmental uncertainty*' and '*firm performance*', which had eight indicators each, and the largest number of independent latent variables leading to an dependent latent variable (i.e. *SCM implementation*) as predictors were six, the minimum sample size required for this study was 80 samples (8 x10).

A total 308 surveys were completed. This number indicates a 44% response rate. The completed questionnaires were reviewed to track down errors in the form of invalid data, including irrational or missing values, and those questionnaires that came from firms that had less than 100 employees. This procedure was performed to produce clean data for the research analysis (Jackson, 2008; Alreach & Settle, 1995). Upon reviewing, twelve questionnaires were found to be incomplete and thus were excluded to avoid misleading results in the analysis. Finally, 296 valid responses were used for data analysis, which is considered more than sufficient for a robust PLS model. Based on the sample size requirement by PLS (Barclay et al., 1995; Hair et al., 2011), 296 is sufficient for meaningful data analysis.

6.2.3 Pilot Study

A pilot study was conducted to get an overview of the applicability of the data in this research. It was not intended to assess the structural or measurement models, rather to test the content validity and appropriateness of the question items by using a simple frequency. The test was also intended to determine the length of time it would take to complete the questionnaire. Prior to conducting the main large-scale survey, twenty five questionnaires were distributed to potential respondents from randomly selected firms. Overall, the findings of the pilot study revealed that all the question items in the questionnaire were

understandable and appropriate in the research context. The test also indicated that on average, the respondents needed 25-35 minutes to complete the questionnaire.

6.2.4 Common Method Bias

Common method bias (CMB) may be a concern in quantitative research when data on two or more constructs is collected from the same respondent, and the correlations between these constructs need to be interpreted (Podsakoff & Organ, 1986). Common method bias refers to the "amount of spurious covariance shared because of the common method used in the collecting data" (Malhotra et al., 2006, p. 1865). In this study, several steps recommended by Podsakoff, MacKenzie, Lee, and Podsakoff (2003) were taken into account to minimize the common method bias.

There are two techniques for controlling method biases; viz., procedural and statistical remedies. Several procedural measures were employed to keep the questionnaire items simple and specific, and methodologically and psychologically separated, such as using clear and concise language, defining key constructs and ambiguous or unfamiliar terms, the inclusion of instructions for each section of the questionnaire, using different anchor points and checking scale items for exogenous and endogenous variables for similarity (Podsakoff et al., 2003; Podsakoff, MacKenzie, & Podsakoff, 2012). Arrangement of the face-to-face meetings also allowed the researcher to inform the respondents about the meaning of the items of the questionnaire. An introduction page was attached to the questionnaire to explain the purpose of the survey and assure the respondents about the anonymity and confidentiality of their responses. Respondents were notified that the questionnaire was given with no intention to determine whether their answer was considered right or wrong, but was for research purposes. This technique minimizes consistency, social desirability, leniency and acquiescence biases (Podsakoff et al. 2003).

In addition, to examine the extent to which common method variance was present in the collected data, Harman's single factor test was performed as statistical remedy (Podsakoff & Organ, 1986). In this test, all items are entered together into a single factor analysis, and the results of the unrotated factor solution are examined. If either a single strong factor emerges or the first factor loads significantly on all items, common method variance is most likely present in the data (Podsakoff & Organ, 1986). All scale items of the present study were included in a principle components factor analysis. The exploratory factor analysis resulted in 27 distinct factors with eigenvalues greater than 1.0, which explain

72.43% of the total variance. The first factor accounted for 31.80% of the total variance and no single, general factor was apparent in the unrotated factor solution. These findings indicate that common method bias is not a significant threat to interpreting the results of the hypotheses (Podsakoff & Organ, 1986). Again, the techniques prescribed by Podsakoff et al. (2003) do have some limitations, however, most detected bias, as asserted by Doty and Glick (1998), is insufficient to invalidate the research findings.

6.2.5 Non-Response Bias

Non-response bias is a concern in any survey research (Lambert & Harrington, 1990), because when non-response bias exists, the information collected might not be representative of the targeted population of the study. Non-response bias is checked to ensure that the respondents who participated in the survey do not differ from those who did not respond to the survey. In order to obtain a higher response rate and minimize non-response bias, the researcher used different techniques suggested by various researchers, as discussed in the previous sections. Non-response bias was investigated with the aim of examining the generalizability of the sample to the population (Armstrong & Overton, 1977). A common practice in estimating non-response bias, following the approach proposed by Armstrong and Overton (1977), is testing the mean differences of some variables between the first wave responses and the second wave responses, by assuming that the second wave response is a non-response for the first wave. In this case, the respondents of the first wave were considered those who responded after the initial contact and the respondents of the second wave were those who responded after the second and third reminders.

There were 238 responses in the first wave and the other 58 were in the second wave. Twenty-nine of the 122 survey items (23.8%) were randomly chosen and independent sample '*t*' tests were performed on each item (n1=238, n2=58) to examine the non-response bias, as shown in Table 6.1. The t-tests showed no significant difference at a 0.05 level between first wave responses and second wave responses, and therefore, non-response bias did not seem to be a concern in this research.

Table 6.1: *t* Test of 29 items for First and Second Wave Responses

Variable	Item	Mean Differ.	*t*-stat.	Sig. (2-tailed)
IC2	We encourage creative problem solving within our organization	-0.04	-0.39	0.70
IC5	We are responsive to external environmental changes	0.13	1.29	0.20
SC3	We believe in co-operative relationship	0.11	1.15	0.25
EU1	Our customers' order quantity fluctuates continually	-0.11	-1.01	0.31
EU8	Political unrest affects our delivery schedule	0.13	1.31	0.19
CF1	We are in close contact with our buyers	0.08	0.79	0.43
ITC1	We believe that our trading partners are open and honest in dealing with us	-0.04	-0.36	0.72
ITC4	We believe that our trading partners will be willing to offer us assistance in changed circumstances	-0.07	-0.67	0.51
NT4	Our firm evaluates and use external knowledge	0.11	1.07	0.29
SCMI-SBP3	Periodic evaluation of buyer satisfaction	-0.11	-0.82	0.41
SCMI-SBP4	Seeking long term relationships with buyers	0.06	0.61	0.55
SCMI-SP2	Suppliers' performance monitoring and evaluation	-0.09	-0.74	0.46
SCMI-SP5	Developing products in collaboration with suppliers	-0.22	-1.60	0.11
SCMI-IS2	Information sharing support technologies	0.16	1.46	0.14
SCMI-IQ1	Timely information sharing among the trading partners	-0.13	-1.19	0.24
SCMI-LS6	Continuous quality improvement program	-0.04	-0.34	0.74
SCMP-SBP2	Collaboration with buyers in planning	-0.13	-1.07	0.29
SCMP-SP5	Developing products in collaboration with suppliers	-0.17	-1.20	0.23
SCMP-IS3	Keeping each other informed about issues that may affect other partner	-0.14	-1.00	0.32
SCMP-IQ4	Adequate information exchange among the trading Partners	-0.06	-0.50	0.62
SCMP-LS4	Improving operations, ordering and shipping processes	0.12	1.09	0.28
RQ1	We are satisfied with the outcomes from the collaboration with SC partners	0.06	0.64	0.52
DR3	We are able to leverage our partners' competencies to respond to market demand	0.04	0.37	0.71
FL3	We have the ability to quickly develop new product samples	0.13	1.34	0.18
INT2	We have real-time data on the location and status of supplies and finished goods	0.13	1.32	0.19
CR1	We respond quickly and effectively to changing requirements of design specifications	-0.01	-0.14	0.89
CA5	We respond well to buyer demands for "new" features	0.13	1.28	0.20
FP3	Buyer retention rate	0.10	0.92	0.36
FP8	Overall competitive position	0.13	1.43	0.16

6.3 DESCRIPTIVE ANALYSIS OF THE SAMPLE

The descriptive findings generated from the empirical investigation are described in this section. Descriptive analysis is often performed in empirical research to gain a basic understanding of the data at hand. Descriptive statistics characteristically provide measures for frequency distribution, central tendency, and dispersion of the data reported (Hair et al., 2007).

6.3.1 Demographic Characteristics of the Firms and Respondents

The respondents of this survey were from apparel manufacturing firms in Bangladesh. Descriptive analysis using the IBM SPSS 20 statistical package was carried out to gain understanding of the respondents' demographic backgrounds in this study. This section discusses sample characteristics in terms of (1) the firm (product types being manufactured, number of machines deployed, employment size, annual sales and number of years in business), and (2) the respondent (job title, job function, and number of years at the firm).

6.3.1.1 Demographic Characteristics of Surveyed Firms

The key demographic characteristics of the responding firms are depicted in Table 6.2.

Types of Product

Woven and knit wear are the two broad categories of product manufactured in the apparel industry of Bangladesh. There are currently 1140 knit-based, 1893 woven-based and 610 knit- and woven-based apparel manufacturing firms in Bangladesh (BGMEA, 2016). Table 6.2 shows that the majority of responding firms appeared to be manufacturing woven wear products. Half the respondents (50.3%) indicated that their firm made only woven wear products, 30.1% of the responding firms made only knit-based apparel products, and 19.6% of the firms were reported as manufacturers of both types of product.

Number of Machines

One of the most commonly reported measures of size of an apparel manufacturing firm (used by BGMEA) is the *number of machines* deployed. Half the responding firms (50.7%) had between 300 and 1000 sewing machines, and 13.2% of firms had over 3000

machines. Firms with between 1001-3000 machines accounted for 20.6% of the sample and the rest (15.5%) had less than 300 machines.

Table 6.2: Characteristics of the Surveyed Firms

Metric	Frequency	Percentage (%)
Firms by Product Types		
Knit Wear	89	30.1%
Woven wear	149	50.3%
Knit and Woven Wear	58	19.6%
Number of Machines		
<300	46	15.5%
300-1000	150	50.7%
1001-3000	61	20.6%
>3000	39	13.2%
Number of Employees		
<1000	97	32.8%
1000-2500	103	34.8%
2501-4000	57	19.3%
>4000	39	13.2%
Annual Sales in Millions of USD		
<5	53	17.9%
5-10	77	26.0%
11-25	69	23.3%
>25	97	32.8%
Number of Years in Business		
<2 years	14	4.7%
2-5 years	60	20.3%
6-10 years	62	20.9%
>10 years	160	54.1%

Employment Size

The number of employees indicates the diversification of the firms in terms of employment size, ranging from small to large. 13.2% of the firms were large, with more than 3000 employees. 34.8 2% of the firms had between 1000 and 2500 employees, and 19.3% of the firms had between 2501 and 4000 employees. Almost one third of the firms (32.8%) had fewer than 1000 employees.

Annual Sales

Almost one third of the firms (32.8%) had very high annual sales, exceeding 25 million USD and about 18% of the firms had sales volumes below 5 million USD. 26% and 23% of the respondents had sales volumes between 5-10 million and between 11-25 million

USD respectively. The results show that, based on annual sales, a good range of firms contributed to this study.

Number of Years in Business

More than half the respondent firms (54.1%) had been in business for more than 10 years. 20.9% indicated that they had been in business for between 6 and 10 years, and another 20.3% of the firms had been in business for between 2 and 6 years. The rest (4.7%) were very new firms, since they had been in operation for less than 2 years.

Overall, the diversification in product types, number of sewing machines deployed, employment size, annual sales, and experience in operations shows that a wide range of firms of different sizes and experience were covered in this survey. However, the majority of the surveyed firms were reported as woven-based apparel product manufacturers and more than half of the firms had been in business for over ten years. The survey results must therefore be explained with caution for the firms manufacturing knit wear products, and those that are new in operation.

6.3.1.2 Demographic Characteristics of the Respondents

Table 6.3 presents some key demographic characteristics of the respondents.

Job Titles

As can be seen from Table 6.3, thirty-five percent (35.1%) of the respondents were managers, and 54.1% of the respondents belonged to the "other" category such as assistant manager, senior executive, executive officer and team leader. 6.4% of the respondents held the titles general manager or deputy general manager, and 4.4% of the respondents were the CEO/Chairman/Directors of their firm. Eleven percent of the respondents were thus high level executives with wider domains (job responsibility) and administrative knowledge.

Job Functions

The respondents were asked to indicate the key job functions that applied to their everyday tasks. The majority of the respondents (55.4%) chose merchandizing, 13.2% of the respondents were responsible for purchasing/procurement, 9.1% for sales, and another 9.1% were in the production/operations area, while distribution accounted for only 1%. 6.8% of the respondents were corporate executives and the rest of the respondents (5.4%) belonged

to the 'other' category, such as compliance monitoring, product design and development, quality assurance, material management, and demand planning. It is notable that more than half the respondents are merchandizers who play the role of coordinators of buyers, manufacturer and suppliers in the apparel industry. They directly interact with buyers and suppliers, and work with all almost departments within an apparel manufacturing firm, such as management, design and development, sourcing, production, logistics and sales, to make sure that orders for finished products are executed appropriately and on time. By and large, the respondents of this study were individuals responsible for procurement, supply chain management, logistics, manufacturing/ operations, and sales, and they were knowledgeable enough to answer the questions on SCM implementation and practice, agility, and their firm's competitive performance.

Table 6.3 Characteristics of the Respondents

Metric	Frequency	Percentage (%)
Job Title		
CEO/Chairman/Director	13	4.4%
Gen. Manager/Deputy Gen.	19	6.4%
Manager	104	35.1%
Others	160	54.1%
Job Functions		
Corporate Executive	20	6.8%
Purchasing/Procurement	39	13.2%
Production/Operations	27	9.1%
Distribution	3	1.0%
Sales	27	9.1%
Merchandizing	164	55.4%
Others	16	5.4%
Years Worked at the Firm		
<2	39	13.2%
2-5	103	34.8%
6-10	97	32.8%
>10	57	19.3%

Years Worked at the Firm

About one fifth (19.3%) of the respondents indicated that they had been with the firm for more than 10 years, 34.8% indicated that they had been at the firm 2-5 years, 32.8% gave their years at the firm as 6-10 and 13.2% of the respondents had been with the firm for less than 2 years. It can thus be said that most of the respondents were experienced and had been working in their firm for many years.

6.3.2 Measurement Items

6.3.2.1 Antecedent Constructs

This study explored innovative culture, supportive culture, environmental uncertainty, customer focus, inter-firm trust and commitment, and networking as the major antecedents for encouraging SCM implementation in the apparel manufacturing industry in Bangladesh. In addition, supportive culture and employee competency were explored as antecedents of SCM practice. These antecedent factors were measured on a six-point Likert scale ranging from 'Strongly disagree' (1) to 'Strongly agree' (6). This scale indicates the extent to which the respondents agree or disagree with the statement concerning the organizational culture and environment of the firm. The mean values and standard deviation are shown in Table 6.4. As shown in Table 6.4, the mean values of the investigated items were not very different from each other, however, the standard deviations indicate that there was some variation in the responses. The mean values of the items investigating the beliefs and underlying values shared within the firm (organizational culture), and the overall environment in terms of environmental uncertainty, customer focus, networking, and inter-firm trust and commitment were either very close to or higher than five. However, the mean values of two items measuring the environmental uncertainty of the firm, 'Our buyers order quantity fluctuates continually' (mean 4.67) and 'Production technology generally changes in our industry' (mean 4.75), one item measuring the networking construct 'Informal networks provide information about market changes and opportunities' (mean 4.91) and all the items measuring employee competency were somewhat lower than five.

Table 6.4: Descriptive Statistics of Antecedent Constructs

Variable	Item	Mean	Std. Deviation
Innovative Culture			
IC1	We encourage innovative idea generation within our organization	5.01	0.75
IC2	We encourage creative problem solving within our organization	5.19	0.69
IC3	We take challenges in designing and making new products	5.23	0.79
IC4	We take challenges in adopting new processes or technologies	5.18	0.76
IC5	We are responsive to external environmental changes	5.13	0.71
Supportive Culture			
SC1	We encourage teamwork in problem solving	5.49	0.66
SC2	We encourage participative decision making	5.24	0.76
SC3	We believe in co-operative relationships	5.49	0.66
SC4	We believe that relationships with trading partners are important to us	5.58	0.56
SC5	We believe in equitable treatment of all employees and firms in the supply chain	4.97	0.89
Environmental Uncertainty			
EU1	Our buyer order quantity fluctuates continually	4.67	0.73
EU2	Buyers frequently change their product order specifications	5.05	0.64
EU3	Buyer delivery time requirement put pressure on production	4.68	0.93
EU4	We need to follow up with our suppliers to ensure on time delivery of raw materials	5.38	0.74
EU5	We need to closely monitor our suppliers to ensure their material quality	5.28	0.78
EU6	We need to follow newer technology to remain competitive	4.75	0.85
EU7	Competition in our industry is high	5.31	0.65
EU8	Political unrest affects our delivery schedule	5.22	0.83
Customer Focus			
CF1	We are in close contact with our buyers	5.41	0.65
CF2	Customer satisfaction is our main focus	5.60	0.62
CF3	We anticipate and respond to the evolving needs of customers	5.38	0.73
CF4	Customer focus is reflected in business planning	5.26	0.67
CF5	We follow up with our buyers for quality and delivery performance feedback	5.20	0.73
Networking			
NT1	Informal networks help in sharing experience and business knowledge among the participants	5.11	0.70
NT2	Informal networks provide information about market changes and opportunities	4.91	0.74
NT3	We receive updates on products, technology and supply sources through networking	5.05	0.64
NT4	Our firm evaluates and use external knowledge	5.00	0.68
Inter-firm Trust and Commitment			
ITC1	We believe that our trading partners are open and honest in dealing with us	5.07	0.78
ITC2	We feel that our trading partners are reliable		
ITC3	We think that our partners have the required knowledge and capability to do business with us	5.12	0.66
ITC4	We believe that our trading partners will be willing to offer us assistance and support in changed circumstances	5.23	0.72
ITC5	Our trading partners keep their promises to us	5.03	0.71
ITC6	We and our trading partners have a similar understanding of the aims and objectives of the supply chain	5.04	0.66
Employee Competency			
EC1	Overall level of employee skills are sufficient	4.83	0.80
EC2	Training and education with regards to SCM are adequate	4.48	0.97
EC3	Facility for continual training and upgrading employee skills	4.64	0.99

6.3.2.2 Supply Chain Management Implementation and Practice

As previously discussed, SCM implementation and practice are operationalized in this study as multidimensional constructs consisting of strategic buyer partnership, supplier partnership, information sharing, information quality, and lean system. Table 6.5 displays the descriptive findings for the level of SCM implementation and practice pursued via formal and or informal means by the investigated manufacturing firms. An identical set of items was used to measure the extent of both SCM implementation and practice by letting the respondents specify each item on a six-point Likert scale as (1) 'None or to a little extent' and (6) 'To a very great extent'. The higher the mean value, the higher the level of SCM implementation and practice. The results indicate that the highest level of implementation was with 'Seeking long term relationships with buyers' (mean 5.41), and that 'Collaboration with suppliers in planning and goal-setting activities' (mean 4.93) was the lowest implementation area. With respect to SCM practice, the highest and the lowest mean values were 'Buyer order based production system' (mean 5.24) and 'Collaboration with suppliers in planning and goal-setting activities' (mean 4.77) respectively.

The current study explicitly differentiates SCM implementation and practice, and such differentiation is reflected in the empirical investigation. It can be seen from Table 6.5 that the mean values of the SCM practice in all the items were lower than those of the implementation. These differences imply that the implemented policy, processes, practices or systems were not fully practiced in the surveyed firms. To determine whether these differences were statistically significant, a series of paired sample *t*-tests were performed for each item. The results of the paired sample t-tests for all items measuring SCM implementation and practice are shown below Table 6.6. The t-tests show that implementation is significantly different at a 0.05 level from practice in all items.

Table 6.5: Descriptive Statistics of SCM Implementation and Practice

Vari-able	Item	Implementation		Practice	
		Mean	Std. Dev.	Mean	Std. Dev.
Strategic Buyer Partnership					
SBP1	Interaction with buyers to set standards for buyer requirements	5.04	0.86	4.88	0.92
SBP2	Collaboration with buyers in planning	5.24	0.75	5.04	0.80
SBP3	Periodic evaluation of buyer satisfaction	5.00	0.89	4.87	0.87
SBP4	Striving to establish long term relationships with buyers	5.41	0.70	5.18	0.84
SBP5	Buyer oriented capacity planning	5.28	0.78	5.09	0.85
Supplier Partnership					
SP1	Supplier selection process	5.06	0.82	4.89	0.85
SP2	Supplier performance monitoring and evaluation	5.05	0.84	4.84	0.85
SP3	Collaboration with suppliers in planning and goal-setting activities	4.93	0.92	4.77	0.95
SP4	Resolving problem jointly with suppliers	5.01	0.82	4.85	0.93
SP5	Involvement of key suppliers in product development	5.12	0.93	4.98	0.97
SP6	Establishing long term relationships with suppliers	5.23	0.81	5.05	0.88
Information Sharing					
IS1	Formal communication procedure to share information	5.08	0.89	4.92	0.90
IS2	Information sharing support technologies	5.30	0.76	5.19	0.79
IS3	Keeping each other informed about issues that may affect other partner	5.11	0.90	4.89	0.95
IS4	Informing partners in advance of changing needs	5.01	0.82	4.93	0.86
IS5	Information exchange that helps establishment of business planning	5.10	0.79	4.90	0.87
Information Quality					
IQ1	Timely information sharing among the trading partners	5.31	0.76	5.07	0.80
IQ2	Accurate information exchange among the trading partners	5.30	0.69	5.05	0.77
IQ3	Complete information exchange among the trading partners	5.09	0.81	4.92	0.83
IQ4	Adequate information exchange among the trading partners	5.17	0.78	4.92	0.85
Lean System					
LS1	Work study program to improve operational efficiency	4.94	0.93	4.79	0.98
LS2	Efficient utilization of machine time	5.09	0.91	4.86	0.98
LS3	Buyer order based production system	5.37	0.73	5.24	0.74
LS4	Streamlining operations, ordering and shipping processes	5.14	0.79	5.06	0.77
LS5	Controlling operational activities to eliminate waste	5.11	0.79	4.87	0.81
LS6	Continuous quality improvement program	5.30	0.77	5.14	0.80

Table 6.6: Comparison between SCM Implementation and Practice

Vari-able	Item	Paired Differences		*t*-test for Equality of Means	
		Mean	Std. Dev.	*t* stat.	Sig. (2-tailed)
Strategic Buyer Partnership					
SBP1	Interaction with buyers to set standards for buyer requirements	0.16	0.76	3.70	0.00
SBP2	Collaboration with buyers in planning	0.21	0.69	5.14	0.00
SBP3	Periodic evaluation of buyer satisfaction	0.13	0.74	2.97	0.00
SBP4	Striving to establish long term relationships with buyers	0.24	0.68	6.01	0.00
SBP5	Buyer oriented capacity planning	0.19	0.63	5.16	0.00
Supplier Partnership					
SP1	Supplier selection process	0.18	0.74	4.09	0.00
SP2	Supplier performance monitoring and evaluation	0.20	0.66	5.30	0.00
SP3	Collaboration with suppliers in planning and goal-setting activities	0.16	0.66	4.16	0.00
SP4	Resolving problem jointly with suppliers	0.16	0.69	3.87	0.00
SP5	Involvement of key suppliers in product development	0.14	0.67	3.49	0.00
SP6	Establishing long term relationships with suppliers	0.18	0.57	5.41	0.00
Information Sharing					
IS1	Formal communication procedure to share information	0.16	0.61	4.48	0.00
IS2	Information sharing support technologies	0.11	0.69	2.77	0.01
IS3	Keeping each other informed about events/issues that may affect other partner	0.22	0.59	6.48	0.00
IS4	Informing partners in advance of changing needs	0.08	0.62	2.35	0.02
IS5	Information exchange that helps establishment of business planning	0.21	0.62	5.69	0.00
Information Quality					
IQ1	Timely information sharing among the trading partners	0.23	0.66	6.11	0.00
IQ2	Accurate information exchange among the trading partners	0.25	0.62	7.01	0.00
IQ3	Complete information exchange among the trading partners	0.18	0.61	4.93	0.00
IQ4	Adequate information exchange among the trading partners	0.25	0.64	6.78	0.00
Lean System					
LS1	Work study program to improve operational efficiency	0.15	0.72	3.55	0.00
LS2	Efficient utilization of machine time	0.23	0.69	5.80	0.00
LS3	Buyer order based production system	0.14	0.55	4.24	0.00
LS4	Streamlining operations, ordering and shipping processes	0.07	0.61	2.11	0.04
LS5	Controlling operational activities to eliminate waste	0.24	0.63	6.58	0.00
LS6	Continuous quality improvement program	0.16	0.63	4.25	0.00

6.3.2.3 Supply Chain Agility

Supply chain agility (SCA) was represented by four constructs in this study: demand response, flexibility, integration, and customer responsiveness. These constructs were assessed by asking the respondents to indicate their level of capability (internally, and in collaboration with their key suppliers and buyers) when responding to a changing marketplace environment in a speedy manner on a six-point Likert scale ranging from 'Strongly disagree' (1) to 'Strongly agree' (6). Table 6.7 shows the mean values and standard deviations of all items measuring SCA under the four constructs. As presented in Table 6.7,

the respondents stated that they had considerably high levels of capability in terms of SCA with a mean value of around five, however, the mean values of the items measuring demand response capability appeared to be lower than five.

Table 6.7: Descriptive Statistics of Supply Chain Agility

Variable	Item	Mean	Std. Deviation
Demand Response			
DR1	Our supply chain is capable of forecasting changes and opportunities in a timely manner	4.77	0.73
DR2	Our supply chain is capable of forecasting market demand	4.85	0.71
DR3	We are able to leverage our partners' competencies to respond to market demand	4.98	0.73
Flexibility			
FL1	We are able to provide a wide range of products	5.27	0.67
FL2	We are able to quickly adjust capacity in response to changes in customer demand	5.13	0.73
FL3	We have the ability to quickly develop new product samples	5.30	0.68
FL4	We have backup capacity of materials, equipment, and workforce to quickly increase production if needed	5.00	0.77
Integration			
INT1	There is a high level of communication and coordination between all functional departments in our firm	5.14	0.78
INT2	We have real-time data on the location and status of raw materials, parts and finished goods	5.11	0.70
INT3	Our supply chain is able to quickly exchange information	5.12	0.72
INT4	There are many joint planning activities with supply chain partners	4.89	0.81
Customer Responsiveness			
CR1	We respond quickly and effectively to changing requirements of design specifications	5.21	0.68
CR2	Improving our level of customer service is a high priority	5.52	0.61
CR3	Improving delivery reliability is a high priority	5.55	0.61
CR4	We have a short order-to-delivery cycle time	4.92	0.75
CR5	We have fast buyer response time	5.38	0.69

6.3.2.4 Other Outcome Constructs

Finally, the descriptive statistics of the outcome constructs, supply chain relationship quality, competitive advantage, and firm performance, are presented in Table 6.8.

Table 6.8: Descriptive Statistics of Outcome Constructs

Variable	Item	Mean	Std. Deviation
Supply Chain Relationship Quality			
SCRQ1	We are satisfied with the outcomes from the collaboration with trading partners	4.93	0.62
SCRQ2	Our trust in our trading partners has increased over the years	5.17	0.64
SCRQ3	The benefits of collaboration with trading partners have been fair	5.19	0.66
SCRQ4	We would be willing to work with our trading partners again in the future	5.36	0.64
Competitive Advantage			
CA1	We offer competitive prices	5.25	0.62
CA2	Our buyers perceive our products as being of higher quality	5.27	0.68
CA3	We provide dependable delivery	5.26	0.70
CA4	We provide customized products to meet buyer needs	5.30	0.67
CA5	We respond well to buyer demands for 'new' features	5.27	0.69
CA6	We have fast product development time	5.25	0.69
Firm Performance			
FP1	Market share	4.93	0.67
FP2	Return on investment	4.90	0.67
FP3	Buyer retention rate	5.05	0.75
FP4	Sales growth	5.19	0.66
FP5	Growth in return on investment	4.86	0.70
FP6	Profit margin on sales	4.65	0.77
FP7	Reduction in per unit production time	4.95	0.65
FP8	Overall competitive position	5.11	0.64

6.4 ANALYSIS BY PARTIAL LEAST SQUARES (PLS)-BASED STRUCTURAL EQUATION MODELLING

The partial least squares (PLS) approach, a component-based structural equation modeling (SEM) technique, was used to analyze the measurement model and test the research hypotheses. PLS was chosen because of the predictive nature of the study, its ability to handle complex model with multidimensional constructs (i.e., large numbers of manifest and latent variables) and to estimate models using both reflective and formative constructs (Hair et al., 2011; Chin, 1998a; Barclay et al., 1995). In addition, PLS is a nonparametric technique and, thus does not assume normality of the data, and can accommodate smaller sample sizes than other SEM techniques (e.g., covariance-based techniques such as LISREL) (Arnett et al., 2003; Chin, 1998a).

The PLS technique was applied in two stages: the assessment of the measurement model and the assessment of the structural model. In the first stage, the objective was to examine the properties of the hierarchical measurement model (first-order and second-order) in terms of item reliability, internal consistency and discriminant validity (Hulland,

1999; Barclay et al., 1995) for the reflective constructs. As discussed in Chapter Three, the present study used the two-stage approach in assessing second-order measurement models. For the formative constructs, this study tested item reliability and multicollinearity. In the second stage, assessment of the structural model was undertaken to test the proposed hypotheses by examining the path coefficients (β), statistical significance of t-values, and the amount of variance explained (R^2). In PLS, a good model fit is confirmed with significant path coefficients, reasonably high R^2 values and internal consistency (i.e. construct reliability) being above 0.7 for each construct (Gefen et al., 2000). The SmartPLS, Version 2.0 M3 software was used for the data analysis, with 296 usable responses (Ringle et al., 2005). A nonparametric bootstrapping procedure was undertaken on 296 cases where 500 random samples of observations with replacements were generated from the original dataset (Chin, 1998a; Efron & Tibshirani, 1993). This section presents the findings in terms of the first-order measurement model, second-order measurement model, and structural model, with results of the hypotheses testing.

6.4.1 Assessment of the Measurement Model

In the first stage of the PLS analysis, an assessment of the measurement model was performed. The model consists of twenty four first-order constructs and three second-order constructs. The first-order measurement model comprises twenty one reflective and three formative constructs, and all of the second-order constructs were reflective. The two-stage approach was used in estimating second-order constructs.

6.4.1.1 Assessment of the First-Order Measurement Model

The measurement quality of the two types of constructs in this model, formative and reflective, was examined separately by following different procedures. In this section, assessment of the reliability and validity of the twenty reflective constructs is reported first and then the measurement quality of the other three formative construct is reported. Figure 6.1 illustrates the first-order measurement model.

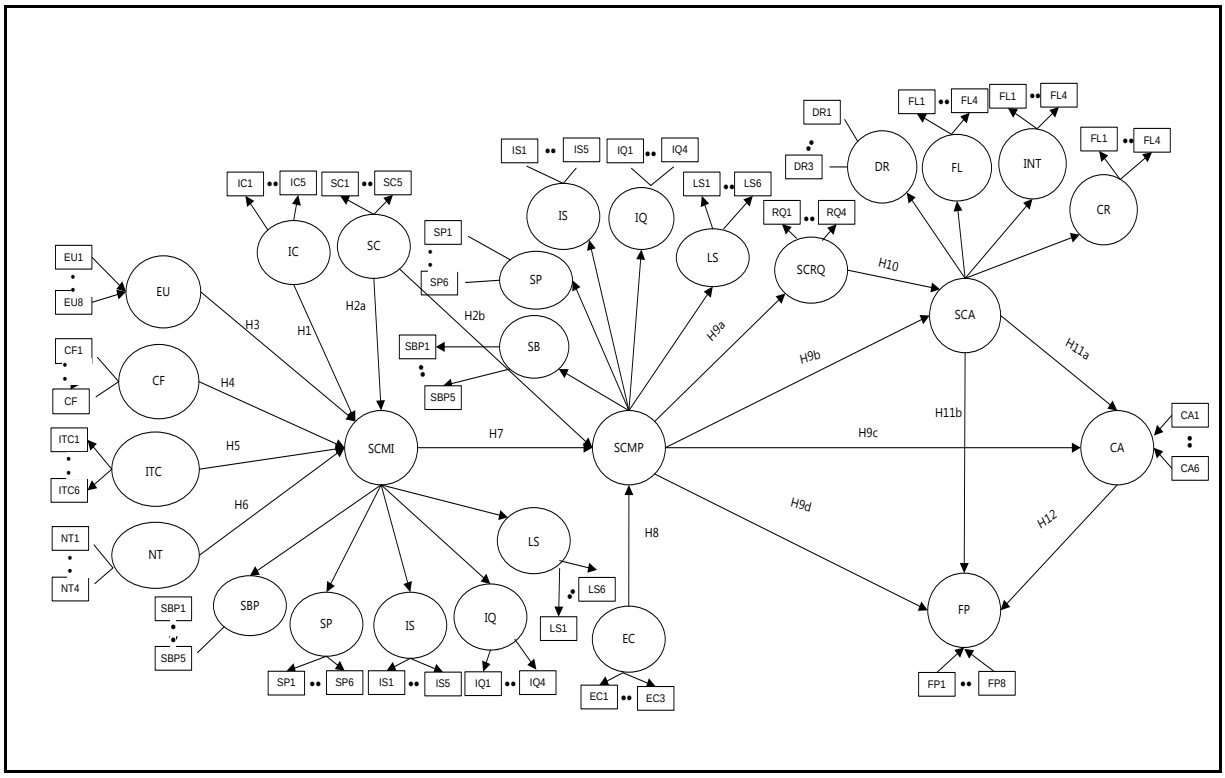


Figure 6.1: First-Order Measurement Model

IC: Innovative Culture	SBP: Strategic Buyer Partnership	DR: Demand Response
SC: Supportive Culture	SP: Supplier Partnership	FL: Flexibility
EU: Environmental Uncertainty	IS: Information Sharing	INT: Integration
CF: Customer Focus	IQ: Information Quality	CR: Customer Responsiveness
NT: Networking	LS: Lean Systems	CA: Competitive Advantage
ITC: Inter-firm Trust and Commitment	EC: Employee Competency	FP: Firm Performance
SCMI: SCM Implementation	SCRQ: Supply Chain Relationship Quality	
SCMP: SCM Practice	SCA: Supply Chain Agility	

6.4.1.1.1 First-Order Reflective Constructs

The measurement quality of the twenty reflective constructs was assessed based on their convergent validity, reliability, and discriminant validity (Hulland, 1999).

Convergent Validity

Convergent validity indicates the extent to which each measurement item is converged into a theoretical construct. It ensures that items are correlated and measure the same construct. Convergent validity was assessed by estimating item reliability, internal

consistency, and average variance extracted (AVE), as suggested by Fornell and Larcker (1981).

Item Reliability

The item reliability of an individual item is assessed by examining its loading on the intended construct. The loadings are reported in Table 6.9. The loadings indicate the correlation of the measurement items with their respective constructs. Items with good measurement properties should exhibit high loadings on the construct for which they are indicators. Therefore, low loading items in a construct need to be identified and eliminated to ensure that the operational measures are free from random error, and measure the construct in a consistent manner (Fornell & Larcker, 1981).

Researchers have suggested a number of rules of thumb with regard to the acceptable value of item loading. Igbaria et al. (1995) considered 0.4 as acceptable minimum loading. Hair, Black, Babin, and Anderson (2010) suggested three significance levels for item loadings; loadings above 0.3 as significant, above 0.4 as more significant and above 0.5 as very significant. Barclay et al. (1995) specified 0.707 as the minimum reliability limit. According to Hair et al. (2011), item loadings should be higher than 0.70. Most researchers recommend that most of the loadings should be at least 0.6 and ideally at 0.7 or above (Chin 1998a), however, in exploratory research, loadings of 0.40 are acceptable (Hair et al., 2013a). Low loading items are sometimes retained, considering their contribution to content validity (Hair et al., 2011). Li et al. (2010) used item loading values of 0.60 or higher and the *t* values of loadings as the criteria for convergent validity.

Considering the recommendations in the literature, the exploratory nature of the study, and to maximize the measurement model's ability to fulfil the requirements of convergent validity, this research adopted the minimum cut-off value of 0.60 for item loading. Accordingly, eleven items failed to meet this criterion: IC1, SC1, SCMI-SP1, SCMI-SP2, SCMI-IS1, SCMP-SBP4, SCMP-SBP5, SCMP-SP1, SCMP-SP6, SCMP-LS1, and CR3. PLS was run again, discarding these thirteen items. Based on this procedure, all the items achieved loading values above 0.60 and loaded with significant *t*-values on their respective latent constructs, as shown in Table 6.9. All these reflective items thus exhibit sound convergent validity. To streamline the results, item loadings lower than 0.60 were not reported.

Internal Consistency

Internal consistency is the measure of reliability of the constructs. The study examined internal consistency reliability using composite reliability (CR) (Fornell & Larcker, 1981). A minimum value of 0.7 is recommended for composite reliability (Chin, 1998b; Gefen et al., 2000; Hair et al., 2011). As seen in Table 6.9, all constructs met the acceptable criterion for internal consistency. The highest internal consistency was observed for 'SCM implementation-information quality' (0.9084), and the lowest for 'innovative culture' (0.8018). The high internal consistency values for all the constructs confirm the reliability of the measurement model.

Average Variance Extracted (AVE)

Average variance extracted (AVE) was utilized as the third measure to confirm the convergent validity. AVE measures "the amount of variance captured by a set of items in a scale relative to measurement error" (Netemeyer et al., 2003, p.153). It is suggested that the AVE of a construct be at least 0.50 which indicates that 50% or more of the variance is explained by the measurement items of the construct (Hair et al., 2011; Chin, 1998b; Fornell & Larcker, 1981). In Table 6.9, it can be seen that the AVE value of each construct exceeded the requirements, and therefore the convergent analysis for these constructs was satisfied. Overall, the measurement model satisfied all three necessary criteria and achieved convergent validity. These results thus clearly indicate that all the reflective items were reliable.

Table 6.9: Psychometric Properties for First-order Reflective Constructs

Construct	Item	Loading	*t*-statistics	CR	AVE
Innovative Culture (IC)	IC2	0.6662	15.9809	0.8018	0.5039
	IC3	0.7433	21.9945		
	IC4	0.7669	23.9761		
	IC5	0.6565	15.1541		
Supportive Culture (SC)	SC2	0.6604	13.9328	0.8038	0.5064
	SC3	0.7175	19.3582		
	SC4	0.7349	19.4525		
	SC5	0.7312	19.9354		
Customer Focus (CF)	CF1	0.7696	25.5786	0.8729	0.5789
	CF2	0.7597	21.9358		
	CF3	0.7964	35.2202		
	CF4	0.7234	21.7371		
	CF5	0.7533	24.2641		
Inter-firm Trust and Commitment (ITC)	ITC1	0.7592	24.1916	0.8904	0.5755
	ITC2	0.8087	34.5595		
	ITC3	0.7563	32.3186		
	ITC4	0.7419	28.3668		
	ITC5	0.7606	23.1541		
	ITC6	0.7223	20.6201		
Networking (NT)	NT1	0.7717	29.5472	0.8243	0.5404
	NT2	0.7588	25.5648		
	NT3	0.7211	19.0149		
	NT4	0.6857	20.8312		
Employee Competency (EC)	EC1	0.8372	48.0086	0.8909	0.7316
	EC2	0.8969	57.4000		
	EC3	0.8305	25.6206		
SCM Implementation (SCMI)					
Strategic Buyer Partnership (SBP)	SCMI-SBP1	0.7963	35.0294	0.8645	0.5613
	SCMI-SBP2	0.7457	20.7611		
	SCMI-SBP3	0.7596	24.7496		
	SCMI-SBP4	0.7655	25.0943		
	SCMI-SBP5	0.6735	14.8215		
Supplier Partnership (SP)	SCMI-SP3	0.8385	44.1378	0.8865	0.6616
	SCMI-SP4	0.8016	26.9678		
	SCMI-SP5	0.8320	33.8035		
	SCMI-SP6	0.7800	26.8285		
Information Sharing (IS)	SCMI-IS2	0.6651	16.2499	0.8678	0.6865
	SCMI-IS3	0.7922	30.3392		
	SCMI-IS4	0.8389	38.3233		
	SCMI-IS5	0.8533	44.0951		
Information Quality (IQ)	SCMI-IQ1	0.8080	41.7923	0.8992	0.6904
	SCMI-IQ2	0.8330	37.8259		
	SCMI-IQ3	0.8333	34.9677		
	SCMI-IQ4	0.8488	46.1095		
Lean System (LS)	SCMI-LS1	0.7434	20.5141	0.9009	0.6025
	SCMI-LS2	0.8036	40.2925		
	SCMI-LS3	0.7594	24.4443		
	SCMI-LS4	0.7855	33.427		
	SCMI-LS5	0.7732	28.2498		
	SCMI-LS6	0.7906	26.6273		

SCM Practice (SCMP)					
Strategic Buyer Partnership (SBP)	SCMP-SBP1	0.7910	29.1679	0.8412	0.6384
	SCMP-SBP2	0.8021	28.1286		
	SCMP-SBP3	0.8038	27.2081		
Supplier Partnership (SP)	SCMP-SP2	0.7781	27.0552	0.8828	0.6535
	SCMP-P3	0.8521	45.9783		
	SCMP-SP4	0.7910	30.9199		
	SCMP-SP5	0.8105	31.8746		
Information Sharing (IS)	SCMP-IS1	0.8100	37.5244	0.8877	0.6642
	SCMP-IS2	0.6149	12.6541		
	SCMP-IS3	0.7810	29.8576		
	SCMP-IS4	0.8336	36.373		
	SCMP-IS5	0.8341	41.6704		
Information Quality (IQ)	SCMP-IQ1	0.8367	48.4231	0.9084	0.7128
	SCMP-IQ2	0.8510	45.8387		
	SCMP-IQ3	0.8263	42.0805		
	SCMP-IQ4	0.8626	55.6171		
Lean System (LS)	SCMP-LS2	0.7665	27.4537	0.8876	0.6126
	SCMP-LS3	0.7393	21.8219		
	SCMP-LS4	0.8280	43.4744		
	SCMP-LS5	0.7803	29.6567		
	SCMP-LS6	0.7966	33.3035		
Supply Chain Relationship Quality (SCRQ)	SCRQ1	0.7523	21.1992	0.8723	0.6310
	SCRQ2	0.8005	33.6894		
	SCRQ3	0.8147	40.6001		
	SCRQ4	0.8082	37.2338		
Supply Chain Agility (SCA)					
Demand Response (DR)	DR1	0.8635	52.1105	0.8814	0.7129
	DR2	0.8809	57.8649		
	DR3	0.7856	31.2231		
Flexibility (DR)	FL1	0.7290	21.805	0.8684	0.6232
	FL2	0.8224	36.4539		
	FL3	0.7868	30.8725		
	FL4	0.8160	34.4878		
Integration (INT)	INT1	0.7987	33.6483	0.8915	0.6726
	INT2	0.8106	34.5049		
	INT3	0.8377	43.9386		
	INT4	0.8329	38.247		
Customer Responsiveness (CR)	CR1	0.7692	31.3959	0.8882	0.6657
	CR2	0.8619	46.5193		
	CR3	0.8436	46.5099		
	CR5	0.7851	25.1044		

Discriminant Validity

Discriminant validity assesses the extent to which the constructs in a model are different (Barclay et al., 1995; Farrell, 2010). It ensures that items from one construct do not conceptually overlap with items representing another constructs. To establish discriminant validity, two analytical procedures, average variance extracted (AVE) analysis at the construct level, and cross loading matrix evaluation at the item level, were performed (Barclay et al., 1995; Hair et al., 2011).

Discriminant Validity at Construct Level

The square root of AVE was compared to the inter-construct correlations to assess discriminant validity at construct level. For each construct, the square root of AVE should be greater than its correlation with other constructs in the model (Fornell & Larcker, 1981; Chin, 1998b; Koufteros, 1999). Table 6.10 presents the correlations between the latent constructs. The square root of AVE is shown on the diagonal. The correlations between the constructs and the AVEs were obtained from the SmartPLS output. The result shows that the square root of AVE is greater than the correlation among the latent constructs, with respect to its corresponding row and column values. This indicates that none of the constructs shares more variance with other constructs in the model than with its assigned indicators, and thus confirms the discriminant validity at construct level.

Discriminant Validity at Item Level

To assess discriminant validity at item level, a loading and cross-loading matrix was generated with all the retained items using SmartPLS. In this matrix, all measurement items should load more strongly on their respective construct than on other constructs. In this process, two items (i.e. SCMI-IS2 and SCMP-IS2) with problematic cross-loadings were removed. The matrix was generated again and the results are presented in Table 6.11. The table shows that all items are loaded higher on their respective construct than on other constructs in the model, demonstrating the discriminant validity of all reflective constructs in the model, indicating their uniqueness and independence.

Table: 6.10: Intercorrelations of the Latent Variables and Square Root of AVE for First-order Constructs[a]

	IC	SC	CF	ITC	NT	EC	SCMI -SBP	SCMI -SP	SCMI -IS	SCMI -IQ	SCMI -LS	SCMP -SBP	SCMP -SP	SCMP -IS	SCMP -IQ	SCMP -LS	DR	FL	INT	CR	SCRQ
IC	**0.710**																				
SC	0.461	**0.712**																			
CF	0.384	0.429	**0.761**																		
ITC	0.482	0.533	0.509	**0.759**																	
NT	0.444	0.408	0.524	0.570	**0.735**																
EC	0.413	0.320	0.291	0.459	0.401	**0.855**															
SCMI-SBP	0.544	0.440	0.585	0.518	0.539	0.364	**0.749**														
SCMI-SP	0.600	0.393	0.571	0.538	0.589	0.420	0.690	**0.813**													
SCMI-IS	0.453	0.411	0.613	0.469	0.534	0.406	0.655	0.690	**0.829**												
SCMI-IQ	0.459	0.421	0.596	0.467	0.455	0.370	0.678	0.625	0.735	**0.831**											
SCMI-LS	0.518	0.386	0.596	0.457	0.472	0.441	0.641	0.621	0.692	0.654	**0.776**										
SCMP-SBP	0.500	0.416	0.512	0.583	0.530	0.482	0.684	0.608	0.530	0.514	0.472	**0.799**									
SCMP-SP	0.521	0.437	0.540	0.591	0.557	0.478	0.581	0.779	0.584	0.544	0.497	0.772	**0.808**								
SCMP-IS	0.461	0.441	0.563	0.544	0.546	0.476	0.601	0.633	0.790	0.620	0.567	0.683	0.702	**0.815**							
SCMP-IQ	0.449	0.440	0.482	0.533	0.441	0.459	0.566	0.521	0.571	0.737	0.505	0.678	0.666	0.721	**0.844**						
SCMP-LS	0.463	0.385	0.496	0.527	0.417	0.510	0.522	0.490	0.531	0.514	0.746	0.579	0.572	0.635	0.645	**0.783**					
DR	0.433	0.401	0.436	0.553	0.541	0.657	0.504	0.560	0.520	0.430	0.503	0.587	0.611	0.627	0.516	0.575	**0.844**				
FL	0.421	0.439	0.436	0.596	0.444	0.540	0.444	0.476	0.420	0.495	0.458	0.531	0.513	0.493	0.555	0.514	0.557	**0.789**			
INT	0.417	0.449	0.424	0.593	0.461	0.655	0.461	0.492	0.499	0.501	0.519	0.573	0.596	0.622	0.621	0.644	0.696	0.684	**0.820**		
CR	0.481	0.560	0.532	0.576	0.507	0.442	0.521	0.487	0.528	0.543	0.474	0.530	0.506	0.549	0.554	0.544	0.588	0.671	0.704	**0.816**	
SCRQ	0.367	0.455	0.490	0.611	0.450	0.528	0.457	0.431	0.428	0.433	0.421	0.550	0.498	0.570	0.530	0.532	0.642	0.625	0.660	0.640	**0.794**

[a]Square root of the AVE on the diagonal.

Table 6.11: Cross-Loadings of Items to their Respective Constructs

	IC	SC	CF	NT	ITC	SCMI -SBP	SCMI -SP	SCMI -IS	SCMI -IQ	SCMI -LS	SCMP -SBP	SCMP -SP	SCMP -IS	SCMP -IQ	SCMP -LS	DR	FL	INT	CR	SCRQ	EC
IC2	**0.666**	0.357	0.282	0.442	0.341	0.419	0.480	0.385	0.376	0.357	0.350	0.375	0.335	0.328	0.307	0.290	0.318	0.278	0.367	0.252	0.294
IC3	**0.743**	0.314	0.316	0.283	0.378	0.393	0.494	0.338	0.364	0.394	0.433	0.460	0.352	0.358	0.361	0.368	0.338	0.319	0.355	0.336	0.315
IC4	**0.767**	0.373	0.270	0.275	0.374	0.419	0.380	0.298	0.296	0.425	0.345	0.341	0.356	0.329	0.381	0.322	0.295	0.349	0.366	0.240	0.326
IC5	**0.657**	0.398	0.302	0.314	0.378	0.336	0.347	0.290	0.265	0.370	0.311	0.383	0.328	0.369	0.400	0.370	0.412	0.440	0.308	0.324	0.346
SC2	0.330	**0.660**	0.232	0.287	0.379	0.284	0.250	0.254	0.270	0.276	0.223	0.232	0.271	0.285	0.255	0.273	0.362	0.333	0.371	0.390	0.226
SC3	0.450	**0.718**	0.248	0.319	0.416	0.341	0.210	0.227	0.287	0.205	0.296	0.295	0.283	0.322	0.266	0.277	0.340	0.321	0.453	0.316	0.259
SC4	0.315	**0.735**	0.379	0.255	0.301	0.363	0.350	0.386	0.335	0.326	0.329	0.348	0.379	0.296	0.289	0.288	0.237	0.286	0.401	0.280	0.158
SC5	0.362	**0.731**	0.337	0.314	0.449	0.257	0.284	0.274	0.299	0.275	0.327	0.358	0.302	0.356	0.284	0.303	0.337	0.351	0.376	0.325	0.291
CF1	0.387	0.368	**0.770**	0.412	0.364	0.520	0.390	0.499	0.458	0.495	0.388	0.335	0.411	0.346	0.419	0.337	0.319	0.319	0.424	0.325	0.231
CF2	0.286	0.296	**0.760**	0.331	0.319	0.393	0.408	0.437	0.436	0.395	0.375	0.397	0.377	0.326	0.360	0.277	0.343	0.298	0.411	0.358	0.147
CF3	0.300	0.348	**0.796**	0.384	0.423	0.445	0.432	0.525	0.502	0.489	0.438	0.462	0.473	0.462	0.419	0.355	0.371	0.383	0.481	0.470	0.274
CF4	0.315	0.330	**0.723**	0.450	0.416	0.429	0.480	0.411	0.441	0.449	0.397	0.424	0.408	0.348	0.341	0.318	0.316	0.290	0.355	0.339	0.164
CF5	0.275	0.283	**0.753**	0.413	0.409	0.431	0.464	0.452	0.427	0.432	0.346	0.437	0.466	0.342	0.343	0.368	0.310	0.317	0.348	0.367	0.282
NT1	0.381	0.333	0.444	**0.772**	0.414	0.468	0.510	0.447	0.380	0.357	0.445	0.475	0.440	0.340	0.290	0.404	0.321	0.336	0.403	0.320	0.258
NT2	0.263	0.253	0.380	**0.759**	0.390	0.348	0.400	0.361	0.267	0.309	0.352	0.390	0.411	0.261	0.263	0.403	0.257	0.312	0.331	0.358	0.248
NT3	0.336	0.270	0.343	**0.721**	0.382	0.374	0.363	0.326	0.265	0.310	0.341	0.315	0.317	0.291	0.291	0.337	0.347	0.303	0.350	0.319	0.263
NT4	0.370	0.328	0.360	**0.686**	0.477	0.379	0.434	0.413	0.398	0.397	0.399	0.431	0.418	0.387	0.373	0.435	0.372	0.391	0.393	0.329	0.397
ITC1	0.418	0.401	0.407	0.430	**0.759**	0.378	0.446	0.334	0.380	0.374	0.486	0.494	0.405	0.400	0.448	0.442	0.437	0.457	0.415	0.460	0.419
ITC2	0.377	0.424	0.391	0.422	**0.809**	0.437	0.420	0.378	0.412	0.385	0.497	0.468	0.423	0.407	0.464	0.412	0.469	0.460	0.467	0.466	0.335
ITC3	0.393	0.401	0.444	0.436	**0.756**	0.465	0.416	0.376	0.371	0.344	0.473	0.444	0.433	0.417	0.387	0.390	0.422	0.408	0.459	0.445	0.327
ITC4	0.398	0.404	0.376	0.447	**0.742**	0.369	0.422	0.370	0.352	0.374	0.407	0.441	0.459	0.468	0.404	0.408	0.492	0.447	0.442	0.463	0.293
ITC5	0.374	0.365	0.352	0.401	**0.761**	0.333	0.353	0.322	0.293	0.315	0.375	0.412	0.376	0.374	0.371	0.438	0.452	0.437	0.391	0.506	0.371
ITC6	0.395	0.433	0.336	0.459	**0.722**	0.361	0.380	0.350	0.299	0.274	0.397	0.421	0.369	0.351	0.304	0.436	0.445	0.498	0.441	0.449	0.350

SCMI-SBP1	0.434	0.409	0.478	0.414	0.415	**0.796**	0.535	0.533	0.551	0.517	0.564	0.421	0.506	0.473	0.414	0.443	0.386	0.375	0.449	0.449	0.314
SCMI-SBP2	0.396	0.314	0.434	0.421	0.407	**0.746**	0.535	0.490	0.468	0.478	0.548	0.489	0.467	0.412	0.382	0.398	0.330	0.379	0.375	0.354	0.284
SCMI-SBP3	0.407	0.271	0.531	0.456	0.436	**0.760**	0.570	0.538	0.542	0.513	0.606	0.503	0.452	0.418	0.436	0.429	0.389	0.385	0.428	0.334	0.330
SCMI-SBP4	0.454	0.293	0.405	0.375	0.349	**0.766**	0.484	0.428	0.539	0.460	0.418	0.384	0.383	0.416	0.369	0.295	0.286	0.309	0.388	0.277	0.238
SCMI-SBP5	0.390	0.368	0.324	0.347	0.325	**0.673**	0.453	0.458	0.431	0.427	0.407	0.373	0.441	0.399	0.348	0.308	0.258	0.268	0.297	0.286	0.183
SCMI-SP3	0.493	0.350	0.461	0.534	0.473	0.595	**0.839**	0.626	0.548	0.507	0.509	0.672	0.599	0.488	0.409	0.517	0.412	0.420	0.401	0.402	0.382
SCMI-SP4	0.529	0.415	0.485	0.508	0.414	0.516	**0.802**	0.514	0.467	0.441	0.477	0.640	0.476	0.381	0.367	0.440	0.363	0.403	0.417	0.312	0.350
SCMI-SP5	0.473	0.259	0.443	0.457	0.448	0.537	**0.832**	0.548	0.470	0.466	0.509	0.663	0.497	0.391	0.349	0.439	0.377	0.376	0.361	0.329	0.236
SCMI-SP6	0.477	0.258	0.468	0.418	0.413	0.589	**0.780**	0.549	0.540	0.595	0.480	0.560	0.479	0.426	0.462	0.424	0.393	0.401	0.403	0.353	0.391
SCMI-IS3	0.391	0.368	0.507	0.459	0.400	0.561	0.585	**0.792**	0.566	0.549	0.450	0.520	0.664	0.476	0.389	0.449	0.341	0.423	0.414	0.378	0.357
SCMI-IS4	0.331	0.306	0.476	0.411	0.372	0.540	0.523	**0.839**	0.630	0.578	0.429	0.443	0.652	0.456	0.451	0.411	0.327	0.392	0.406	0.332	0.294
SCMI-IS5	0.434	0.348	0.539	0.457	0.394	0.528	0.606	**0.853**	0.629	0.592	0.440	0.489	0.647	0.487	0.477	0.432	0.375	0.424	0.492	0.356	0.359
SCMI-IQ1	0.432	0.315	0.432	0.362	0.342	0.579	0.522	0.619	**0.808**	0.576	0.430	0.437	0.517	0.589	0.421	0.320	0.363	0.392	0.430	0.310	0.309
SCMI-IQ2	0.365	0.356	0.523	0.420	0.423	0.597	0.555	0.585	**0.833**	0.532	0.446	0.491	0.490	0.615	0.412	0.386	0.438	0.422	0.480	0.373	0.326
SCMI-IQ3	0.389	0.420	0.492	0.344	0.377	0.519	0.482	0.617	**0.833**	0.516	0.395	0.443	0.523	0.621	0.430	0.368	0.422	0.418	0.447	0.387	0.299
SCMI-IQ4	0.352	0.312	0.534	0.385	0.409	0.556	0.517	0.621	**0.849**	0.546	0.437	0.438	0.533	0.625	0.444	0.354	0.421	0.433	0.446	0.370	0.296
SCMI-LS1	0.373	0.233	0.378	0.297	0.294	0.428	0.389	0.471	0.437	**0.743**	0.280	0.283	0.386	0.309	0.450	0.310	0.304	0.308	0.273	0.250	0.335
SCMI-LS2	0.430	0.235	0.449	0.341	0.288	0.484	0.463	0.540	0.500	**0.804**	0.375	0.389	0.454	0.381	0.588	0.395	0.306	0.361	0.247	0.252	0.397
SCMI-LS3	0.415	0.336	0.473	0.399	0.394	0.536	0.545	0.547	0.523	**0.759**	0.381	0.396	0.430	0.373	0.601	0.391	0.339	0.348	0.410	0.365	0.268
SCMI-LS4	0.474	0.391	0.479	0.436	0.394	0.552	0.480	0.587	0.541	**0.786**	0.389	0.389	0.437	0.422	0.592	0.417	0.373	0.450	0.431	0.365	0.323
SCMI-LS5	0.397	0.299	0.500	0.349	0.345	0.447	0.448	0.482	0.480	**0.773**	0.338	0.388	0.434	0.372	0.604	0.404	0.370	0.431	0.356	0.325	0.384
SCMI-LS6	0.438	0.293	0.489	0.366	0.402	0.524	0.549	0.581	0.551	**0.791**	0.418	0.452	0.492	0.479	0.624	0.416	0.432	0.503	0.470	0.390	0.353
SCMP-SBP1	0.447	0.386	0.413	0.428	0.452	0.559	0.451	0.422	0.455	0.402	**0.791**	0.564	0.575	0.584	0.469	0.481	0.450	0.471	0.449	0.477	0.439
SCMP-SBP2	0.395	0.355	0.397	0.408	0.443	0.530	0.458	0.378	0.362	0.364	**0.802**	0.623	0.506	0.524	0.422	0.438	0.386	0.491	0.430	0.412	0.366
SCMP-SBP3	0.383	0.259	0.417	0.432	0.501	0.549	0.546	0.469	0.413	0.364	**0.804**	0.664	0.555	0.518	0.494	0.486	0.434	0.415	0.393	0.428	0.350
SCMP-SP2	0.391	0.331	0.445	0.418	0.436	0.457	0.506	0.423	0.433	0.401	0.646	**0.778**	0.510	0.523	0.484	0.496	0.404	0.500	0.387	0.340	0.372
SCMP-SP3	0.473	0.370	0.412	0.483	0.502	0.518	0.691	0.514	0.472	0.424	0.642	**0.852**	0.624	0.590	0.473	0.503	0.445	0.470	0.401	0.431	0.403

SCMP-SP4	0.465	0.422	0.429	0.476	0.482	0.449	0.624	0.486	0.415	0.385	0.591	**0.791**	0.598	0.530	0.442	0.493	0.399	0.513	0.445	0.407	0.400
SCMP-SP5	0.451	0.288	0.463	0.420	0.489	0.452	0.694	0.463	0.439	0.395	0.618	**0.811**	0.532	0.509	0.451	0.484	0.410	0.446	0.403	0.432	0.372
SCMP-IS1	0.381	0.337	0.475	0.474	0.502	0.511	0.506	0.542	0.522	0.439	0.581	0.582	**0.810**	0.582	0.517	0.502	0.409	0.496	0.448	0.446	0.390
SCMP-IS3	0.357	0.392	0.450	0.423	0.394	0.499	0.542	0.683	0.484	0.495	0.504	0.566	**0.781**	0.559	0.452	0.450	0.366	0.497	0.391	0.442	0.342
SCMP-IS4	0.396	0.328	0.410	0.430	0.413	0.477	0.483	0.678	0.487	0.441	0.560	0.545	**0.834**	0.570	0.514	0.530	0.402	0.489	0.445	0.448	0.373
SCMP-IS5	0.439	0.380	0.496	0.450	0.460	0.473	0.533	0.675	0.527	0.476	0.579	0.593	**0.834**	0.637	0.580	0.556	0.428	0.545	0.499	0.517	0.440
SCMP-IQ1	0.442	0.379	0.397	0.367	0.471	0.477	0.426	0.462	0.594	0.447	0.605	0.563	0.604	**0.837**	0.548	0.439	0.473	0.559	0.508	0.455	0.422
SCMP-IQ2	0.400	0.346	0.414	0.390	0.420	0.442	0.433	0.459	0.606	0.410	0.574	0.579	0.583	**0.851**	0.542	0.435	0.442	0.500	0.459	0.404	0.382
SCMP-IQ3	0.366	0.356	0.400	0.299	0.418	0.461	0.404	0.471	0.632	0.394	0.529	0.532	0.598	**0.826**	0.538	0.436	0.474	0.497	0.437	0.484	0.364
SCMP-IQ4	0.433	0.404	0.415	0.432	0.489	0.530	0.493	0.535	0.656	0.452	0.582	0.576	0.649	**0.863**	0.552	0.433	0.484	0.542	0.465	0.448	0.382
SCMP-LS2	0.416	0.279	0.332	0.258	0.355	0.364	0.333	0.399	0.391	0.612	0.414	0.405	0.445	0.462	**0.767**	0.413	0.349	0.413	0.322	0.290	0.403
SCMP-LS3	0.355	0.348	0.356	0.343	0.421	0.448	0.436	0.421	0.387	0.562	0.455	0.447	0.474	0.445	**0.739**	0.437	0.371	0.479	0.455	0.431	0.319
SCMP-LS4	0.465	0.375	0.440	0.370	0.428	0.476	0.397	0.471	0.434	0.644	0.475	0.464	0.553	0.537	**0.828**	0.516	0.458	0.555	0.469	0.514	0.408
SCMP-LS5	0.321	0.262	0.427	0.270	0.377	0.349	0.317	0.391	0.372	0.542	0.405	0.407	0.496	0.508	**0.780**	0.403	0.356	0.512	0.394	0.393	0.404
SCMP-LS6	0.423	0.244	0.382	0.381	0.472	0.402	0.430	0.395	0.423	0.560	0.510	0.510	0.510	0.565	**0.797**	0.473	0.463	0.549	0.479	0.438	0.455
DR1	0.408	0.323	0.374	0.420	0.445	0.454	0.473	0.451	0.393	0.419	0.526	0.527	0.536	0.474	0.492	**0.864**	0.460	0.608	0.499	0.532	0.590
DR2	0.404	0.380	0.425	0.495	0.508	0.461	0.522	0.526	0.404	0.478	0.541	0.550	0.584	0.472	0.515	**0.881**	0.488	0.593	0.514	0.557	0.558
DR3	0.387	0.311	0.302	0.456	0.445	0.356	0.421	0.333	0.287	0.373	0.415	0.467	0.464	0.358	0.446	**0.786**	0.463	0.562	0.475	0.536	0.515
FL1	0.333	0.327	0.325	0.293	0.467	0.317	0.335	0.290	0.360	0.311	0.390	0.374	0.362	0.355	0.360	0.338	**0.729**	0.504	0.492	0.441	0.362
FL2	0.383	0.373	0.307	0.376	0.464	0.342	0.330	0.293	0.378	0.316	0.396	0.368	0.372	0.449	0.347	0.451	**0.822**	0.527	0.551	0.504	0.411
FL3	0.448	0.388	0.406	0.373	0.499	0.395	0.441	0.420	0.456	0.420	0.460	0.455	0.450	0.518	0.465	0.476	**0.787**	0.586	0.585	0.522	0.447
FL4	0.333	0.296	0.336	0.355	0.454	0.344	0.392	0.316	0.363	0.393	0.426	0.420	0.369	0.419	0.444	0.483	**0.816**	0.537	0.485	0.500	0.480
INT1	0.443	0.390	0.408	0.365	0.517	0.410	0.429	0.433	0.462	0.552	0.467	0.476	0.494	0.519	0.613	0.550	0.616	**0.799**	0.553	0.536	0.539
INT2	0.428	0.350	0.329	0.322	0.429	0.373	0.349	0.390	0.389	0.451	0.412	0.436	0.472	0.487	0.530	0.526	0.484	**0.811**	0.565	0.485	0.502
INT3	0.348	0.400	0.343	0.387	0.440	0.359	0.404	0.408	0.405	0.343	0.489	0.494	0.523	0.521	0.475	0.579	0.547	**0.838**	0.590	0.543	0.551
INT4	0.365	0.334	0.311	0.432	0.555	0.371	0.430	0.405	0.389	0.361	0.508	0.543	0.549	0.511	0.496	0.624	0.591	**0.833**	0.599	0.597	0.555
CR1	0.428	0.410	0.372	0.393	0.494	0.411	0.401	0.440	0.448	0.404	0.443	0.418	0.449	0.448	0.460	0.484	0.599	0.601	**0.769**	0.508	0.418

CR2	0.398	0.482	0.459	0.424	0.461	0.427	0.399	0.443	0.441	0.382	0.420	0.401	0.440	0.467	0.458	0.465	0.512	0.540	**0.862**	0.540	0.359
CR3	0.451	0.482	0.484	0.468	0.458	0.441	0.419	0.458	0.444	0.400	0.423	0.407	0.494	0.457	0.425	0.479	0.505	0.540	**0.844**	0.519	0.317
CR5	0.336	0.453	0.423	0.369	0.463	0.418	0.366	0.382	0.434	0.358	0.440	0.421	0.406	0.433	0.429	0.487	0.567	0.609	**0.785**	0.519	0.343
SCRQ1	0.292	0.308	0.346	0.324	0.415	0.347	0.301	0.326	0.363	0.322	0.384	0.331	0.413	0.415	0.420	0.469	0.444	0.510	0.428	**0.752**	0.488
SCRQ2	0.357	0.451	0.402	0.398	0.486	0.341	0.323	0.322	0.318	0.348	0.417	0.391	0.445	0.438	0.435	0.517	0.526	0.533	0.588	**0.801**	0.420
SCRQ3	0.374	0.353	0.373	0.374	0.557	0.384	0.372	0.362	0.373	0.300	0.517	0.452	0.509	0.462	0.412	0.564	0.508	0.550	0.563	**0.815**	0.405
SCRQ4	0.253	0.326	0.436	0.329	0.473	0.379	0.372	0.350	0.323	0.373	0.421	0.401	0.436	0.364	0.424	0.482	0.502	0.502	0.440	**0.808**	0.371
EC1	0.435	0.331	0.317	0.329	0.456	0.401	0.405	0.387	0.376	0.420	0.487	0.436	0.416	0.439	0.473	0.574	0.497	0.600	0.470	0.532	**0.836**
EC2	0.375	0.250	0.184	0.347	0.366	0.266	0.340	0.305	0.252	0.332	0.398	0.401	0.361	0.348	0.396	0.580	0.429	0.537	0.316	0.424	**0.897**
EC3	0.333	0.231	0.231	0.352	0.344	0.251	0.324	0.341	0.310	0.370	0.338	0.384	0.436	0.381	0.430	0.528	0.450	0.534	0.331	0.385	**0.832**

6.4.1.1.2 Assessment of Formative Constructs

Among twenty two constructs in the theoretical model, three constructs, environmental uncertainty (EU), competitive advantage (CA), and firm performance (PF), comprising twenty two items, were identified as formative constructs. Unlike reflective indicators which are meant to measure the same underlying dimensions and should be correlated, formative items 'cause' the latent construct, which is defined as a function of the formative measures (Petter et al., 2007). Theoretically, formative indicators do not necessarily correlate highly (Hair et al., 2011; Coltman et al., 2008). Content validity is emphasized to ensure the appropriateness of the measurement model formative constructs and items. Thus, measures of reliability such as factor loading, average variance extracted and composite reliabilities, which assume internal consistency indicating high intercorrelations among the items in question, are not meaningful for formative constructs (Jarvis et al., 2003; Coltman et al., 2008). The statistical significance of weights was therefore examined to determine the relative importance of indicators in forming the corresponding latent construct. The weights for twenty two formative items are presented in Table 6.12. The table shows that sixteen of twenty two items had significant path coefficients (or PLS weight) while one item had negative weight, and four items did not have significant formative weights for their corresponding latent constructs.

According to Mathieson et al. (2001), formative constructs may contain insignificant indicators, specifically in the absence of multicollinearity. Santosa, et al. (2005) had seven out of thirteen indicators with low weights, including two with negative weights. Helm et al. (2010) reported four out of ten indicators as having insignificant weights, including one negative value. The retention of non-significant indicators is also recommended by Bollen and Lennox (1991) to maintain the content validity of constructs. They emphasized the inclusion of all facets of formative construct to maintain content domain. As the indicators define a formative construct, excluding an indicator may result in the exclusion of a part of (or may substantially alter) the theoretical domain of the construct (Bollen & Lennox, 1991). Furthermore, a higher number of indicators measuring a formative construct increase the likelihood of one or more indicators having low or even non-significant weights (Hair et al., 2011). Diamantopoulos and Winklhofer (2001) suggested removal of indicators only when the breadth of the construct domain was not compromised.

In addition to assessing the weights, the statistical significance of the loadings should also be noted, with a minimum critical *t*-value of 1.65 to examine the indicators' absolute contribution to a formative latent construct (Hair et al., 2013a). There is no empirical

support for retaining formative indicators when both the weight and loading are insignificant (Hair et al., 2011; Coltman et al., 2008). As can be seen from Table 6.12, loading *t*- values were found significant for all formative indicators. A test of multicollinearity among the formative indicators was further conducted by computing the variance inflation factor (VIF). VIF values greater than 10 would suggest the existence of high correlation among the indicators and raise doubts about the validity of the formative construct measurement (Diamantopoulos & Winklhofer, 2001; Li et al., 2010). According to Hair, et al., (2011) each indicator's VIF statistic should be less than 5, however, Diamantopoulos and Siguaw (2006) suggested the most conservative threshold, indicating a VIF value of 3.3 as the maximum level of the VIF threshold for formative measures. To compute the VIF for each item, the IBM SPSS 20 statistical package was used to perform the regression analysis with the PLS latent variable scores as the dependent variables and the measurement items as independent variables (Andreev, Maoz, Heart, & Pliskin, 2009). The results of the collinearity diagnostics are shown in Table 6.12. The VIF values varied from 1.12 to 2.09 for the twenty two items, measuring three formative constructs, and thus multicollinearity was not a concern in this study. Collectively, the results suggest that the formative measures demonstrate acceptable measurement properties, and therefore, taking all the suggested guidelines mentioned above into account, it was decided to retain all the formative indicators in the measurement model.

Table 6.12: Measures for Formative Indicators

Formative Construct	Items	Weight	T - Stat.	Loading	T - Stat.	VIF
Environmental Uncertainty (EU)	EU1	0.0363	0.6841	0.1292	1.6939	1.140
	EU2	0.3960	6.6272	0.6537	13.7342	1.389
	EU3	0.0979	1.7577	0.4380	6.0859	1.216
	EU4	0.2399	3.5311	0.7842	20.2254	1.937
	EU5	0.3987	5.9312	0.7812	17.3078	1.708
	EU6	0.0705	1.1492	0.4833	7.5250	1.277
	EU7	0.3388	5.6685	0.5490	10.8348	1.153
	EU8	-0.1060	2.0409	0.1578	2.2412	1.120
Competitive Advantage (CA)	CA1	0.1053	2.4725	0.5179	9.2368	1.238
	CA2	0.2139	4.4163	0.7226	23.6122	1.584
	CA3	0.3484	8.1731	0.8023	21.1191	1.588
	CA4	0.2033	3.9436	0.7694	22.5448	1.911
	CA5	0.1963	4.1149	0.7499	22.1134	1.835
	CA6	0.2646	5.1449	0.7854	22.7291	1.754
Firm Performance (FP)	FP1	0.3441	5.0019	0.7774	20.3759	1.598
	FP2	0.0333	0.4405	0.6756	12.8000	2.003
	FP3	0.2468	3.1081	0.7743	18.8075	1.775
	FP4	0.1478	1.8220	0.7429	15.8556	1.975
	FP5	0.1179	1.3502	0.6563	10.8517	2.093
	FP6	0.1179	1.6716	0.4693	6.8259	1.635
	FP7	0.2454	3.3498	0.6957	14.3947	1.537
	FP8	0.2759	3.7479	0.7840	18.5556	1.902

Based on the outcome as shown in Tables 6.9 to Table 6.12, the assessment of the first-order measurement model provided satisfactory support for the reliability, consistency and validity requirements. Having established that the first-order measurement model is adequate and sufficient, the next stage of PLS analysis was thus performed to assess the measurement model at the second-order construct level following the two-stage approach.

6.4.1.2 Assessment of Higher-Order Measurement Model

Three constructs of the research model, SCM implementation, SCM practice and supply chain agility, were conceptualized as higher-order reflective constructs. The conceptual explorations (Chapter Two) and the findings of the field study (Chapter Four) confirmed these constructs as hierarchical-reflective constructs. Hierarchical constructs are defined as constructs consisting of more than one dimension of facet, each of which represents some portion of the focal higher-order latent variable (Edwards 2001; Jarvis et al., 2003; Law & Wong 1999; Law et al. 1998; Netemeyer et al. 2003; MacKenzie et al., 2005; Wetzels, et al., 2009; Petter et al., 2007). Theoretically, the essential characteristics of these constructs have more than one unique conceptual aspect or dimension, and the elimination

of any one of them would affect the conceptual domain of the construct (MacKenzie et al, 2011). Hierarchical construct modeling is seen as a way of improving theoretical parsimony and reducing model complexity (Edwards, 2001; Becker et al., 2012; Law et al., 1998; MacKenzie et al., 2005). The conceptual justification of such modeling is complemented by empirical assessment in terms of reliability, construct validity and the nomological validity of the higher-order latent constructs (Edwards, 2001; Becker et al., 2012; Wetzels, et al., 2009; MacKenzie et al., 2011). Table 6.13 presents the three second-order reflective constructs of the research model and each of their first-order constructs, and the number of indicators associated with each sub-construct.

Table 6.13: Measurement of Higher-order Constructs

Second-order Construct	Type	First-order constructs	Type	Number of items
SCM implementation (SCMI)	Reflective	Strategic buyer partnership	Reflective	5
		Supplier partnership	Reflective	4
		Information sharing	Reflective	4
		Information quality	Reflective	4
		Lean system	Reflective	6
SCM practice (SCMP)	Reflective	Strategic buyer partnership	Reflective	3
		Supplier partnership	Reflective	4
		Information sharing	Reflective	5
		Information quality	Reflective	4
		Lean system	Reflective	5
Supply chain agility (SCA)	Reflective	Demand response	Reflective	3
		Flexibility	Reflective	4
		Integration	Reflective	4
		Customer responsiveness	Reflective	4

As discussed in Chapter Three, this study used the two-stage approach to estimate higher-order constructs for several reasons. First, all the first-order constructs had unequal numbers of indicators, which might lead to biased loadings for the first-order constructs on the second-order constructs (Becker, et al., 2012; Ringle et al., 2012). Secondly, it can estimate a more parsimonious model on the second-order analysis in the absence of the first-order constructs (Becker et al., 2012).

PLS-SEM involves the calculation of construct scores for latent variables in the path model. These latent variable scores for lower-order constructs can be obtained and subsequently used as indicators for the higher-order constructs in the second-stage analysis (Chin, 1998a; Tenenhaus et al., 2005; Wetzel, et al., 2009; Becker, et al., 2012). The two-stage

approach was thus followed to estimate the construct scores of second-order constructs from observed variables measuring the first-order constructs (Ringle et al., 2012; Becker et al., 2012; Wetzels et al., 2009). Following the two-stage approach, the measurement model was estimated with the first-order constructs linked to the second-order constructs, such as SCM implementation (SCMI), SCM practice (SCMP), and supply chain agility (SCA), and the latent variable scores of each first-order constructs were saved and then used as reflective indicators for the respective second-order constructs. In the second-stage analysis, the second-order SCMI and SCMP constructs comprised five items (i.e. five first-order constructs) which reflected strategic buyer partnership, supplier partnership, information sharing, information quality, and lean system. The second-order SCA construct consisted of four items (i.e. four first-order constructs) which reflected demand response, flexibility, integration, and customer responsiveness. The study confirmed that the loadings of the first-order latent variables on the second-order constructs (i.e., SCMI, SCMP, and SCA) were either equal to or exceeded 0.80 (see Table 6.14). The results confirmed that all these loadings were significant at $p < 0.001$. The results also confirmed that the CRs and AVEs of the second-order model were either equal to or greater than 0.80 and 0.50 respectively. Overall, the results provide evidence of reliable and valid higher-order measures (see Table 6.14).

Table 6.14 Psychometric Properties for Second-order Reflective Constructs

Construct	Item	Loading	*t*-statistics	CR	AVE
SCM Implementation (SCMI)	SCMI-SBP	0.8562	45.0937	0.9326	0.7345
	SCMI-SP	0.8507	38.6128		
	SCMI-IS	0.8802	57.3877		
	SCMI-IQ	0.8591	49.3560		
	SCMI-LS	0.8384	32.7697		
SCM Practice (SCMP)	SCMP-SBP	0.8667	55.2053	0.9320	0.7330
	SCMP-SP	0.8659	56.6680		
	SCMP-IS	0.8781	61.0537		
	SCMP-IQ	0.8669	50.7099		
	SCMP-LS	0.8009	27.9923		
Supply Chain Agility (SCA)	DR	0.8264	39.3569	0.9184	0.7380
	FL	0.8430	42.1439		
	CR	0.8634	62.0390		
	INT	0.9016	87.1258		

The correlations between the latent variables of the second-order measurement model and square root of AVE are presented in Table 6.15. The result shows that the square root of AVE is greater than the correlation among the latent constructs, with respect to its

corresponding row and column values, which confirms the construct level discriminant validity of the second-order measurement model. It can be noted from Table 6.14 that the second-order constructs, i.e., SCMI, SCMP, and SCA, have significant relationships with their corresponding first-order constructs (converted into corresponding items). For example, SCMI-SBP has a significant relationship with SCMI (β = 0.8562, *t* = 45.09). The others can be interpreted in a similar way.

Table: 6.15: Intercorrelations of the Latent Variables of the Second-Order Measurement Model and Square Root of AVE[a]

	IC	SC	FC	ITC	NT	EC	SCMI	SCMP	RQ	SCA
IC	**0.7096**									
SC	0.5072	**0.7125**								
FC	0.4122	0.4276	**0.7609**							
ITC	0.5171	0.5365	0.5091	**0.7586**						
NT	0.4662	0.4092	0.5237	0.5696	**0.7351**					
ET	0.4491	0.3234	0.2910	0.4590	0.4001	**0.8553**				
SCMI	0.6163	0.4761	0.6906	0.5724	0.6059	0.4672	**0.8570**			
SCMP	0.5929	0.4952	0.6063	0.6484	0.5823	0.5618	0.8032	**0.8562**		
RQ	0.4047	0.4539	0.4896	0.6113	0.4502	0.5285	0.5067	0.6268	**0.7943**	
SCA	0.5602	0.5391	0.5320	0.6744	0.5677	0.6681	0.6681	0.7667	0.7471	**0.8591**

[a]Square root of the AVE on the diagonal.

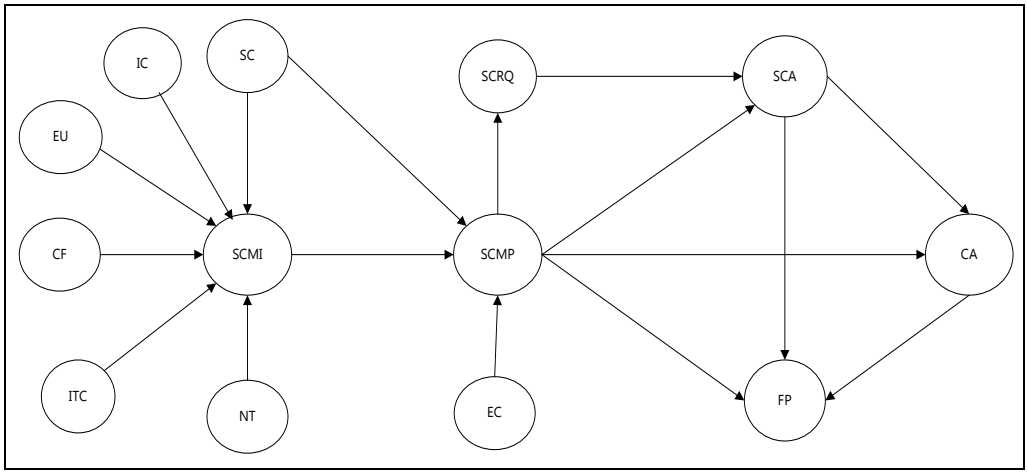


Figure 6.2: Higher-order Structural Model

IC: Innovative Culture
SC: Supportive Culture
EU: Environmental Uncertainty
CF: Customer Focus
ITC: Inter-firm Trust and Commitment
NT: Networking
EC: Employee Competency
SCMI: SCM Implementation
SCMP: SCM Practice
RQ: Supply Chain Relationship Quality
SCA: Supply Chain Agility
CA: Competitive Advantage
FP: Firm Performance

Based on the results as shown in Table 6.9 to Table 6.15, the assessment of the measurement model provided adequate empirical support for the reliability, consistency, and validity requirements. With adequate and sufficient results for the measurement model, the next stage of PLS analysis was conducted to assess the structural model in this research. The analysis is presented in the next section.

6.4.2 Assessment of the Structural Model

The estimation in the preceding section confirmed a reliable and valid measurement model, and therefore, it was considered appropriate to proceed with assessment of the structural model. This was performed to examine the model's predictive capabilities and the relationship between the constructs as predicted in the hypotheses based on the research model. To conduct this assessment, the amount of variance explained, and the statistical significance, were evaluated based on three criteria: path coefficient (β), statistical significance of *t*-value and amount of variance explained or R squared (R^2) (Santosa, et al., 2005; Hair, et al., 2011). Prior to assessing the structural model, it was examined for collinearity (Hair, et al., 2013b). Predictive relevance (Q^2) (Hair, et al., 2011) and power analysis (1-β) (Cohen, 1988) were also considered. A bootstrapping procedure, that is, the non-parametric approach (Chin 1998a) was used to gather all information.

6.4.2.1 *Collinearity Assessment*

Multi-collinearity can be a problem in estimating the relationships among the latent variables (Temme, Kreis, & Hildebrandt, 2010). The path coefficients may be biased if the estimation contains significant levels of collinearity among the predictor constructs. This is because the estimation of path coefficients in the structural model is based on OLS regressions of each endogenous latent variable on its corresponding predecessor latent exogenous variables (Hair et al., 2013b). The structural model must therefore be examined for collinearity before assessing the structural model.

Multicollinearity was tested using VIF and tolerance values. In doing so, each set of predictor constructs were examined separately for each subpart of the structural model. Using the SPSS linear regression option, the following sets of predictor constructs were run to examine collinearity: (1) innovative culture, supportive culture, environmental uncertainty, customer focus, networking, and inter-organizational trust and commitment as predictors of SCM implementation; (2) SCM implementation, supportive culture, and employee

competency as predictors of SCM practice; (3) supply chain relationship quality and SCM practice as predictors of supply chain agility; (4) supply chain agility and SCM practice as predictors of competitive advantage; and (5) SCM practice, supply chain agility, and competitive advantage as predictors of organizational performance. Tolerance levels below 0.20 and VIF above 5.00 in the predictor constructs suggest the existence of excessive multicollinearity (Hair, et al., 2013b; Hair, et al., 2011). The results of the collinearity diagnostics are shown in Table 6.16. The VIF values are clearly below the threshold of 5, and thus multicollinearity was not a concern for assessing the structural model.

Table 6.16: Results of Collinearity Assessment

Endogenous Construct	Exogenous Construct	Tolerance	VIF
SCM Implementation	Innovative Culture	.593	1.686
	Supportive Culture	.616	1.624
	Environmental Uncertainty	.465	2.149
	Customer Focus	.507	1.972
	Networking	.557	1.794
	Inter-organizational Trust and Commitment	.518	1.930
SCM Practice	SCM Implementation	.664	1.507
	Supportive Culture	.760	1.315
	Employee Competency	.769	1.301
Supply Chain Agility	Supply Chain Relationship Quality	.607	1.647
	SCM Practice	.607	1.647
Competitive Advantage	Supply Chain Agility	.412	2.426
	SCM Practice	.412	2.426
Organizational Performance	Supply Chain Agility	.214	4.666
	SCM Practice	.406	2.462
	Competitive Advantage	.269	3.711

6.4.2.2 Path Coefficient (β) and Statistical Significance (*t*-Value)

Figure 6.3 displays the results of the structural model resulting from the structural equation modeling (SEM) analysis using SMART PLS. The path coefficient (β) and the *t*-value were assessed by means of the PLS-SEM algorithm and bootstrapping procedures respectively, to evaluate the hypothesized relationships between the constructs (Hair, et al., 2011). A *t*-value greater than 1.65 is considered to be significant at $p<0.05$, a *t*-value greater than 1.96 is considered to be significant at $p<0.025$, and a *t*-value greater than 2.32 is significant at $p<0.01$. A *t*-value is the ratio of the estimated parameter to its standard error. In Figure 6.3, the path coefficient value and *t*-value are shown near each link among the constructs.

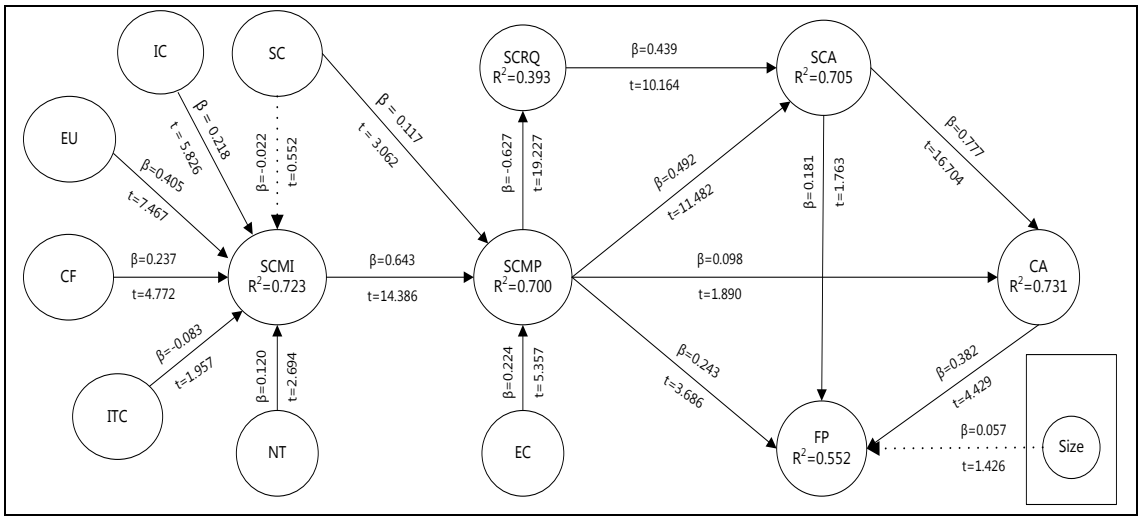


Figure 6.3: Results – The Structural Model of PLS Analysis

Note: Solid lines are for significant paths; dashed lines indicate insignificant paths.

IC: Innovative Culture
SC: Supportive Culture
EU: Environmental Uncertainty
CF: Customer Focus
ITC: Inter-firm Trust and Commitment
NT: Networking
EC: Employee Competency
SCMI: SCM Implementation
SCMP: SCM Practice
RQ: Supply Chain Relationship Quality
SCA: Supply Chain Agility
CA: Competitive Advantage
FP: Firm Performance

Evaluations of the individual paths of the model and hypotheses are presented in Table 6.17. Sixteen out of the seventeen hypotheses were supported. This study considered organizational culture, environmental uncertainty, customer focus, inter-firm trust and commitment, and networking as major antecedents influencing SCM implementation. It was found that customer focus (β=0.239; *t*=4.772), networking (β=0.120; *t*=2.694), and inter-firm trust and commitment (β=0.083; *t*=1.96) had positive influences on SCM implementation. Among the antecedents, Environmental uncertainty was supported as the most influential contributing factor in SCM implementation (β=0.405; *t*=7.467), supporting H3.

With regard to the influence of organization culture, H1, which expected the positive influence of innovative culture on SCM implementation, was supported (β=0.218; *t*=5.826), however, the influence of the second dimension of organizational culture, supportive culture (β=-0.022; *t*=0.552) in SCM implementation, was not found to be significant, thus rejecting H2a. On the other hand, supportive culture was found to have a significant effect on SCM practice (β=0.117; *t*=3.062), thus supporting H2b.

Table 6.17: PLS Structural Equation Modeling Results

Hypothesis	Link	Path Coefficient	*t*-Value	Result
H1	IC → SCMI	0.218	5.826***	Supported
H2a	SC → SCMI	-0.022	0.552	Not Supported
H2b	SC → SCMP	0.117	3.062***	Supported
H3	EU → SCMI	0.405	7.467***	Supported
H4	CF → SCMI	0.237	4.772***	Supported
H5	ITC → SCMI	0.083	1.957**	Supported
H6	NT → SCMI	0.120	2.694***	Supported
H7	SCMI → SCMP	0.643	14.386***	Supported
H8	EC → SCMP	0.224	5.357***	Supported
H9a	SCMP → SCRQ	0.627	19.227***	Supported
H9b	SCMP → SCA	0.492	11.482***	Supported
H9c	SCMP → CA	0.098	1.890*	Supported
H9d	SCMP → FP	0.243	3.686***	Supported
H10	SCRQ → SCA	0.439	10.164***	Supported
H11a	SCA → CA	0.777	16.704***	Supported
H11b	SCA → FP	0.181	1.763*	Supported
H12	CA → FP	0.382	4.429***	Supported

*Significant *p<0.05, **p<0.01, ***p<0.005*

.05=1.645; .025=1.96; .01=2.32; .005==2.57

Hypothesis H7 predicted that an increase in the level of SCM implementation would lead to an increase in the level of SCM practice. This hypothesis was supported. The significant influence of SCM implementation on SCM practice (H7) was proven by a high path coefficient of 0.643 and the highest *t*-value of 14.386 in the overall model. Employee competency was supported as a significant factor affecting SCM practice (β=0.224; *t*=5.357), supporting H8.

Hypotheses H9a, H9b, H9c, and H9d postulated the positive impact of SCM practice on supply chain relationship quality, supply chain agility, competitive advantage, and firm performance respectively. The model estimates indicated a significant association between SCM practice and supply chain agility (β=0.492; *t*-11.482), and SCM practice and firm performance (β=0.243; *t*-3.686). SCM practice had a highly significant impact on supply chain relationship quality (β=0.627; *t*=19.227). Although the impact of SCM practice on competitive advantage was statistically significant (β=0.098; *t*-1.890), the strength of this impact was relatively weak.

The tenth hypothesis of this study, H10 which investigated the impact of supply chain relationship quality on supply chain agility, was strongly supported as the standardized path coefficient of 0.439 was statistically significant. This *t*-value of 10.164 was significant at $p < 0.01$.

The impact of supply chain agility on competitive advantage had a path coefficient of 0.777 and the *t*-value of 16.704, and therefore, strong support at $p < 0.01$ was found for hypothesis H11a. On the other hand, the impact of supply chain agility was found to be significant on firm performance at $p < 0.05$ (β=0.181; *t*=1.763), supporting H11b, although the strength of this impact was relatively weak.

Finally, hypothesis H12 projected a positive relationship between competitive advantage and firm performance. This hypothesis was supported, since the standardized path coefficient was 0.382, $P \leq 0.01$ (*t*-value = 4.429). The results are further discussed in the following chapter (Chapter Seven).

6.4.2.3 Explanatory Power Assessment or R Square (R^2)

In PLS analysis, the variance explained is an important criterion for model assessment (Barclay, 1991). R^2 value was examined for each endogenous construct to evaluate the explanatory power of the model (Santosa, et al., 2005). This value estimates the variance associated with endogenous constructs. The interpretation of the R^2 is similar to traditional regression models (Jackson, 2008). Falk and Miller (1992) indicated 0.10 as the minimum cut-off value for R^2. Again, according to Hair et al. (2011), R^2 values of 0.75, 0.50 or 0.25 for the endogenous latent variables in the structural model can be described as substantial, moderate or weak, respectively. Table 6.18 and Figure 6.3 show that the hypothesized integrative model accounts for 55% of the variance in firm performance (FP) which is the ultimate dependent construct in the model, 73% of the variance in competitive advantage (CA), 71% of supply chain agility (SCA), 39% of supply chain relationship quality (SCRQ), 70% of SCM practice (SCMP), and 72% of SCM implementation (SCMI). There is thus evidence that the structural model is appropriate, since a significant portion of the variance in the endogenous constructs is explained by the model.

6.4.2.4 Predictive Relevance (Q^2)

In addition to evaluation of the magnitude of the R-square as a criterion of predictive accuracy, this study examined the predictive sample reuse technique, or Q^2, to assess the predictive relevance of the PLS model (Hair, et al., 2013b; Chin, 2010; Chin, 1998a; Geisser, 1975; Stone, 1974). This technique demonstrates how well observed values can be reconstructed by the model and its parameter estimates (Chin, 1998). Using the blindfolding procedure with an omission distance of 7 (Hair, et al., 2011), the study obtained a cross-validated redundancy Q^2 of 0.519 for SCM implementation, 0.508 for SCM practice, 0.247 for supply chain relationship quality, 0.513 for supply chain agility, 0.393 for competitive advantage, and 0.272 for firm performance (see Table 6.18). The Q^2 values for all of the endogenous constructs in the model are greater than zero ($Q^2 > 0$), which is indicative of a highly predictive model (Chin, 2010).

Table 6.18: Results of R^2 and Q^2 Values

Endogenous Construct	R^2 Value	Q^2 Value
SCM implementation	0.723	0.519
SCM practice	0.700	0.508
Supply chain relationship quality	0.393	0.247
Supply chain agility	0.705	0.513
Competitive advantage	0.731	0.393
Firm performance	0.552	0.272

6.4.2.5 Power Analysis (1-β)

A power analysis (1-β) was also conducted to validate the empirical findings of the study. Power is defined as the probability of obtaining a statistically significant result (H_1), successfully rejecting the H_0 (Cohen, 1988). Statistical power relies on the significance criteria (α) of the test, the sample size (N) of the study, and the population effect size (ES) (Cohen, 1992). The G*Power 3.1.9.2 power analysis program (Faul et al., 2009) was used to perform the power test (post hoc) in assessing the validity of statistical parameters. A value of 0.80 is used for power in behavioral research (Cohen, 1988). The study estimated power of 0.99 for the base model with a sample size of 296, at the 0.05 significance level and 0.10 effect size (see Table 6.19 and Figure 6.4). The size of estimated power (0.99) clearly exceeded the cut-off value of 0.80 (Cohen 1988), and thus the high power (greater than 0.80) confirmed that the study had sufficient confidence in the hypothesized relationships in the research model.

Table 6.19: Power analysis (1-β)

***t* Tests -** Linear multiple regression: Fixed model, single regression coefficient **Analysis:** Post hoc: Compute achieved power			
Input		**Output**	
Tail(s)	= One	Non-centrality parameter δ	= 5.4405882
Effect size f^2	= 0.10	Critical *t*	= 1.6502557
α err prob	= 0.05	Df	= 283
Total sample size	= 296	Power (1-β err prob)	= 0.9999224
Number of predictors	= 12		

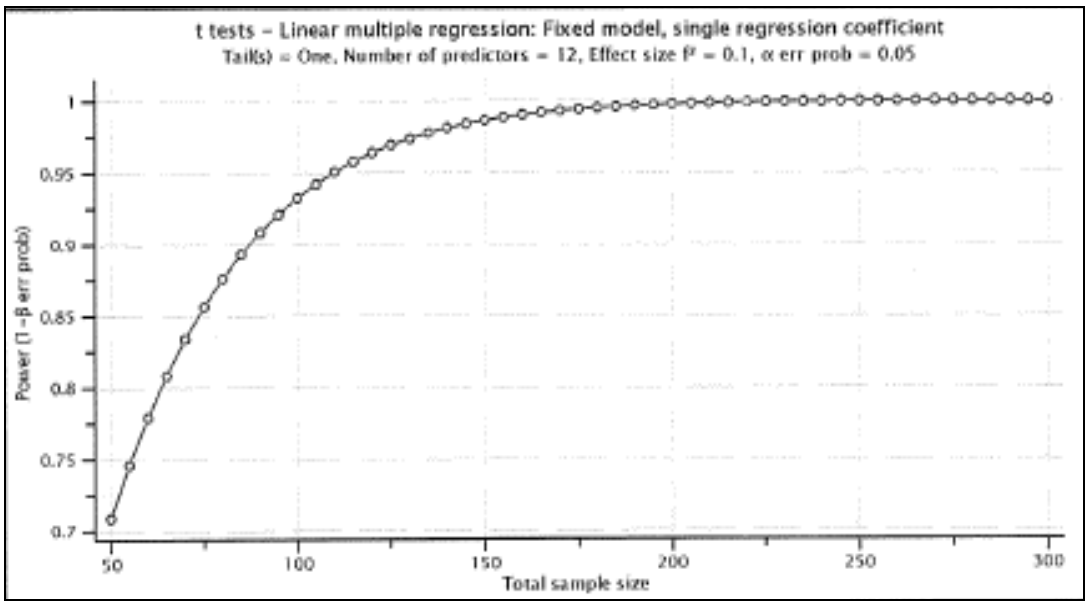


Figure 6.4: Power analysis (1-β)

6.4.3 Mediation Analysis

As discussed in Chapter Three, a mediating effect is formed when a third construct interferes between two other correlated constructs. Two hypotheses were formulated to evaluate the role of supply chain relationship quality and supply chain agility as mediators in this research model. These mediation hypotheses were tested by means of a statistical technique suggested by Judd and Kenny (1981) and Baron and Kenny (1986). They proposed that a given variable may function as a mediator (M), if the following requirements are met: (1) a significant relationship exists between the independent or predictor variable (X) and the dependent or criterion variable (Y); (2) a significant relationship exists between X and M; and (3) in the presence of a significant relationship between M and Y, the previous relationship between X and Y ceases to be significant. (i.e., complete mediation), or the strength of the

relationship is significantly reduced (i.e. partial mediation). The results of these analyses are discussed in the following sections.

6.4.3.1 Assessing the Mediating Role of Supply Chain Relationship Quality

In order to verify whether supply chain relationship quality (SCRQ) mediates in the relationship between SCM practice (SCMP) and supply chain agility (SCA), two separate PLS models were tested (as shown in Figure 6.5) and the results were compared (see Table 6.20). The first model, without mediating variable SCRQ, examined the direct effects of SCMP on SCA (Figure 6.5a), and the hypothesized model with mediated effect (Figure 6.5b) considered the predictor, criteria, and mediator variables, measuring their direct and indirect effects. As can be seen from Figure 6.5, the study adequately confirmed the criteria for mediation analysis suggested by Baron and Kenny (1986) as follows: a significant relationship existed between the predictor, SCMP and the criterion variable, SCA (β=0.767, *t*=33.516); variations in level of the predictor variable, SCMP, significantly accounted for variations in the presumed mediator, SCRQ (β=0.627, (*t*=18.259); and variations in the mediator (SCRQ) significantly accounted for variations in the criteria variable, SCA (β=0.439, *t*=10.715). Since all these conditions were met, it was assumed that SCRQ might have a mediating role in explaining the relationship between SCMP and SCA. A comparison of the results of both models (Figure 6.5 and Table 6.20) suggests that the direct effect of SCMP on SCA declined markedly (β=0.491, *t*=12.246) with the inclusion of an indirect effect through the mediator, SCRQ. The coefficient of regression and its associated *t*-value dropped to 0.491 and 12.246 from 0.767 and 33.516 respectively for the link between SCMP and SCA. The R^2 value of the criteria variable also increased from 0.588 to 0.705. These results suggest that SCRQ plays a partial mediating role between SCMP and SCA.

To establish the mediating effect of SCRQ, the indirect effect of a × b has to be significant in the SCMP-SCA link (Iacobucci, 2008). The z-statistic (Sobel 1982) was used to test the significance of indirect effect. If the z-value exceeds 1.96 ($p < 0.05$), hypothesis H13 can be accepted as it confirms that the indirect effect of the predictor variable on the criteria variable through the mediator variable is significant. The z value was estimated by the following formula:

$$z = \frac{a \times b}{\sqrt{b^2 \times s_a^2 + a^2 \times s_b^2 + s_a^2 \times s_b^2}}$$

The calculation of z value requires the use of the non-standardized regression coefficient (*a*) and the standard error (s_a) of the relationship between the predictor variable and the mediating variable, and the non-standardized regression coefficient (*b*) and standard error (s_b) of the path from the mediating variable to the criteria variable. Table 6.20 shows the required data and the results of the Sobel test. The results show that the z value for the SCMP-SCA link is 9.240, which confirms the mediating effect of SCRQ. These findings support H13 which implies that SCM practice has an indirect impact on supply chain agility through supply chain relationship quality. This study also used the VAF (variance accounted for) value to estimate the size of the indirect effect, which represents the ratio of the indirect effect to the total effect. The total effect was calculated as the sum of the direct and indirect relationship. VAF is calculated by dividing the indirect effect by the total effect, which can be shown as follows:

$$VAF = \frac{a \times b}{a \times b + c}$$

A VAF value of 0.359 (Table 6.20) indicates that 35.9% of the total effect of SCMP on SCA is explained by the indirect effect through SCRQ.

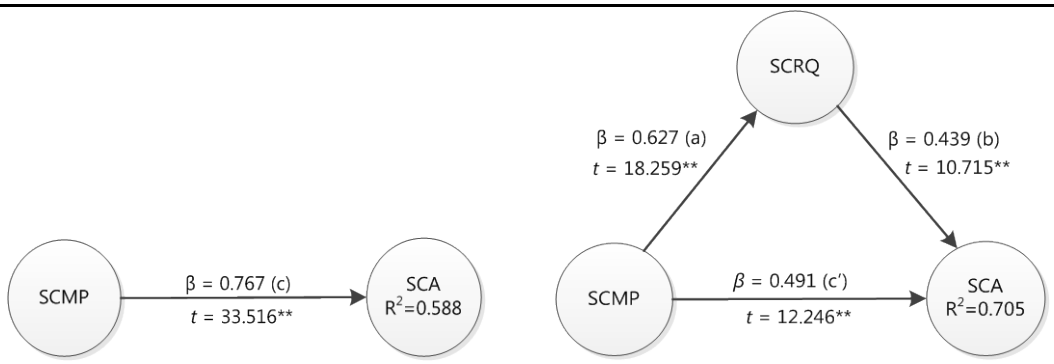


Figure 6.5a: Model with direct effect

Figure 6.5b: Model with mediated effect

***significant at P < 0.01*

Figure 6.5: Mediating Effects of Supply Chain Relationship Quality

SCMP: SCM Practice; SCA: Supply Chain Agility; SCRQ: Supply Chain Relationship Quality

6.4.3.2 Assessing the Mediating Role of Supply Chain Agility

This study tested for the mediation effect of supply chain agility (SCA) in the relationship between SCM practice (SCMP) and competitive advantage (CA). In order to test for the mediation effects of SCA (H14), the guidelines of Baron and Kenny (1986) were

followed: two separate models, as shown in Figure 6.6, needed to be assessed: one without SCA and one with SCA. The results of the both models are summarized in Table 6.20. The first model (Figure 6.6a) was executed to estimate the direct effect of SCMP on CA (β = 0.696, t=24.175; R^2 = 0.485). In the second model (Figure 6.6b), the relationship between SCMP (predictor) and SCA (mediator) was found to be significant (β=0.767, t=33.482), SCA (mediator) had a significant effect (β=0.777, t=16.818) on CA (criteria variable). Comparing the coefficients of regression (Table 6.20), it can be seen that the inclusion of SCA in the model (Figure 6.6b) significantly reduced the strength of the relationship between SCMP and CA (from β = 0.696, t=24.175 to β=0.098, t=2.010). As the coefficients continued being significant, it could not be affirmed that SCA exercised complete mediation between the constructs, however, there was a significant decrease in the t statistic from 24.175 to 2.010 and the variance explained (R^2) for CA significantly increased from 0.485 to 0.730. Although, theoretically, the results gave clear support for the partial mediation of SCA between these constructs, it appeared to be very close to full mediation. The results of the Sobel test (Table 6.20) show that the z value for the SCMP-CA link is 15.212, which confirms the mediating effect of SCA. These findings support H14, which implies that SCM practice has an indirect impact on a firm's competitive advantage through supply chain agility. A VAF value of 0.859 indicates that more than three-fourths (85.9%) of the total effect of SCM practice on competitive advantage is explained by the indirect effect through SCA.

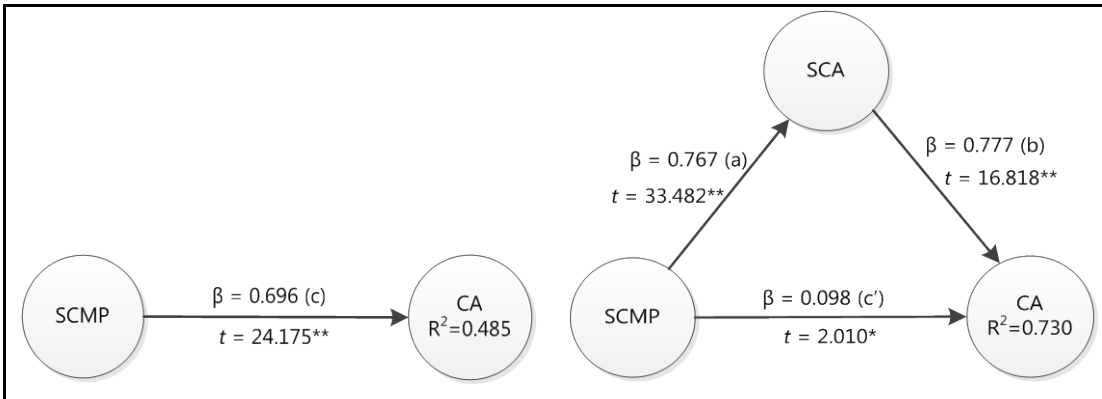


Figure 6.6a: Model with direct effect

Figure 6.6b: Model with mediated effect

**p < 0.01, *p < 0.05

Figure 6.6: Mediating effects of Supply Chain Agility

Table 6.20: Results of Mediation Analysis

Hypothesis	Relationship	Path-coefficients			Standard Error	VAF	R^2	Mediation effect
		Direct effect	Indirect effect	Total effect				
H_{13} (*SC relationship quality mediates the relationship between SCM practice and SC agility*)	SCMP→SC agility (without mediator)	0.767 (*t*=33.516**)					0.588	
	SCMP→RQ (a)	0.627 (*t*=18.259**)			0.034			
	RQ→SC agility (b)	0.439 (*t*=10.715**)			0.041			
	SCMP→SC agility (with mediator)	0.491 (*t*=12.246**)	0.275 (z=9.240**)	0.766 (*t*= 32.955**)		0.359	0.705	Partial mediation
H_{14} (*SC agility mediates the relationship between SCM practice and CA*)	SCMP → CA (without mediator)	0.696 (*t*=24.175**)					0.485	
	SCMP → SC agility (a)	0.767 (*t*=33.482**)			0.022			
	SC agility → CA (b)	0.777 (*t*=16.818**)			0.046			
	SCMP → CA (with mediator)	0.098 (*t*=2.010*)	0.596 (z=15.212**)	0.694 (*t*=23.411**)		0.859	0.730	Partial mediation

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

6.4.4 Impact of the Control Variable

In this study, firm size was specified as the control variable. The total number of full-time or equivalent organizational employees was used as a measure of firm size. In this section, the study models the impact of control variable (i.e., firm size) on the ultimate outcome construct (i.e., firm performance). The path coefficient for the control variable is positive but insignificant (β=0.057, *t*=1.426), as seen in Figure 6.3. The insignificant path coefficient implies that the control variable, firm size, was not found to be significantly associated with firm performance.

6.5 SUMMARY

This chapter has reported the results of the quantitative analysis of the large-scale survey conducted among apparel manufacturing firms in Bangladesh, exploring how SCM implementation and practice contribute to improving supply chain agility and the competitiveness performance of firms. First, it has presented an overview of the survey reporting on the research process, empirical pilot study, response rate, common method bias, and non-response bias. Next, descriptive findings of the surveyed firms and respondents, including descriptive statistics of the study with a focus on differentiation

between SCM implementation and practice, were presented. This study involved 296 respondents who were supply chain professionals and high-level corporate executives in the Bangladesh apparel industry. A full analysis using PLS was described in the later section. Two stages of data analyses were performed: assessment of the measurement model and assessment of the structural model. Most assessment was performed using the SmartPLS Version 2.0 M3.

In the process of the measurement model assessment, some indicators were removed so as to meet validity, and reliability requirements. Details of the measurement model assessment procedure was given, where it was clarified that the measures and constructs possessed appropriate levels validity and reliability which allowed for the measurement of the structural model. In assessing the structural model, path coefficients (β), significance of t-values, R^2 (amount of variance explained), Q^2 (predictive relevance) and power analysis (1-β) were examined. Based on the findings of the analysis, the hypotheses developed in the current study were tested and evaluated. Overall, of the nineteen hypotheses proposed based on the comprehensive research model, sixteen hypotheses were supported. In the next chapter, the implications of these results are discussed.

Chapter Seven

DISCUSSION AND IMPLICATIONS

7.1 INTRODUCTION

This chapter presents and discusses the empirical findings of the analysis presented in the previous chapter. The aim is to discuss and reflect on the factors that influence supply chain management (SCM) implementation and practice, and the impact of the SCM practice in achieving competitive advantage through supply chain agility (SCA) in the apparel manufacturing industry of Bangladesh. One of the most valuable contributions of the current study is the differentiation between SCM implementation and practice as per the diffusion of innovation theory, which has not yet been addressed. Such differentiation is established in the empirical investigation. As shown in Chapter Six (Table 6.5), the mean values for SCM practice in all the items were lower than those of the implementation. These differences imply that the implemented policies, processes, practices or systems were not fully practiced in the surveyed firms. To ensure that these differences were statistically significant, a series of paired sample *t*-tests were performed for each item. The results of the paired sample *t*-tests for all items measuring SCM implementation and practice proved that implementation is significantly different, at a 0.05 significance level, from practice in all items (See Table 6.5 and Table 6.6 in Chapter Six). Through hypothesis testing, the study also found the existence of a significant link between 'SCM implementation' and 'SCM practice'. The findings of the field study also supported the relationship between SCM implementation and practice. The majority of the field study participants directly or indirectly confirmed that the practice of SCM depends on its implementation. For example, Participant 5 stated: "*Practice needs proper implementation*". He added: "*we have implemented an informal policy of sharing information in a timely manner and accurately, but we cannot practice it fully as we encounter challenges with regard to insufficient support tools and formal procedures*".

The empirical findings of the previous chapter are discussed in terms of the hypotheses proposed in the comprehensive model derived from the literature review and the field study analysis. As noted in Chapter Six, eighteen hypotheses were supported, and one hypothesis was not supported. The results of this research can be used by both academicians, in further exploring and testing the causal relationships in SCM, and practitioners, for guiding the implementation and practice of SCM practices, and assessing supply chain agility and thus, competitive advantage and firm performance. The theoretical

and practical implications of the results of each hypothesis test are therefore discussed in this chapter.

7.2 DISCUSSION OF HYPOTHESES TESTING RESULTS

7.2.1 Hypothesis Related to Antecedent Factors of SCM Implementation

The literature review and field study identified six factors that could potentially influence SCM implementation in the apparel manufacturing firms of Bangladesh. The influence of each factor was explored through hypotheses H1, H2a, H3, H4, H5 and H6. The results of the hypotheses testing are discussed in detail in the following sections.

7.2.1.1. Innovative Culture and SCM Implementation (Hypothesis H1)

This study investigated the antecedent role of organizational culture in SCM implementation. A significant finding in relation to the influence of the organizational culture is that 'innovative culture' has a positive influence on SCM implementation (β=0.218; *t*=5.826). It suggests that the presence of an innovative culture will encourage the formation of strategic partnerships with key buyers and suppliers, and the adoption of SCM practices and policies. This finding is in line with support from Sambasivan and Yen (2010) and Beugelsdijk et al. (2006). The results of this hypothesis testing also conform with the findings of Baird et al. (2011), who reported significant positive relationships between the implementation of total quality management (TQM) practices with the innovation dimension of organizational culture. Based on strategic marketing literature, the finding is also similar to the findings of Leppard and McDonald's (1991) research, where it was suggested that innovative culture was a prerequisite for the implementation of strategic marketing planning. For H1, the findings basically emphasize that firms with an innovative culture will be more likely to adopt innovative practices such as SCM.

The field study results also support the role of innovative culture for the success of SCM implementation in the apparel manufacturing firms of Bangladesh. As these firms operate in a dynamic business environment, they need to be adaptive and externally oriented. This finding calls for firms to pay attention to the importance of an innovative culture as it promotes the values that enhance adaptability and nurture internal capabilities to adopt new management approaches, practices, and strategic changes in order to successfully survive in a dynamic environment, because an innovative culture provides not only the external awareness required to recognize market changes, but also the ability to

implement new management practices as part of the organizational response. Thus, apparel manufacturers of Bangladesh should emphasize on the dominants attributes of innovative culture such as creativeness, innovation, and external orientation to develop such capability. Overall, the finding suggests an imperative for managers when identifying the specific cultural dimensions they need to develop to support their strategic goal of securing competitive advantage through effective SCM implementation.

7.2.1.2 Supportive Culture and SCM Implementation (Hypothesis H2a)

Hypothesis 2a predicted that a supportive culture would have a significant positive correlation with SCM implementation. Contrary to the expectation, this research did not find a significant relationship between these two (β=-0.022; *t*=0.552). This is inconsistent with the results of similar studies. For example, Prajogo and Mcdormant (2011) have empirically shown that the adoption of innovation or process technology is significantly associated with similar cultural dimension (teamwork, participation, empowerment etc.). The finding is somewhat consistent with the findings of a study undertaken by Hartnell et al. (2011) who reported that an adhocracy culture (which is similar to innovative culture) is more closely related to innovation and the quality of products and services than the clan culture (which is similar to supportive culture). The result also contradicts the field study findings, as half the participants agreed with the link between a supportive culture and SCM implementation. The rejection of an assumption by a quantitative survey which was initially justified through the qualitative field study might be due to the mixed-method research, because, some assumptions which are primarily warranted from the field study based on small sample size, may be rejected by the responses from the larger sample used in the quantitative survey (Azam, 2014).

The absence of a significant relationship between supportive culture and SCM implementation could be attributed to the characteristics of a supportive culture. A supportive culture is basically internally-oriented, and puts the emphasis on providing a supporting environment for employees where teamwork, participation, cooperation, respect, and equality are valued. On the other hand, the implementation of SCM policies and practices are usually the result of the strategic decisions of the top management and the existence of favorable external conditions, including the intention and support of the buyers and suppliers. SCM implementation involves long-term business vision, resource commitment, and the integration of SCM into an organization's business strategy, which calls for support from the top management (Burgess, 1998). The long-term commitment of each

of the organizations involved in a supply chain is also critical for successful SCM implementation. It can be concluded that a supportive culture is more related to the practice or diffusion of an innovation (i.e., practices, systems etc.) (Khalil et al., 2006), but it may not have direct impact on strategic decisions to implement SCM, which is more related to top management and external factors.

7.2.1.3 Environmental Uncertainty and SCM Implementation (Hypothesis H3)

This study found very strong evidence in support of hypothesis H3, that there was a positive relationship between environmental uncertainty and SCM implementation. The relationship was found to be significant with a path coefficient (β) of 0.405 and a *t*-value of 7.467. This finding reveals that the challenges arising from environmental uncertainty drive apparel manufacturing firms to implement SCM practices. The result is supported by the existing literature (Wong & Boon-itt, 2008; Ogan, 2010; Chen & Paulraj, 2004). Cao and Zhang (2011) maintain that firms facing uncertain environments strive to attain greater supply chain collaboration to leverage the resources of their customers and suppliers. The field study investigation also provided similar evidence. Most of the field study participants believed that effective SCM can help their firms yield the expected results and provide safeguards against supply chain uncertainty.

The findings of this study suggest that environmental uncertainty arises from a variety of external sources, including demand, supply, competition, technology, and the political environment, which is largely beyond the control of individual firms. Lee and Kincade (2003) assert that apparel manufactures require more product variety in response to diversified customer demands, which creates demand uncertainty and supplier variability. As a result, apparel firms under this sort of uncertain environment face numerous managerial problems in forecasting, production planning, procurement, inventory management, production systems, and timely distribution. Apparel manufacturers of Bangladesh are also facing the similar problems. Thus, these firms need to build a closer relationship with their suppliers and buyers (Premkumar, 2000) and implement SCM to better meet market demands. Uncertainty about supplier delivery and quality performance has been a big concern for Bangladeshi apparel manufacturers, as it is directly related to their ability to meet buyer quality and order delivery lead time requirements. Moreover, competition in the apparel industry is perceived to be fierce (Candace et al., 2011) and uncertainties arising from competitors will compel firms to implement SCM practices which will enable them to increase their ability to provide more customer value and satisfaction, and thereby, to build

strategic partnership with buyers. In short, this study provides strong evidence of the need for the firms operating in an uncertain environment to implement SCM. As firms seek out effective ways of handling uncertainty arising from the external environment, SCM implementation will assist them in minimizing uncertainty and reducing inefficiencies throughout the supply chain, which will eventually help them achieve and sustain competitive advantage.

7.2.1.4 Customer Focus and SCM Implementation (Hypothesis H4)

Hypothesis H4 was proposed with the expectation that the customer focus of firms would influence SCM implementation in the apparel industry of Bangladesh. Statistical analysis demonstrated significant positive support for this hypothesis. The standardized structural coefficient (β) measuring the relationship between customer focus and SCM implementation was 0.237 with a *t*-value of 4.772 (Table 6.17). This result is in line with evidence from the literature review which supported the notion that customer focus would influence SCM implementation (Chen & Paulraj, 2004; Richey et al., 2009; Lado et al., 2011). The participants of the field study also confirmed the antecedent role of customer focus in implementing SCM practices and policies. The findings of this study provide empirical evidence that customer focus drives apparel manufactures to implement SCM practices in order to build and maintain long-term collaborative relationships with their buyers through creating and delivering superior value. This is specifically true in the context of the Bangladesh apparel industry where the supply chain is by and large buyer-dominated and significant pressure to implement SCM has been primarily because of buyer demand for a wide variety of quality products with short lead times. In addition, the dynamic nature of customer requirements and market conditions require firms to maintain a close relationship with buyers to gain a better understanding of the current and evolving needs of customers, and how to satisfy them in an effective manner. The findings of this study thus suggest that a firm's interest in building long-term collaborative relationships with buyers in today's complex business environment, through better meeting the current and future needs and expectations of customers must be backed by well implemented SCM practices. In other words, firms that strive to be more customer-focused are more likely to implement SCM practices in order to improve their ability to meet customer needs more effectively and efficiently, and thereby, sustain their position in a competitive marketplace.

7.2.1.5 Inter-firm Trust and Commitment and SCM Implementation (Hypothesis H5)

This study sought to investigate the role of inter-firm trust and commitment in the implementation of SCM practices. The findings of this study confirm inter-firm trust and commitment as a predictor of SCM implementation as anticipated (β = 0.083, *t* = 1.957), although the relationship is not strong. One plausible explanation for this may be that before entering a long-term strategic relationship, inter-firm trust and commitment are determined by the initial belief of one party that the other exchange partner is reliable or dependable (Ballou et al., 2000) and has an enduring aspiration to build and maintain a valued relationship (Mentzer et al., 2000). This is also supported by the field study: "A *relationship does not grow in a day rather it grows through working together for a period of time and ongoing communication, assessments and sharing of rewards of each other's efforts*" (Participant 6).

The findings of this study support a number of researchers (e.g., Mentzer et al., 2000, Morgan & Hunt, 1994; Ireland & Webb, 2007; Tan et al., 1998; Vijayasarathy, 2010) who consider trust and commitment as essential for firms to enter a long-term cooperative relationship. The result is also consistent with past empirical studies. Ryu et al. (2009) have found that trust and commitment influence collaboration in the supply chain context. Similarly, Li and Lin (2006) found that the practices of information sharing and information quality are positively influenced by inter-firm trust and shared vision between the trading partners. A more recent study by Wu et al. (2014) has also reported that trust and commitment significantly affect information sharing and collaboration in the supply chain. As previously noted in the literature (Cullen et al., 2000; Mentzer et al., 2001), the result of the current study confirms the critical role of 'soft' factors such as trust and commitment in connecting firms within a strategic network. Similarly, Bangladesh apparel manufacturing firms should focus on building trust and commitment to initiate long-term collaborative relationship with their buyers and suppliers. The results suggest that effective implementation of SCM practices will require the existence of trust and commitment between trading partners, and that a relationship built on these attributes will be supportive for a firm implementing various SCM practices such as a strategic buyer partnership, supplier partnership, information sharing, information quality, and lean systems.

7.2.1.6 Networking and SCM Implementation (Hypothesis H6)

Hypothesis H6 was proposed in order to examine the influence of networking on SCM implementation. The hypothesis testing provides evidence in support of H6. The

standardized structural coefficient (β) measuring the path from networking to SCM implementation in the final model was 0.120 with a *t*-value of 2.694 (Table 6.17). The result indicates that networking has a significant influence on SCM implementation. In other words, the participation of organizational members in informal networks has an effect on the implementation of various SCM practices. This implies that networking as a means of knowledge and information sharing helps firms to learn about new and innovative business practices, and recognize the relevance of these practices in the context of their business environment, which eventually influences the firms to implement them. The findings in the present study are supported by the extant literature (Du Plessis, 2008; Rogers, 1991; Frambach, 1993). For example, Frambach (1993) argues that the likelihood of implementing an innovation in an organization increases with its members' extensive participation in informal networks.

The field study findings also confirm that networking plays an important role in sharing the business experience and knowledge of best practices, and enhancing inter-organizational learning. It was found that participation in informal networks help organizational members become aware of new practices and technology, and potential opportunities and changes in the market. Apparel manufacturers place high value on these external sources of information and knowledge for their success in the market. It was also found that the top management of Bangladeshi manufacturing firms develop and maintain extensive personal and professional networks in order to remain up to date with the newest development in the industry and, thereby, to implement new practices, processes or technology and pursue greater collaboration with their supply chain members. In short, the current study confirms networking as an antecedent of SCM implementation and suggests that the management of apparel manufacturing firms should promote a culture of networking among their organizational members to strategically leverage external knowledge and facilitate the implementation of innovative practices.

7.2.2 Hypothesis Related to Antecedents of SCM Practice

This study attempted to investigate the relationship between SCM implementation and its practice. The field study also explored two more factors (supportive culture, and employee training) that could potentially enhance SCM practice, which were justified with support from the literature. The associations between these factors were explored through hypotheses H7, H2b, and H8. The results of the hypotheses testing are discussed below.

7.2.2.1 SCM Implementation and Practice (Hypothesis H7)

Considering diffusion of innovation theory, this research claims, through H7, that there is a positive and significant relationship between SCM implementation and its practice in the organization. This claim was well supported by the research. The standardized structural coefficient (β) measuring the path from SCM implementation to its practice in the final model was 0.643 with a *t*-value of 14.386 (Table 6.17). There is overwhelming evidence to demonstrate that there is a positive and significant relationship between SCM implementation and its practice in an organization. The finding indicates that the higher the level of SCM implementation in an organization, the higher the level of its practice. This is consistent with what has been directly or indirectly emphasized in previous studies (Xu & Quaddus, 2005a, 2005b; Chan and Chong, 2013; Premkumar et al., 1994; Kotzab et al., 2011, and Teller et al., 2012). The result is in accordance with Xu and Quaddus's (2005b) study of knowledge management system (KMS) in Australia, which has shown the significant effect of the organization-wide implementation of KMS on the diffusion of KMS within organizations. The studies of Teller et al. (2012) and Kotzab et al. (2011) have shown that 'internal SCM conditions' (e.g., information technology and human resources, top management support, internal visions and goals, the staff's technical expertise, internal IT-systems) and 'joint SCM conditions' (e.g. planning and controlling systems, shared vision and goals, organizational structure, joint project groups, systems perspective, long-term relationships, orientation, shared profits and risks, mutual dependency, shared information and so on) must exist for adopting SCM-related processes which together lead to SCM execution. The result of the current study confirms that the implementation of SCM practices has to go through the stages of implementation and practice. Organizations implement SCM practices in the first stage. This then facilitates the practice or execution of those practices in the whole organization. As such, effective implementation will lead to the sound practice of SCM. Finally, the success of SCM practice can be evaluated through the increase in a firm's supply chain agility and competitive advantage, which will eventually be reflected in the improvement in firm performance.

This result is also supported by the field study findings. The majority of the field study participants directly or indirectly confirmed that the practice of SCM depends on how well it is implemented. This study demonstrates how the level of SCM practice can be increased. It highlights the need for effective implementation before an organization moves to next stage, practice. As mentioned in Chapter Two, SCM is implemented and practiced through a set of integrative practices and policies aimed at effectively managing the supply

chain and integrating its members in order to improve overall business performance by offering maximum customer value. This study has also established that these practices represent five major areas of SCM in the context of the Bangladesh apparel industry, such as the strategic buyer partnership, supplier partnership, information sharing, information quality, and lean systems. These practices should be implemented in an integrated way, because, SCM practices will not bring full benefits when they are implemented independently (Kim, 2006). As the improvement in SCM practice is directly affected by the implementation of these practices, organizations need to assess what it requires to successfully implement them. SCM implementation needs collective actions, and involves different organizational, technical, managerial, and behavioral requisites (e.g., changes to organizational structure, resources, basic cultural values, operations processes, management methods, communication technologies etc.) which will eventually determine the level of SCM practice internally, and externally with customers and suppliers. Following formal implementation, the organization-wide practice of SCM needs to be ensured in order for the implementation to provide its expected benefits (Premkumar et al., 1994). The more the SCM practices are practiced within and across the organizations involved in a supply chain, the more these practices will provide benefits to the adopting organizations. Again, there may be other factors or constraints that may further influence the level of practice. The results of the empirical investigation suggest that the SCM practices implemented in the Bangladeshi apparel manufacturing firms are not fully practiced (Table 6.5 and Table 6.6 in Chapter Six). The absence of a supportive environment and the lack employee competency are still plague the widespread practice of SCM efficaciousness.

In today's highly dynamic market environment, it is quite impossible for any firm to survive the intense competition without managing its supply chains effectively and efficiently, however, evidence of failure in SCM implementation is still evident (Chan & Chong, 2013; Li et al., 2005). Bringing concepts into practice has been a challenge in the SCM context (Kotzab et al., 2011). Firms are keen to understand what drives the sound practice of SCM, and so the results of this study provide an answer to the question, which calls for the proper implementation of SCM practices in order for these practices to be practiced to the extent that will enable firms to achieve competitive advantage. Without proper implementation, SCM practices and policies may be under-utilized, wrongly practiced or may totally fail (Quaddus, 1995). This is an important finding as it clearly demonstrates how SCM implementation and practice should be planned in the apparel manufacturing organizations of Bangladesh.

7.2.2.2 Supportive Culture and SCM Practice (Hypothesis H2b)

The findings of the study provide significant evidence to support a positive relationship between supportive culture and SCM practice (β=0.117; *t*=3.062). In other words, the supportive culture of an organization has a significant effect on the level of SCM practice. This finding is consistent with the findings of an empirical study conducted by Baird et al. (2011) which demonstrated a significant association between the cultural dimension of teamwork/respect for people and the extent of use of TQM practices. Many researchers have echoed similar arguments (e.g., Prajogo & McDermott, 2011; Khalil et al., 2006; and Liao et al., 2013). Khalil et al. (2006) emphasize the creation of a supportive culture in enhancing knowledge management implementation. The field study results also confirm that a supportive culture is a prerequisite for enhancing SCM practice following implementation within the organization. Putting formal and informal policies, systems or practices into an organization does not guarantee the success of SCM implementation. It requires the undertaking of further organizational steps such as the building of a supportive culture. A supportive culture would provide a supportive environment for employees, where employee involvement, participative decision making, teamwork, cooperative relationships, and employee empowerment are valued. Such an environment will influence employee motivation, behavior, and the acceptability of the adoption of SCM practices and policies, and will eventually lead to the enhanced practice of SCM. Building a supportive culture can be seen as a function of change management in the organization. Therefore, management of the apparel manufacturing firms of Bangladesh needs to be aware of the association between supportive culture and SCM practice, and attempt to establish an organizational atmosphere that facilitates the sound practice or use of SCM practices in their organizations.

7.2.2.3 Employee Competency and SCM Practice (Hypothesis H8)

In order to investigate the effect of employee competency on SCM practice, hypothesis H8 was formulated. The result of the hypotheses testing provides evidence in support of H8. The standardized structural coefficient (β) measuring the path from employee competency to SCM practice in the final model was 0.224 with a *t*-value of 5.357 (Table 6.17). The result indicates that there is a significant positive relationship between employee competency and SCM practice. The findings are in line with the studies of Chang and Chong (2013) and Pandey et al. (2012). The result suggests that, when implementing SCM, employees need to be provided with training and education to improve their competency so that they can understand and appropriately practice it. The need for appropriate training and

education in enhancing SCM practice is also emphasized in the extant literature (Fawcett, et al., 2008; Halldo´rsson et al., 2008; Gowen & Tallon, 2003). A lack of employee skills is also identified as one of the challenges for the Bangladesh apparel sector. Berg et al. (2011) emphasize in-house training for both workers, and the middle and top management of this sector. Fawcett et al. (2008) maintain that supply chain managers, along with other employees of a firm, need the appropriate attitudes and skills for the execution of supply chain policies and practices. The implementation of SCM practices may not have a significant impact if the firm's employees do not possess the required skills and right attitudes required for its sound practice. Employees responsible for managing supply chain processes need to have an understanding of supply chain dynamic, teamwork and collaboration, systems thinking, workflow structure, communication and information flow, management methods, leadership structure, culture, and the need for appropriate attitudes. Overall, employees, specifically in apparel firms in Bangladesh, need to be trained and educated on the implemented SCM practices and policies, and the requirements for effectively execute them. Sufficient training should be provided to improve proficiency in using technological applications and in communication and interpersonal skills. It can be expected that if employees are given sufficient training and education, they will be more willing to accept and practice the newly implemented policies and practices. Following implementation, firms therefore need to undertake further steps to develop employee understanding and ability through training and education to ensure effective practice of SCM.

7.2.3 Hypothesis Related to the Outcomes of SCM Practice

The current study expected that the more SCM practices were practiced within and across the firms involved in a supply chain, the more likely it was that these practices would bring benefits to the adopting firms. With such an expectation, this study attempted to investigate the impact of SCM practice on a number of aspects of a firm, namely, supply chain relationship quality, supply chain agility, competitive advantage, and firm performance. The outcomes of SCM practice were explored through hypotheses H9a, H9b, H9c, H9d, H10, H11a, H11b, and H12. The results of these hypotheses tests are discussed below.

7.2.3.1 SCM Practice and Supply Chain Relationship Quality (Hypothesis H9a)

Through Hypothesis H9a, this study attempted to examine the effect of SCM practice on supply chain relationship quality (SCRQ) in the apparel manufacturing industry of Bangladesh. The results of the statistical analysis demonstrated strong positive support for

this hypothesis (β = 0.627, *t* = 19.227), suggesting a significant association between SCM practice and SCRQ. The findings of the field study also supported this notion. A number of field study participants pointed out that their firms have improved the quality of relationships with their buyers and key suppliers through the continuous practice of SCM over the years. The findings of this study empirically confirm the notion reflected in the literature that well-practiced SCM leads to improved supply chain relationship quality. The result is well supported by the literature (e.g., Naudé & Buttle, 2000; Fynes et al., 2008; Fawcett et al., 2011; Lee & Kim, 1999) where it is argued that participation, coordination, information sharing, information quality, joint actions, collaboration, and the mutual integration of needs contribute to relationship quality among supply chain partners. In other words, SCRQ demands the continuous and sound practice of SCM. An important imperative, thus, will be for apparel manufacturing firms in Bangladesh to enhance SCM practice to improve SCRQ, which is vital for their success in today's environment. This is because the extent and scope of SCM practice will lead to improved SCRQ, which strengthens the ground for further collaboration through increased trust, morale, and overall satisfaction of the working relationship with the supply chain partners. This result implies that improving SCRQ is a critical means to reaping the greatest benefits from SCM practice, through building agility in the supply chain which has become inevitable for firms to survive in today's highly dynamic market environment. The findings also suggest that SCRQ is not only an antecedent of supply chain agility but also a key measure of success in SCM practice, because competition today is no longer between individual firms, rather between entire supply chains, and thus, the goal of SCM is to improve overall supply chain performance. As each and every member of a supply chain plays an integral role in the value creation processes, they each need to be satisfied with the collaboration efforts and outcomes.

7.2.3.2 SCM Practice and Supply Chain Agility (Hypothesis H9b)

This study found very strong statistical evidence in support of Hypothesis H9b (β=0.492; *t*=11.482) suggesting that the level of a firm's supply chain agility (SCA) is affected by the extent of SCM practice. The results of the hypothesis testing empirically confirm the theoretical notion reflected in the literature, that well-practiced SCM directly leads to improved agility in the supply chain. The previous literature supports the relationships between several individual supply chain practices and various dimensions of SCA, such as the strategic buyer-supplier relationship and agility (e.g., Paulraj & Chen, 2007; Khan & Pillania, 2008; Yang, 2014), SCM practice and supply chain integration (e.g., Kim, 2006), SCM practice

and operational flexibility and responsiveness (Narasimhan & Das, 1999), information sharing and integration (e.g., Lee et al., 2007), information sharing and agility (e.g., Ledyard & Keough, 2007), lean practices and agility (e.g., Yusuf et al., 2014; van Hoek et al., 2001), lean practices, and supply chain flexibility and customer responsiveness (e.g., Jacobs & Chase, 2014; Yusuf et al., 2004). There has, however, been a lack of empirical research examining the impact of integrated SCM practice (which comprehensively incorporates upstream and downstream components of supply chain along with the internal operations of the focal firm) on SCA. SCM practices cannot improve their own effectiveness independently, rather the effectiveness is accomplished through the interaction and integration of various SCM practices (Kim, 2006). This study fills this gap by providing strong support for a positive relationship between integrated SCM practice and a firm's SCA. Based on the literature review, this study conceptualized SCA as an externally focused concept or outcome which reflects the ability of a firm in collaboration with its external supply chain members to adapt or respond quickly and effectively to changes in market demands (Swafford et al., 2006a; Braunscheidel & Suresh, 2009). This implies that the impact of SCM practice can be assessed by the extent of SCA on the basis of various complementary agile capabilities required for success in a dynamic marketplace.

The field study results also support the relationship between SCM practice and SCA. In Bangladesh apparel industry, strategic partnerships with buyers and the suppliers was found to be a critical factor in achieving SCA, as a single firm might not be able to quickly respond to changing market demands. Engaging in practices of information sharing and information quality also help firms improve demand response, integration, and customer responsiveness capability, through increased visibility across the supply chain, which will eventually enable them to respond rapidly to unexpected events or changes in the market conditions. The practices of a lean system, supported by strategic partnership practices, not only increase flexibility in the supply chain, but also improve efficiency in supply chain operations and overall customer responsiveness. Apparel manufacturing firms, specifically Bangladeshi ones, should promote the sound practice of SCM in order to improve SCA.

7.2.3.3 SCM Practice and Competitive Advantage (Hypothesis H9c)

Hypothesis H9c investigated the effect of SCM practice on a firm's competitive advantage. The hypothesis was found to be significant (β=0.098; *t*=1.890) in this study and was, thus, supported. This indicates that SCM practice in a firm has a direct positive effect on its competitive advantage. This result is in line with the findings of the past empirical studies

of Li et al. (2006) and Kim (2006) which have shown that higher levels of SCM practice can lead to an improved competitive edge. The field study findings also demonstrated that SCM practice plays an essential role in gaining competitive advantage. This positive association implies that sound practice of SCM will enable a firm to achieve competitive advantage in terms of price, product quality, delivery performance, product customization and innovation, and product development time. The result suggests that the apparel manufacturing firms of Bangladesh need to emphasize the implementation and proper execution of various SCM practices related to strategic buyer partnership, supplier partnership, information sharing, information quality, and lean systems in order to integrate and effectively manage heterogeneous resources and the competencies of different supply chain members in fulfilling customer needs and expectations in the most effective and efficient way.

Although this study confirms the direct effect of SCM practice on competitive advantage, the strength of this effect is relatively weak, as indicated by the standardized structural coefficient. This may be the result of not considering any intervening factor such as supply chain agility in the relationship between SCM practice and a firm's competitive advantage. Through hypothesis H14, this study also attempted to examine the mediating role of supply chain agility in this relationship and the results confirm that SCM practice has a significant, indirect effect on competitive advantage through SCA (see Section 7.3.4.2).

7.2.3.4 SCM Practice and Firm Performance (Hypothesis H9d)

Hypothesis H9d was proposed to examine the effect of SCM practice on firm performance. The result of this hypothesis was found to be significant (β=0.243; *t*=3.686), indicating that firms with high levels of SCM practice will have high levels of firm performance. A number of studies (e.g., Li et al., 2006; Kim, 2009, Cao & Zhang, 2011; Tan et al., 1998; Tan, 2002) have shown that well-managed and well-practiced SCM will directly lead to improved firm performance. This result thus corroborates the findings of the previous empirical research, that SCM practice will directly improve a firm's market and financial performance in the long term. The findings of the quantitative analysis are also consistent with the field study results, where the participants agreed and put emphasis on SCM practice to enhance a firm's operational and financial performance. This study highlights the critical role of SCM practice in improving the business performance of the apparel manufacturing firms that belong to an industry characterized by long supply chains, the large number of parties involved, market uncertainty, diversified products and a great number of SKUs, high dependence on foreign suppliers, longer lead time and intense global market competition.

Geographical distance among customers, manufactures and suppliers greatly affects customer lead time. Any reduction in the lead time will reduce the overall cost of the delivered goods (Banomyong, 2010) and, thus, result in improved customer satisfaction and increased competitiveness. The sound practice of integrative SCM (which comprehensively includes various practices such as strategic buyer partnerships, supplier partnerships, information sharing, information quality, and lean systems) will help these firms effectively manage their complex supply chain, reduce cost and remove inefficiency, increase productivity and market responsiveness, and improve customer value. This will eventually allow apparel manufacturing firms to make significant improvements in their financial and market performance by enhancing overall value chain efficiency and reducing the gap between customer expectations and manufacturer capability.

7.2.3.5 Supply Chain Relationship Quality and Supply Chain Agility (Hypothesis H10)

Hypothesis H10 posited that supply chain relationship quality (SCRQ) would have a significant positive effect on supply chain agility (SCA). The quantitative analysis provides strong evidence in support of Hypothesis H10 (β=0.439; *t*=10.164). The result of this hypothesis testing is also consistent with the findings of the field study in which the role of SCRQ in achieving SCA was confirmed. The evidence in the literature also supports the role of various attributes of SCRQ for SCA on its different dimensions (Khan & Pillania, 2008; Fynes et al., 2004; Handfielda & Bechtel, 2002; Fynes et al., 2008). As mobilizing and obtaining the required resource competencies for responding to market changes and exploiting new opportunities are challenging (Yusuf et al., 2004), firms need to rely on their supply chain partners for the required competencies. In such a context, the role of SCRQ becomes critical in acquiring agile capability.

This study suggests that SCRQ plays an important role in improving SCA. In other words, in quality partnerships with high relationship quality, supply chain partners are expected to share sensitive information, collaborate on long-term demand forecast and opportunity detection, engage in a significant number of joint planning activities, and be able to leverage a partner's complementary competencies, enhance process integration, and show more willingness to adapt to unanticipated changes. The empirical results of this study suggest that firms that are keen to improve agile capability should work towards improving supply chain relationship quality which will allow them to deal with market uncertainty more effectively through coordinated joint activities. Thus, it is necessary that members of a supply

chain carefully develop a sharing process that increases satisfaction with the collaboration, a sense of fairness in the outcomes, and willingness for continued collaboration (Jap, 2001).

7.2.3.6 Supply Chain Agility and Competitive Advantage (Hypothesis H11a)

This study proposed Hypothesis H11a in order to investigate the effect of supply chain agility (SCA) on a firm's competitive advantage. The findings in this study show that there is a significantly positive effect of SCA on competitive advantage (β=0.777, t=16.704). This finding empirically confirms the assertion in the literature (e.g., Yusuf et al., 2014; Li et al., 2008) that supply chain agility could provide a firm with competitive advantage in dimensions such as price or cost, quality, delivery reliability, product customization and innovation, and product development time. The results are in congruence with the findings in the field study, where the participants emphasized agile capabilities in the supply chain, such as demand response, flexibility, integration, and customer responsiveness, to adapt or quickly respond to uncertainty and changes in market conditions.

The need to quickly react to market changes is paramount for apparel manufacturing firms. Apparel supply chains are typically complex due to their length and involvement with a large number of parties, diversified demand, and the volatile nature of the market environment (Bruce et al., 2004; Lee & Kincade, 2003; Cao, 2006). Strong dependence on foreign suppliers, increased global competition, lack of infrastructure, limited capacity, and lack of understanding and integration have challenged the Bangladeshi apparel manufacturers in retaining and increasing their position in the global market. In the face of these challenges, firms need to improve agility across the supply chain for success in a dynamic and volatile market. It is important to realize that competition in today's environment is amongst supply chains rather than amongst individual firms, and thus, to outperform less agile competitors, firms need to reconfigure internal resources and leverage external competencies through supply chain integration, improved visibility, and resource coalition. In this study, it has been observed that competitive advantage in the apparel industry is predicted by the combined capacity for demand response, flexibility, integration, and customer responsiveness. These abilities are interrelated and complementary. Demand response capability will improve the accuracy of information on demand and opportunity, which in turn, will facilitate the process of developing an effective demand response strategy. Flexibility will enhance a firm's ability to handle demand changes without excessive cost, any disruptions or loss of performance (Aggarwal, 1997). Through improved connectedness and coordination, integration will improve the ability to provide maximum customer value at

greater speed. Customer responsiveness will improve the speed and adequacy of response to changing customer requirements. In short, the findings of this study suggest that these dynamic capabilities will enable apparel manufacturing firms to rapidly and effectively address marketplace changes and uncertainty, and thereby, secure and sustain competitive advantage.

7.2.3.7 Supply Chain Agility and Firm Performance (Hypothesis H11b)

The relationship between supply chain agility (SCA) and firm performance was found to be significant (β=0.181, *t*=1.763). This finding indicates that SCA has a significant positive impact on a number of measures related to firm performance such as market share, return on investment, sales growth, profit margin, productivity, and so on. The results are consistent with the argument made in the literature that the various capabilities within SCA are necessary for improving the business performance of the firms which operate in a market with continuous change and are part of a complex supply chain (e.g., Christopher et al., 2004; Gimenez et al., 2012; Peng et al., 2013). The findings corroborate the findings of the previous empirical research (e.g., Ralston et al., 2015; Kim, 2009; Yusuf et al., 2014; Qrunfleh & Tarafdar, 2013) that has shown that various dimensions of SCA will directly improve firm performance. However, the result is somewhat contradictory to the findings of Yang (2014) who did not find a significant direct effect of SCA on performance and reported a significant mediating effect of cost efficiency between manufacturer's SCA and performance. This suggests a need for consideration of potential mediating factors (e.g., competitive advantage) while examining the effect of SCA on firm performance.

The findings of the field study are also consistent with the results of the quantitative analysis, where the participants emphasized different capabilities of SCA, such as demand response, flexibility, integration, and customer responsiveness to improve a firm's operational, market and financial performance in the long term. The results imply that success in a dynamic business environment can be attained though a firm's agility in their supply chain. With these capabilities (demand response capability, flexibility to market changes, accomplished integration, and responsiveness to customer requirements), an apparel manufacturing firm will be able to respond effectively and quickly to the changing and diverge demands in the market, while minimizing the back-end risks of supply uncertainty. This will in turn benefit the firm in terms of improved performance, providing solid ground for its long-term survival as well as the short-term success of improved overall competitive position through increased efficiency and profitability.

7.2.3.8 Competitive Advantage and Firm Performance (Hypothesis H12)

The link between competitive advantage and firm performance was hypothesized in H12, which also received support from the results of the analysis (β=0.382, *t*=4.429). The results suggest that higher levels of competitive advantage will result in improved firm performance. The findings corroborate the results of the empirical study of Li et al. (2006) which has shown that competitive advantage has a direct impact on organizational performance. The results also illustrate that competitive advantage has a greater effect on firm performance (β=0.382, *t*=4.429), than SCM practice (β=0.243, *t*=3.686) and supply chain agility (β=0.181, *t*=1.763). This implies that SCM practice generates supply chain agility; and both SCM practice and supply chain agility produce competitive advantage for the firm in the first place; competitive advantage will then eventually result in better firm performance (Li et al., 2006).

A firm may gain competitive advantage in one or a combination of several competitive dimensions, including cost, quality, delivery, flexibility, customization and innovation, allowing them to provide superior value to their customers in comparison to their competitors. A competitive firm will have a short order cycle time, precise delivery of customer orders, greater order fill rates, and fast product development time. These factors will allow firms to achieve high levels of customer satisfaction, and, thereby, improve a firm's overall performance such as market share, return on investment, sales growth, profit margin, and overall competitive position.

7.2.4 Hypothesis Related to Mediation Effects

This study postulated two hypotheses related to the mediation effects of supply chain relationship quality (SCRQ) and supply chain agility (SCA). The mediating role of SCRQ in the association between SCM practice and SCA was explored through Hypothesis H13, and the mediating effect of SCA on the relationship between SCM practice and a firm's competitive advantage (CA) was proposed in Hypothesis H14. The results of these hypotheses tests are discussed below.

7.2.4.1 Mediation Effect of Supply Chain Relationship Quality (Hypothesis H13)

This study attempted to investigate the mediating role of supply chain relationship quality (SCRQ) in the relationship between SCM practice and supply chain agility (SCA). The results of this study support the mediating effect of SCRQ between SCM practice and SCA.

The results of the quantitative analysis showed that the direct effect of SCM practice on SCA was significantly reduced (from β = 0.767, *t*=33.516 to β=0.491, *t*=12.246) by the inclusion of SCRQ in the model as a mediator (Chapter Six, Figure 6.5a and 6.5b). As the relationship between SCM practice and SCA continued being significant, it could not be confirmed that SCRQ exercised complete mediation between the constructs. There was a significant decrease in the *t* statistic, however, from 33.516 to 12.246, and the variance explained (R^2) for SCA significantly increased from 0.588 to 0.705. Moreover, it was found that 35.9% of the total effect of SCM practice on SCA was explained by the indirect effect through SCRQ. The findings suggest that SCRQ introduces an indirect effect between SCM practice and SCA. This means that SCRQ is a partial mediator for the relationship between SCM practice and SCA, and thus Hypothesis H13 is supported.

The empirical findings of this study demonstrate to managers that SCM practice may not be sufficient to attain greater level of agility in the supply chain required in a highly dynamic marketplace environment. Rather, obtaining the desired level of agility from SCM practice will be fostered by the presence of high quality relationships with the supply chain members. SCRQ as a relational resource may further contribute to competitive performance improvement through the better exchange of knowledge, improved partner commitment, better coordination, and by minimizing the transaction costs related to costly monitoring mechanisms (Srinivasan et al., 2011). The analysis of the mediating effect of SCRQ highlights the fact that SCRQ plays a critical role in ensuring a firm's success in achieving SCA. Firms should therefore regularly assess their relationships with their supply chain partners and ensure that effective relationships are built and maintained by focusing on the satisfaction of supply chain members with collaboration efforts, perceived outcome fairness, and future expectations. In short, the continued practice of SCM, in conjunction with high SCRQ, creates a platform for firms to exploit opportunities and combat complacency and loss of dynamism in an uncertain and intensely competitive business environment.

7.2.4.2 Mediation Effect of Supply Chain Agility (Hypothesis H14)

The current study argued that supply chain agility (SCA) has a mediating effect on the impact of SCM practice on competitive advantage (CA). The results of the quantitative analysis showed that the direct effect of SCM practice on CA was significantly reduced (from β = 0.696, t=24.175 to β=0.098, t=2.010) by the inclusion of SCA in the model as a mediator (Chapter Six, Figure 6.6a and 6.6b). As the relationship between SCM practice and CA continued being significant, it could not be confirmed that SCA exercised complete

mediation between the constructs, however, there was a significant decrease in the *t* statistic from 24.175 to 2.010, and the variance explained (R^2) for CA significantly increased from 0.485 to 0.730. It was also found that more than three-fourths (85.9%) of the total effect of SCM practice on CA was explained by the indirect effect through *S*CA. Although theoretically, the results gave clear support for the partial mediation of SCA between these constructs, it appeared to be very close to full mediation. The findings of this study thus confirmed the mediating role of SCA between SCM practice and CA, and supported H14. This result is consistent with the evidence from the literature review where research in different settings recognized the mediating role of SCA or the different individual dimensions of SCA (Kim, 2009; Wu et al., 2006; Jin et al., 2013; Vickery et al., 2010).

The findings suggest that SCA is capable of transforming SCM practice into greater value for a firm. In other words, SCM practice cannot greatly improve the competitive advantage of a firm by itself unless it is complemented by SCA. This is one of the key insights of this study, as previous research linked SCM practice to competitive advantage directly (Li et al., 2006; Paulraj et al., 2012; Kim, 2006). The current study, on the other hand, empirically confirms the role of supply chain agility as a critical intervening variable leading to higher levels of competitive advantage for the apparel manufacturers of Bangladesh via SCM practice. This implies that the implementation and practice of SCM are not sufficient for securing and sustaining competitive advantage, but that there exists a mediator, SCA, which results from the dynamic capabilities of demand response, flexibility, integration, and customer responsiveness. The result offers an important implication for managers in the apparel manufacturing industry, suggesting that firms can gain greater competitive advantage only when they consider agile capability in their supply chains in conjunction with SCM practice. The improvement in SCA through SCM practice allows a firm to understand and react to market changes more effectively and rapidly than its competitors. Such capabilities provide safeguards against immediate competitive imitation, as they are generally developed over time and, thus, intensely embedded in organizational practices (Wu et al., 2006) which eventually result in sustained competitive advantage (Barney, 1991). Firms need to fully understand the dynamics of their market environment and develop the capability of effectively responding to market uncertainty and changes in order to achieve and sustain competitive advantage.

7.2.5 Result for Control Variable

Although small firms were not considered in this study, but the distribution of the responding firms shows that these firms still have some variation in size (see Table 6.2). Hence, this study examined the impact of one control variable, firm size, on the ultimate outcome constructs (i.e., firm performance) in the comprehensive research model. It was found that the impact of firm size was not significant (β=0.057, t=1.426). This indicates that firm size was not significantly associated with firm performance. The result is contrary to the idea reflected in the literature that larger firms are more likely to adopt sophisticated SCM practices and generate agile capability than smaller firms, as they possess the resources and competences necessary to integrate the practices effectively (Wu et al., 2006). One possible explanation for this contradiction in the result is that due to the nature of global competition and marketplace dynamics, apparel manufacturing firms, irrespective of size, need to implement and practice SCM for their success in improving overall competitive performance.

7.3 SUMMARY

This chapter has presented an interpretation of the results of the hypotheses tests undertaken. The results were discussed and compared with the existing literature and field study analysis. This chapter has discussed the effects of the antecedent factors of SCM implementation and practice by apparel manufacturing firms in Bangladesh. Although the findings did support the influence of supportive culture on SCM implementation, it was found have significant effect on SCM practice. In differentiating SCM practice from implementation, it was found that the practice of SCM depends on how well it is implemented. The results indicate that greater extents of SCM practice will lead to improved supply chain relationship quality, supply chain agility, competitive advantage and firm performance. The results also show that a firm's supply chain agility and competitive advantage are not only influenced directly by SCM practice, but also indirectly through supply chain relationship quality and supply chain agility respectively. The results also reveal that competitive advantage has a greater effect on firm performance than SCM practice and supply chain agility. Overall, the results imply that SCM practice is directly affected by its implementation, and improved firm performance is the result of enhanced competitive advantage achieved through SCM practice and supply chain agility. The next chapter (Chapter Eight) will conclude with a summary of the research, major contributions and limitations of the research, and comment on future research directions.

Chapter Eight

CONCLUSIONS AND FUTURE RESEARCH DIRECTIONS

8.1. INTRODUCTION

The purpose of the present research was to examine the implementation and practice of supply chain management (SCM), and the antecedents, and impacts of SCM practice in the apparel manufacturing industry of Bangladesh. The current final chapter provides the conclusions reached in this research. The next section presents a summary of the research and provides a brief description of the research objectives, methodology, analyses, results and interpretation of the findings. This chapter also highlights the major contributions of this research in terms of theoretical, methodological, and practical aspects. The limitations of the research are discussed, and finally, several recommendations for future research are detailed.

8.2 RESEARCH SUMMARY

In the face of numerous challenges and ever expanding competition, manufacturing firms are being forced to focus on the effective management of their supply chains as a means to achieving competitive advantage and improving overall firm performance. There is a growing realization today that firms should strive for more than effectiveness and efficiency in order to offer competitive net value to customers and remain competitive (Fugate et al., 2010). Maintaining profitability and increasing market presence have become a challenging endeavor for apparel manufacturing firms, specifically for those in Bangladesh. Despite the increased interest of academics and practitioners in SCM issues, there is little research about guiding firms in SCM practice to an extent that can enable them to realize the goal of securing competitive performance. This study therefore attempted to address this research gap and provide some new insights for academics and practitioners. The study first analyzed the literature in depth and identified the constructs needed to develop a theoretically grounded, comprehensive, yet parsimonious, initial research model. The model integrates the possible internal and external antecedent factors of SCM, and explains the process of implementation, practice, and the impact of SCM in a single framework.

A mixed method approach was employed for this research. Mixed method research combines qualitative and quantitative methods of data collection and in the analysis process.

The qualitative field study conducted in the first stage was intended to contextualize and enhance the initial research model. The data for this stage was collected using semi-structured interviews with supply chain executives from apparel manufacturing firms in Bangladesh. The data collected was analyzed via the content analysis technique. Subsequently, the initial research model was fine-tuned, based on the findings of the field study. This process resulted in the development of the comprehensive research model (Figure 4.2), with the incorporation of two new constructs: employee competency and firm performance, and the exclusion of a sub-construct of SCM (postponement) which was found less prevalent in the context of the current research. Justification for the inclusion of these two new constructs was based on the literature. Overall, the comprehensive model consisted of the dimensions of major constructs, and the structural relationships among the antecedents, SCM implementation and practice, outcomes which were confirmed through the field study. Hypotheses within the model were then developed (Figure 5.1).

In the second stage, the quantitative approach was employed to test these hypotheses. This stage involved the development of the questionnaire for the large scale survey. The questionnaire was developed based on past research and relevant literature, and the field study results (as described in Chapter Five). The questionnaire was pre-tested and slightly revised according to the feedback obtained from the pre-testing. Following the pilot study, a total of 296 valid responses were used for the quantitative data analysis by applying the partial least squares (PLS) based structural equation modelling (SEM) technique (Chapter 6). The PLS analysis was performed following a two-step procedure, involving the assessment of the measurement model and the structural model (hypotheses testing). Overall, the findings confirmed the significant constructs, sub-constructs and associated variables. The results of the hypotheses testing showed that, with one exception, all hypotheses were accepted (Table 6.17). The hypotheses suggesting the mediating effects were also supported. The following section provides the major contributions of this study.

8.3 RESEARCH CONTRIBUTIONS

8.3.1 Theoretical Contributions

Several theoretical contributions are made by this research. It provides empirical justification for a framework that identifies several antecedents of SCM implementation and practice, key dimensions of SCM and supply chain agility, and describes the relationships

among the antecedents, SCM implementation, SCM practice, supply chain relationship quality, supply chain agility, competitive advantage, and firm performance.

One of the significant contributions of this study was examining SCM implementation from the diffusion of innovation theory perspective. While existing SCM literature does not clearly differentiate between SCM implementation and practice, this research clearly demonstrates that the practice of SCM depends on how well it is implemented. The study has empirically established that the diffusion of SCM practices within organizations must go through stages of implementation and practice, and improvement in SCM practice is directly affected by its implementation. As there is a need for a better understanding of what drives the sound practice of SCM, this study provides an answer by exploring the major antecedents of SCM practice. This study has shown that SCM practices and policies must be effectively implemented in the first place in order to be effectively practiced.

This research extends our understanding of the different factors that can influence the implementation of SCM in addition to the factors previously suggested by Chen and Paulraj (2004). This study reveals a number of external forces and internal conditions that influence SCM implementation, such as innovative culture, supportive culture, environmental uncertainty, customer focus, networking, and inter-firm trust and commitment, while quantitative analysis provides empirical support for all of these antecedents except a supportive culture. Again, the qualitative field study exposed two factors influencing SCM practice in addition to SCM implementation, namely, supportive culture and employee competency, which were then confirmed by the quantitative analysis, providing significant evidence to support their antecedent role in enhancing SCM practice in the apparel manufacturing firms of Bangladesh. This study concludes that a supportive culture is more related to the practice or diffusion of an innovation and it may not have a direct impact on the strategic decision to implement SCM which is more related to top management and external factors. Although organizational culture is often identified as a key factor in inter-organizational collaboration and innovation adoption (e.g., Boddy et al., 2000; Baird et al., 2011; Liao et al., 2013; Liu et al., 2010), research examining the association of various dimensions of organizational culture with SCM implementation and practice is still sparse. This study has empirically confirmed the influence of innovative and supportive culture on SCM implementation and SCM practice respectively. The antecedent role of most of these factors has not been empirically tested before, thus, this study contributes significantly to the existing literature. For example, this study found a positive relationship between networking

and the implementation of SCM practices. In SCM implementation, the incorporation of a focus on inter-organizational learning and knowledge sharing into organizational resources contributes to the resource-based view (RBV) literature (Sarkis, Zhu, & Lai, 2011).

The empirical results of this study provide a clear idea about a comprehensive, yet parsimonious set of SCM dimensions that positively influence a firm's supply chain relationship quality, supply chain agility, competitive advantage, and firm performance. This will lessen the conceptual ambiguity and inconsistency in the literature concerning the question of what constitutes a comprehensive set of practices in SCM for a manufacturing firm. The validated and reliable measurements of SCM practices provided by the present study will help supply chain managers to assess the comprehensiveness, as well as the extent, of SCM implementation and practice in their firms. This study also enriches the SCM literature as there are only a few empirical studies that have taken the entirety of the supply chain into consideration, combining the upstream and downstream sides of the supply chain together with internal processes, and testing them simultaneously.

The present study has confirmed that supply chain agility forms a second-order construct, comprising an integrative set of first-order constructs, namely, demand response, flexibility, integration, and customer responsiveness. The results of this study highlight the critical role of supply chain relationship quality in facilitating supply chain agility. This study also provides empirical evidence for the argument made in the literature that supply chain relationship quality is improved with the extent and scope of SCM practice. The study also confirms the mediating role of supply chain relationship quality in the relationship between SCM practice and supply chain agility. This extends the RBV through the incorporation of intangible relational resource as mediator between organizational practices and their outcomes.

This study confirmed the effect of SCM practice and supply chain agility on the competitive advantage of firms, which in turn affects the overall operational, market and financial performance of apparel manufacturers. The findings of this research indicate that well-practiced SCM will lead to enhanced supply chain agility, enabling firms to respond quickly to market changes and uncertainty through the reconfiguration and leveraging of the resources and competencies across the supply chain. This study also finds that supply chain agility exerts a mediating effect between SCM practice and a firm's competitive advantage, as grounded in the resource-based view.

8.3.2 Methodological Contributions

One of the important contributions of this research centers on the method that has been adopted. As opposed to most research in SCM, which uses a mono-method approach, this research utilized a mixed method approach. The reasons for employing a mixed method in this study involve a number of considerations, such as that the supply chain phenomena is perceived to be an 'ill-structured, messy' problem (Naslund, 2002), the surrounding business environment increasingly complex (Golicic et al., 2005), and SCM research in the context of apparel manufacturing, particularly in Bangladesh is scant. Use of the mix-method approach is often suggested in operations and SCM research (Golicic et al., 2005; Naslund, 2002; Soni & Kodali, 2012; Giunipero et al., 2008), however, few studies have employed multiple research designs (Soni & Kodali, 2012), and a mono-method using qualitative research (Golicic et al., 2005). Most of the research in SCM has been carried out from the perspectives of developed countries (Soni & Kodali, 2012). In this study, the qualitative field study explored the constructs, variables, and relationships among the constructs, and verified them with those that were used in the initial research model. In the second phase, the quantitative analysis validated the proposed comprehensive research model. Using mixed methods to refine and contextualize the initial model in the field study thus provided valuable information on the accuracy of the comprehensive research model. For example, two additional constructs, 'employee competency' as a relevant factor facilitating SCM practice, and 'firm performance' as an ultimate measure of the impacts of SCM practice, emerged from the field study. As a consequence, both factors were added to the comprehensive research model. Conducting a qualitative field study as the first phase of the mixed-method research has made significant contributions in regard to developing a contextualized comprehensive research model by exploring the relevant constructs and their measurement items as well as the causal links among the constructs. Given the dynamic and complex nature of SCM phenomena, this research suggests the use of mixed methodology in future research, specifically in contexts where sufficient work has not yet been done. This combination of methods helps to improve the accuracy of research models and specify the functional relationship between constructs with greater understanding.

8.3.3 Practical Contributions

The current research has several important implications from practical perspectives. First of all, the results of this study erase the doubts surrounding the potential benefits of the effective implementation and sound practice of SCM. The findings of this research confirm

the importance of SCM as an effective means to achieving competitive advantage, and suggest that the sound practice of SCM has a strong effect on competitive advantage through supply chain agility.

From a managerial standpoint, it is essential to understand the factors that drive SCM implementation, so as to secure competitive advantage in a dynamic business environment. A number of internal and external factors such as innovative culture, environmental uncertainty, customer focus, inter-firm trust and commitment, and networking appear to be significant antecedents for SCM implementation according to this study. The findings of this study call for the attention of firms to be turned to the importance of an innovative culture, as it promotes the values that enhance adaptability and nurture internal capabilities to adopt new management approaches, practices, and strategic changes in order to successfully survive in a dynamic environment. The current study also suggests that the management of apparel manufacturing firms in Bangladesh should promote a culture of networking among their organizational members to strategically leverage external knowledge and facilitate the implementation of innovative practices.

The findings of this study provide valuable insights into the factors that affect a firm's success in SCM practice. The study revealed that improvement in SCM practice is directly affected by the implementation of a set of integrative SCM practices and policies. As shown in Chapter Six (Table 6.5), there is a significant difference between the levels of SCM implementation and practice in the surveyed firms, which implies that the implemented practices were not fully practiced/executed in these firms. As firms seek to understand how to improve the level of SCM practice, the results of this study provide an answer to this question, which emphasizes the proper implementation of various SCM practices. Without proper implementation, they may not be effectively executed and may fail to help firms achieve their goals. The study also highlights the need to undertake several further steps in enhancing SCM practice after formal implementation. It suggests that management must be aware of the association between supportive culture and SCM practice, and attempt to establish an organizational atmosphere that facilitates the sound practice of SCM. The study also suggests that firms need to undertake the necessary steps to develop employee understanding and ability through training and education in order to ensure the effective SCM practice. In short, this research assists decision makers in apparel manufacturing firms to formulate appropriate strategies in implementing SCM.

The current study recognizes the critical role of supply chain relationship quality. The empirical findings indicate that the continued practice of SCM may not be sufficient to

achieve the greater levels of agility in the supply chain that are required in a highly dynamic marketplace environment. Instead, obtaining the desired level of agility from SCM practice will be fostered by the presence of high quality relationships among the supply chain members.

For supply chain practitioners, the findings of this study confirm that firms benefit greatly if they consider building agility into their supply chain in conjunction with SCM practice, and that such a match yields improved competitive advantage and firm performance.

As apparel manufacturers in Bangladesh face numerous internal problems and external challenges in effectively managing their supply chains, this study strongly emphasizes the effective implementation and practice of SCM to improve overall supply chain competitiveness. This study also provides supply chain managers with valuable instruments for comprehensively assessing their current status in SCM implementation and practice, as well as the level of supply chain agility. This can also be used for better understanding of the various complementary agile capabilities required for success in today's marketplace environment.

8.4 LIMITATIONS

Even though this research makes several theoretical, methodological and practical contributions, there are some limitations that need to be considered when interpreting the findings of this study.

First, this research relies on cross-sectional data. One key issue with a cross-sectional research design in this research is that the investigation of the SCM phenomenon is limited to a point-in-time assessment. This limits the extent to which cause-effect relationships can be inferred (Fugate et al., 2010). Future research can address this limitation through the collection of longitudinal data.

Second, this research has been conducted within a specific industry, the apparel manufacturing industry of Bangladesh. The industry- and country-specific conditions could limit the generalizability of the results to other industry contexts, and even the same industry in different countries.

Third, the unit of analysis in this study is apparel manufacturing firms. This study examined SCM practices from the viewpoint of manufacturing firms (the focal firm in a supply chain) and did not consider collection of data from other important members of the

apparel supply chain, such as suppliers, buyers etc. A better approach would have been to collect data from buyers, manufacturers, and suppliers.

Fourth, this study was conducted at firm level, with one person from each organization responding to the survey. A single respondent (merchandizing, purchasing, operations, sales, distribution, supply chain executives, and high level corporate executives) was asked questions about complex SCM issues dealing with all the participants along the supply chain, including downstream customers to upstream suppliers. Although the respondents were carefully chosen with the expectation that they would be knowledgeable in the areas of the survey, whether these respondents had adequate knowledge about the entire supply chain was not actually measured. This may have generated some measurement error.

Fifth, the proposed relationships in the research model may be influenced by contextual factors such as the nature of ownership of the firm, product categories (i.e., fashion wear vs. basic wear) etc., however, this study did not consider these factors as control variables.

8.5 RECOMMENDATIONS FOR FUTURE RESEARCH

The findings, limitations and implications of the current study lead to a number of opportunities for future research.

First, to address the methodological limitations of cross-sectional research design, a longitudinal approach to this study is suggested in future research. The actual impact of SCM implementation and practice in an organization could take a long time to be seen, and thus, future research can examine the relationships among SCM practice, supply chain agility, competitive advantage, and firm performance over time.

Second, this research was conducted in a specific industry, the apparel manufacturing industry of Bangladesh. Future research can extend or replicate the study for other similar industries or in different countries. In brief, cross-industry or cross-country research may increase the applicability of the research model. Comparison of the results from different contexts would be both interesting and useful for a better understanding of the adoption of SCM and its impact on supply chain agility and a firm's sustainable competitive advantage.

Third, to overcome the limitations of using single respondents from each organization to complete survey questions, future research may consider use of multiple

respondents in each participating organization so as to improve the reliability of the research findings. Future research may also consider collection of data from all other important members of the supply chain, along with manufacturers.

Fourth, future research could examine the proposed relationships by considering contextual factors such as the nature of a firm's ownership and product categories (i.e., fashion wear or basic wear) into the model as possible control variables. For example, it would be interesting to examine how SCM practice differs on the basis of product category.

Fifth, this study separates SCM practice from its implementation, and posits that SCM practice depends on how well it is implemented. This study further identifies two other factors, supporting culture and employee competency, that facilitate SCM practice after formal implementation. Future research could explore other factors that may influence SCM practice. Future research may also explore and consider additional dimensions of SCM and supply chain agility relevant to specific research context. The moderating role of supply chain relationship quality, employee competency, networking, and environmental uncertainty in the relationship between SCM implementation and practice is also worth investigating.

REFERENCES

Adebayo, A. (2007). An Investigation into the Use of Work Study Techniques in Nigerian Manufacturing Organizations. *Research Journal of Applied Sciences*, *2*(6), 752-758.

Abraham, D. M. & Leon, L. (2006). Knowledge management in supply chain networks. *Encyclopedia of Communities of Practice in Information and Knowledge Management*, edited by Coakes, E. and Clarke, S., Idea Group Preference, 293-300.

Agarwal, A., Shankar, R., & Tiwari, M. K. (2007). Modeling agility of supply chain. *Industrial Marketing Management, 36*(4), 443-457.

Aggarwal, S. (1997). Flexibility management: the ultimate strategy. *INDUSTRIAL MANAGEMENT-CHICAGO THEN ATLANTA-*, *39*, 26-31.

Ahire, S. L. & Ravichandran, T. (2001). An innovation diffusion model of TQM implementation. *IEEE Transactions on Engineering Management, 48*(4), 445-464.

Ahmed, N. (2009). Sustaining ready-made garment exports from Bangladesh. *Journal of Contemporary Asia*, *39*(4), 597-618.

Ahuja, G. (2000). The duality of collaboration: inducements and opportunities in the formation of interfirm linkages. *Strategic Management Journal, 2* (3), 317–343.

Aitken, J. M. (1998). *Supply chain integration within the context of a supplier association: case studies of four supplier associations* (Doctoral dissertation, Cranfield University).

Allen, J., James, A. D., & Gamlen, P. (2007). Formal versus informal knowledge networks in R&D: a case study using social network analysis. *R&D Management*, *37*(3), 179-196.

Alreach, P. L. and Settle, R. B. (1995). *The Survey Research Handbook*, 2nd edition, Irwin, Illinois, USA.

Amit, R., & Schoemaker, P. J. (1993). Strategic assets and organizational rent. *Strategic Management Journal*, *14*(1), 33-46.

Anderson, James C., & Narus, J. A. (1990). A model of distributor firm and manufacturer firm working partnerships. *The Journal of Marketing*, 42-58.

Andreev, P., Maoz, T., Heart, T. & Pliskin, N. (2009). Validating formative Partial Least Square (PLS) models: Methodological review and empirical illustration. *International Conference on Information Systems,* December 15 -18, 2009, Arizona.

Andrew, J. S. & Clements, M. D. J. (2006). Ever consider a supply chain as a "community of practice"? Embracing a learning perspective to build supply chain integration. *Development and Learning in Organizations, 20*(5), 6 - 8

Applegate, L. M. & Gogan, J. L. (1996). Electronic commerce: Building blocks of new business opportunity. *Journal of Organizational Computing and Electronic Commerce, 6*(1), 1-10.

Armstrong, S. J. & Overton, T. S. (1977). Estimating nonresponse bias in mail survey. *Journal of Marketing Research, 14*(3), 396-402.

Arnett, D. B., Laverie, D. A. & Meiers, A. (2003). Developing parsimonious retailer equity indexes using partial least squares analysis: a method and applications. *Journal of Retailing, 79*(3), 161–170.

Auh, S., & Menguc, B. (2006). Diversity at the executive suite: A resource-based approach to the customer orientation–organizational performance relationship. *Journal of Business Research*, *59*(5), 564-572.

Aurier, P., & N'Goala, G. (2010). The differing and mediating roles of trust and relationship commitment in service relationship maintenance and development. *Journal of the Academy of Marketing Science*, *38*(3), 303-325.

Azam, M. S. (2014). *Diffusion of ICT and SME Performance: the mediating effects of integration and utilization*. PhD thesis, Graduate School of Business, University of Curtain, Australia.

Baird, K., Jia Hu, K., & Reeve, R. (2011). The relationships between organizational culture, total quality management practices and operational performance. *International Journal of Operations & Production Management*,*31*(7), 789-814.

Baker, J. (1996). Agility and flexibility: what's the difference. *The Cranfield School of Management Working Papers Series*. Cranfield University, UK.

Ballou, R. H., Gilbert, S. M. and Mukherjee, A. (2000). New managerial challenges from supply chain opportunities. *Industrial Marketing Management, 29*, 7–18.

Balsmeier, P. W. and Voisin, W. (1996). Supply chain management: a time-based strategy. *Industrial Management, 38*(5), 24-27

Bamford, J.D., Gomes-Casseres, B. and Robinson, M.S. (2003), Mastering Alliance Structure: A Comprehensive Guide to Design, Measure, and Organization, Jossey-Bass, San Francisco, CA.

Bangladesh Garment Manufacturers & Exporters Association (BGMEA). (2016). Members list. Retrieved on November 12, 2016, from http://www.bgmea.com.bd/member/memberlist/

Bangladesh Garment Manufacturers and Exporters Association (BGMEA). (2013). *Bangladesh Apparel and Textiles Exposition 2013*.

Banomyong, R. (2010). *Supply Chain Dynamics in Asia*. ADBI Working Paper 184. Tokyo: Asian Development Bank Institute.

Baramichai, M., Zimmers, E. and Marangos, C. A. (2007). Agile supply chain transformation matrix: an integrated tool for creating an agile enterprise. *Supply Chain Management: An International Journal. 12*(5), 334-348

Barringer, B.R., Harrison, J.S. (2000). Walking a tightrope: creating value through interorganizational relationships. *Journal of Management, 26*(3), 367–403.

Barclay, D., Higgins, C. and Thompson, R. (1995). Partial least squares approach to causal modeling: personal computer adoption and use as an illustration. *Technology Studies*, *2*(2), 285-324.

Barclay, D. W. (1991). Interdepartmental conflict in organizational buying: The impact of the organizational context. *Journal of Marketing Research, 28*(2), 145–159.

Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management. 17*(1), 99–120.

Barney, J. B. (1986). Organizational culture: can it be a source of sustained competitive advantage? *Academy of management review*, *11*(3), 656-665.

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: conceptual, strategic and statistical considerations. *Journal of Personality and Social Psychology, 51*(6), 1173–1182.

Barrat, M. (2004). Understanding the meaning of collaboration in the supply chain. *Supply Chain Management: An International Journal, 9* (1), 30-42.

Barratt, M., & Oke, A., (2007). Antecedents of supply chain visibility in retail supply chains: a resource-based theory perspective. *Journal of Operations Management, 25*, 1217–1233.

Basnet, C., Corner, J., Wisner, J., & Tan, K. C. (2003). Benchmarking supply chain management practice in New Zealand. *Supply Chain Management: An International Journal*, *8*(1), 57-64.

Beamon, B. M. (1999). Measuring supply chain performance. *International Journal of Operations & Production Management*, *19*(3), 275-292.

Becker, J., Klein, K. and Wetzels, M. (2012). Hierarchical Latent Variable Models in PLS-SEM: guidelines for using Reflective-Formative Type Models. *Long Range Planning, 45*, 359-394.

Benbasat, I., Goldstein, D. K., & Mead, M. (1987). The case research strategy in studies of information systems. *MIS quarterly*, 369-386.

Benitez-Amado, J., Llorens-Montes, F. J., and Nieves Perez-Arostegui, M. (2010). Information technology-enabled intrapreneurship culture and firm performance. *Industrial Management & Data Systems*, *110*(4), 550-566.

Berg, A., Hedrich, S., Kempf, S., & Tochtermann, T. (2011). Bangladesh's ready-made garments landscape: The challenge of growth. *McKinsey & Company, Inc. Apparel, Fashion & Luxury Practice*, 1-24.

Bernardes, E. S., & Hanna, M. D. (2009). A theoretical review of flexibility, agility and responsiveness in the operations management literature: Toward a conceptual definition of customer responsiveness. *International Journal of Operations & Production Management, 29*(1), 30-53.

Bernhardt, T. (2014). Economic and social upgrading of developing countries in the global apparel sector: insights from using a parsimonious measurement approach. In Towards Better Work (pp. 40-67). Palgrave Macmillan UK.

Beugelsdijk, S., Koen, C. I., and Noorderhaven, N. G. (2006). Organizational culture and relationship skills. *Organization Studies*, *27*(6), 833-854.

Bharadwaj, N., Nevin, J. R., & Wallman, J. P. (2012). Explicating hearing the voice of the customer as a manifestation of customer focus and assessing its consequences. *Journal of Product Innovation Management*, *29*(6), 1012-1030.

Bhamra, T., Heeley, J., & Tyler, D. (1998). A cross-sectional approach to new product development. *The Design Journal*, *1*(3), 2-15.

BGMEA (Bangladesh Garment Manufacturers & Exporters Association) website. (2016). Available at http://www.bgmea.com.bd/home/pages/TradeInformation, URL accessed on September 16, 2016.

Boddy, D., Macbeth, D. and Wagner, B. (2000). Implementing collaboration between organizations: an empirical study of supply chain partnering. *Jouranl of Management Studies, 37*(7), 1003-1017

BOI (Board of Investement). (2011). *Investing in Bangladesh: Handbook & Guidelines*. Board of Investment, Prime Minister's Office, Government of the People's Republic of Bangladesh.

Bollen, K. A. (1989). *Structural Equations with Latent Variables*, John Wiley, New York.

Bontis, N. (1998). Intellectual capital: an exploratory study that develops measures and models. *Management Decision, 36(2), 63-76.*

Borys, B. and Jemison, D.B. (1989). Hybrid arrangements as strategic alliance: theoretical issues in organizational combination. *Academy of Management Review, 14*, 234–249.

Bowersox, D. J., Closs, D. J., & Stank, T. P. (2000). Ten mega trends that will revolutionize supply chain logistics. *Journal of Business Logistics,* 21(2), 1-16.

Braun, P. (2002). Digital knowledge networks: Linking communities of practice with innovation. *Journal of Business Strategies,* 19(1), 43-53.

Braunscheidel, M. J., Suresh, N. C. and Boisnier, A. D, (2010). Investigating the impact of organizational culture on supply chain integration. *Human Resource Management, 49*(5) 883 – 911.

Braunscheidel, M. and Suresh, N. (2009). The organizational antecedents of a firm's supply chain agility for risk mitigation and response. *Journal of Operations Management, 27*, 119-140.

Bruce, M., Daly, L. and Towers, N. (2004). Lean or agile: a solution for supply chain management in the textiles and clothing industry? *International Journal of Operations & Production Management*, 24(1/2), 151-170.

Burgess, K., Singh, P. J., and Koroglu, R. (2006). Supply chain management: a structured literature review and implications for future research. *International Journal of Operations & Production Management, 26*(7), 703-729.

Burt, R. S. (1997). The contingent value of social capital. *Administrative science quarterly*, 339-365.

Buvik, A., & Grønhaug, K. (2000). Inter-firm dependence, environmental uncertainty and vertical co-ordination in industrial buyer–seller relationships. *Omega*, *28*(4), 445-454.

Campbell, A. J. and Cooper, R. G. (1999). Do customer partnerships improve new product success rates? *Industrial Marketing Management*, *28*(5), 507-519.

Cao, M. & Zhang, Q. (2011). Supply chain collaboration: Impact on collaborative advantage and firm performance. *Journal of Operations Management, 29*, 163–180.

Candace, Y. Yi., Ngai, E.W.T., & Moon, K-L. (2011). Supply chain flexibility in an uncertain environment: exploratory findings from five case studies. *Supply Chain Management: An International Journal, 16*(4), 271 - 283

Cardy, R. L., & Selvarajan, T. T. (2006). Competencies: Alternative frameworks for competitive advantage. *Business Horizons*, *49*(3), 235-245.

Carmen, C., & María José, G. (2008). The role of technological and organizational innovation in the relation between market orientation and performance in cultural organizations. *European Journal of Innovation Management*, *11*(3), 413-434.

Carnegie, R., Butlin, M., Barrat, P., Turnbull, A. & Webber, I. (1993). Managing the Innovating Enterprise: Australian Companies Competing with the World's Best, Business Council of Australia, Melbourne.

Carson, D., Gilmore, A. and Maclaran, P. (1998). Customer or profit focus: an alternative perspective. *Journal of Marketing Practice: Applied Marketing Science, 4,* (1), 26–39.

Cavana, R., Delahaye, B.L. and Sekaran, U. (2001). *Applied Business Research: Qualitative and Quantitative Methods*, John Wiley and Sons, Milton, Queensland, Australia.

Chai, K. H., Yap, C. M., & Wang, X. (2011). Network closure's impact on firms' competitive advantage: The mediating roles of knowledge processes. *Journal of Engineering and Technology Management*, *28*(1), 2-22.

Chan, F. T., & Chan, H. K. (2010). An AHP model for selection of suppliers in the fast changing fashion market. *The International Journal of Advanced Manufacturing Technology*, *51*(9-12), 1195-1207.

Chan, F. T., & Chong, A. Y. L. (2013). Determinants of mobile supply chain management system diffusion: a structural equation analysis of manufacturing firms. *International Journal of Production Research*, *51*(4), 1196-1213.

Chan, Y. E., Sabherwal, R., & Thatcher, J. B. (2006). Antecedents and outcomes of strategic IS alignment: an empirical investigation. *Engineering Management, IEEE Transactions on*, *53*(1), 27-47.

Chavez, R., Fynes, B., Gimenez, C. and Wiengarten, F. (2012). Assessing the effect of industry clockspeed on the supply chain management practice-performance relationship. *Supply Chain Management: An International Journal, 17*(3), 235 – 248.

Charles, A., Lauras, M., & Van Wassenhove, L. (2010). A model to define and assess the agility of supply chains: building on humanitarian experience. *International Journal of Physical Distribution & Logistics Management, 40*(8/9), 722-74

Chen, I. J. and Paulraj, A. (2004). Towards a theory of supply chain management: the constructs and measurements. *Journal of Operations Management, 22*, 119–150

Chen, I. J. and Paulraj, A. (2007). Environmental uncertainty and strategic supply management: a resource dependence perspective and performance implications. *The Journal of Supply Chain Management: A Global Review of Purchasing and Supply, 43*(3), 29-42.

Chenhall, R. H., Kallunki, J. P., & Silvola, H. (2011). Exploring the relationships between strategy, innovation, and management control systems: the roles of social networking, organic innovative culture, and formal controls. *Journal of Management Accounting Research*, *23*(1), 99-128.

Chiang, C. Y., Kocabasoglu-Hillmer, C., & Suresh, N. (2012). An empirical investigation of the impact of strategic sourcing and flexibility on firm's supply chain agility. *International Journal of Operations & Production Management*, *32*(1), 49-78.

Chin, K. S., Rao Tummala, V. M., Leung, J. P., & Tang, X. (2004). A study on supply chain management practices: The Hong Kong manufacturing perspective. *International Journal of Physical Distribution & Logistics Management*, *34*(6), 505-524.

Chin, W. W. (2010). How to write up and report PLS analyses. In *Handbook of Partial Least Squares: Concepts, Methods and Application*. Vinzi, V. E.; Chin, W. W.; Henseler, J.; Wang, H. (Eds.), Springer, Germany, 645-689.

Chin, W. W. (1998a), 'The Partial Least Squares Approach to Structural Equation Modeling', in G. A. Marcoulides (eds.) *Modern Methods for Business Research*, Lawrence Erlbaum Associates Inc., New Jersey, pp. 295-336.

Chin, W.W. (1998b). Issues and opinion on structural equation modeling. *MIS Quarterly, 22*(1).

Chin, W. W., Marcolin, B. L. and Newsted, P.N. (2003) A partial least squares approach for measuring interaction effects: results from a Monte Carlo simulation study and an electronic mail emotion/adoption study. *Information Systems Research, 14* (2), 189-217.

Chin, W. W. and Newsted, P. R. (1999). Structural equation modeling analysis with small samples using partial least squares, in R. H. Hoyle (ed.), *Statistical Strategies for Small Sample Research*. Sage Publications; California, pp. 307-41.

Chopra, S. & Meindl, P. (2010). *Supply Chain Management: Strategy, Planning & Operation*. Fourth Edition, Pearson Prentice Hall.

Chow, W. S., Madu, C. N., Kuei, C. H., Lu, M. H., Lin, C. and Tseng, H. (2008). Supply chain management in the US and Taiwan: an empirical study. *Omega, 36*(5), 665-679.

Chowdhury, M. M. H., & Quaddus, M. A. (2015). A multiple objective optimization based QFD approach for efficient resilient strategies to mitigate supply chain vulnerabilities: The case of garment industry of Bangladesh. *Omega*, *57*, 5-21.

Christopher, M. (2000). The agile supply chain: competing in volatile markets. *Industrial Marketing Management*, *29*(1), 37-44.

Christopher, M., Lowson, R., & Peck, H. (2004). Creating agile supply chains in the fashion industry. *International Journal of Retail & Distribution Management*, *32*(8), 367-376.

Christopher, M. (2011). *Logistics and supply chain management*. Fourth Edition, Financial Times Prentice Hall-Pearson.

Christopher, M., Lowson, R., & Peck, H. (2004). Creating agile supply chains in the fashion industry. *International Journal of Retail & Distribution Management*,*32*(8), 367-376.

Christopher, M., & Towill, D. (2000). Supply chain migration from lean and functional to agile and customised. *Supply Chain Management: An International Journal, 5*(4), 206-13.

Chuah, P., Wong, W. P., Ramayah, T. and Jantan, M. (2010). Organizational context, supplier management practices and supplier performance: a case study of a multinational company in Malaysia. *Journal of Enterprise Information Management, 23*(6), 724-758.

Cigolini, R., Cozzi, M., & Perona, M. (2004). A new framework for supply chain management: conceptual model and empirical test. *International Journal of Operations & Production Management*, *24*(1), 7-41.

Clark, T. H. and Lee, H. G. (2000). Performance, interdependence and coordination in business-to- electronic commerce and supply chain management. *Information Technology and Management, 1*, 85-105.

Clark, T., Varadarajan, P. R., & Pride, W. M. (1994). Environmental management: The construct and research propositions. *Journal of Business Research*, *29*(1), 23-38.

Cohen, J. (1992). Statistical power analysis. *Current directions in psychological science*, *1*(3), 98-101.

Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences* (2nd Ed.), L. Erlbaum Associates, Hillsdale, NJ.

Cohen, W. M., & Levinthal, D. A. (1990). Absorptive capacity: a new perspective on learning and innovation. *Administrative science quarterly*, 128-152.

Collier, D. A., & Evans, J. R. (2014). *Operations Management*. Cengage Learning.

Collis, J. and Hussey, R. (2009). *Business Research: A Practical Guide for Undergraduate and Postgraduate Students*. Basingstoke, Hampshire, UK: Palgrave MacMillan.

Cooper, M. C., Lambert, D. M., and Pagh, J. D. (1997). Supply chain management: more than a new name for logistics. *The International Journal of Logistics Management*, *8*(1), 1-14.

Cooper, R. B., and Zmud, R. W. (1990). Information technology implementation research: a technological diffusion approach. *Management Science, 36*(2), 123–139.

Coltman, T., Devinney, T. M., Midgley, D. F. and Venaik, S. (2008). Formative versus reflective measurement models: two applications of formative measurement. *Journal of Business Research, 61,* 1250–1262.

Council of Logistics Management. (2000). *What it's all about*. Oak Brook: CLM, 2000.

Cousins, P. D., Lawson, B. and Squire, B. (2006). Supply chain management: theory and practice-the emergence of an academic discipline? *International Journal of Operations & Production Management, 26*(7), 697-702

Cousins, P. D., & Menguc, B. (2006). The implications of socialization and integration in supply chain management. *Journal of Operations Management*, *24*(5), 604-620.

Creswell, J. W. (1994). *Research Design: Quantitative and Qualitative Approaches*. Thousand Oaks, California, USA: Sage Publications, Inc.

Creswell, J. W. (2009). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*: SAGE Publications, Incorporated.

Creswell, J. W., and Clark, V. L. P. (2011). *Designing and Conducting Mixed Methods Research*. 2nd ed. Thousand Oaks, California: SAGE Publications Ltd.

Croom, S., Romano, P., and Giannakis M. (2000). Supply chain management: an analytical framework for critical literature review. *European Journal of Purchasing and Supply Management*, 6(1), 67–83.

Crute, V., Wickham, A., Johns, R., & Graves, A. (2008). Exploring Competitive Advantage through Lean Implementation in the Aerospace Supply Chain. In *Lean Business Systems and Beyond* (pp. 357-364). Springer, US.

Cullen, J. B., Johnson, J. L., & Sakano, T. (2000). Success through commitment and trust: The soft side of strategic alliance management. *Journal of World Business*, *35*(3), 223-240.

Daft, R.L., (2004). *Organization Theory and Design*. South Western College Publishing, Cincinnati.

Danese, P., Romano, P., & Formentini, M. (2013). The impact of supply chain integration on responsiveness: The moderating effect of using an international supplier network. *Transportation Research Part E: Logistics and Transportation Review*, *49*(1), 125-140.

Das, A., & Narasimhan, R. (2000). Purchasing competence and its relationship with manufacturing performance. *Journal of Supply Chain Management*, *36*(1), 17-28.

Das, T.K. (2006). Strategic alliance temporalities and partner opportunism. *British Journal of Management, 17*(1), 1-21.

Davis, T., (1993). Effective supply chain management. *Sloan Management Review*, 34(4), 35-46

Day, G. S. (1994). The capabilities of market-driven organizations. *Journal of Marketing, 58*(4), 37–42.

Davis, E. W., & Spekman, R. E. (2004). *The Extended Enterprise: Gaining Competitive advantage through collaborative supply chains*. FT Press.

Denzin, N. K. and Y. S. Lincoln. (2000). *Handbook of qualitative research*. 2nd edition: Thousand Oaks: Sage

Deshpande, A. R. (2012). Supply chain management dimensions, supply chain performance and organizational performance: an integrated framework. *International Journal of Business and Management*, *7*(8), 2-19.

Devlin, A. S. (2005). *Research Methods: Planning, Conducting and Presenting Research*, Cengage Learning.

Diamantopoulos, A., and Siguaw, J. A. (2006). Formative versus reflective indicators in organizational measure development: a comparison and empirical illustration. *British Journal of Management, 17*, 263–282.

Diamantopoulos, A., and Winklhofer, H. M. (2001). Index construction with formative indicators: an alternative to scale development. *Journal of Marketing Research, 38*(May, 2001), 259-277.

De Toni, A., and Nassimbeni, G. (1999). Buyer–supplier operational practices, sourcing policies and plant performance: result of an empirical research. *International Journal of Production Research, 37*(3), 597–619.

Deshpandé, R., Farley, J. U., & Webster Jr, F. E. (1993). Corporate culture, customer orientation, and innovativeness in Japanese firms: a quadrad analysis. *The journal of Marketing*, 23-37.

DeWulf, K., Odekerken-Schröder, G., & Iacobucci, D. (2001). Investments in consumer relationships: a cross-country and cross-industry exploration. *Journal of Marketing, 65*(4), 33–50.

Doney, P. M., & Cannon, J. P. (1997). An examination of the nature of trust in buyer-seller relationships. *the Journal of Marketing*, 35-51.

Doty, D. H. and Glick, W. H. (1998). Common methods bias: does common methods variance really bias results? *Organizational Research Methods, 1*(4), 374-406.

Dowty, R. A. and Wallace, W A. (2010). Implications of organizational culture for supply chain disruption and restoration. *International Journal of Production Economics, 126*, 57-65

Droge, C., Jayaram, J., & Vickery, S. K. (2004). The effects of internal versus external integration practices on time-based performance and overall firm performance. *Journal of operations management*, *22*(6), 557-573.

Drucker, P. (1993). *The post-capitalist society*, New York: Harper Collins.

Du Plessis, M. (2008). The strategic drivers and objectives of communities of practice as vehicles for knowledge management in small and medium enterprises. *International Journal of Information Management*, *28*(1), 61-67.

Dunn, S. C. and Young, R. R. (2004). Supplier assistance within supplier development initiatives. *Journal of Supply Chain Management, 40*(3), 19-29.

Durach, C. F., Wieland, A., & Machuca, J. A. (2015). Antecedents and dimensions of supply chain robustness: a systematic literature review. *International Journal of Physical Distribution & Logistics Management*, *45*(1/2).

Dyer, J. H., Dong, S. C. and Wujin, C. (1998). Strategic supplier segmentation: The next "best practice" in supply chain management. *California Management Review*, *40* (2), 57-77.

Dyer, J. H. and Singh, H. (1998). The relational view: cooperative strategy and sources of interorganizational competitive advantage. *Academy of Management Review, 23*(4), 660–679.

Edwards, J.R. (2001). Multidimensional constructs in organizational behavior research: an integrative analytical framework. *Organizational Research Methods, 4*(2), 144-192.

Efron, B. and Tibshirani, R. J. (1993). *An Introduction to the Bootstrap*. Chapman and Hall, New York.

Eisman, A. (2008). Achieving a high-performance supply chain: sharing information with partners. *Business Intelligence Journal*, *13*(2), 29-37.

Eisenhardt, K. M., & Schoonhoven, C. B. (1996). Resource-based view of strategic alliance formation: Strategic and social effects in entrepreneurial firms. *Organization Science*, *7*(2), 136-150.

Ellram, L. M. (1993). Supply-chain management: the industrial organisation perspective. *International Journal of Physical Distribution & Logistics Management, 21*(1), 13 – 22

Ellram, L. M., and Hendrick, T. E. (1995). Partnering characteristics: a dyadic perspective. *Journal of Business Logistics*, *16*, 41-41.

Elo, S. and Kyngäs, H. (2008). The qualitative content analysis process. *Journal of advanced nursing, 62*(1), 107-115.

Ettlie, J. E., & Reza, E. M. (1992). Organizational integration and process innovation. *Academy of Management Journal*, *35*(4), 795-827.

Falk, R. F. and N. B. Miller. (1992). *A Primer for soft modelling*. Akron, OH: University of Akron Press.

Farrell, A. M. (2010). Insufficient discriminant validity: a comment on Bove, Pervan, Beatty, and Shiu, *Journal of Business Research, 63,* 324–327.

Faul, F., Erdfelder, E., Buchner, A., & Lang, A. G. (2009). Statistical power analyses using G* Power 3.1: Tests for correlation and regression analyses. *Behavior research methods*, *41*(4), 1149-1160.

Faul, F., Erdfelder, E., Lang, A. G., & Buchner, A. (2007). G* Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior research methods*, *39*(2), 175-191.

Fawcett, S. E., Magnan, G. M. and McCarter, M. W. (2008). A three-stage implementation model for supply chain collaboration. *Journal of Business Logistics, 29*(1), 93-112.

Fawcett, S.E., Ellram, L.M and Ogden, J.A. (2007), *Supply Chain Management: From Vision to Implementation*, Pearson/Prentice-Hall.

Fawcett, S. E., Jones, S. L., & Fawcett, A. M. (2012). Supply chain trust: the catalyst for collaborative innovation. *Business Horizons*, *55*(2), 163-178.

Fawcett, S. E., Wallin, C., Allred, C., Fawcett, A. M., & Magnan, G. M. (2011). Information technology as an enabler of supply chain collaboration: a dynamic-capabilities perspective. *Journal of Supply Chain Management*, *47*(1), 38-59.

Feldmann, M. and Müller, S. (2003). An incentive scheme for true information providing in supply chains. *OMEGA, 31*(2), 63–73.

Ferguson, B.R. (2000). Implementing supply chain management. *Production and Inventory Management Journal*, March: 64-7.

Fisher, M. L. (1997). What is the right supply chain for your product?. *Harvard business review*, *75*, 105-117.

Flynn, B. B., Huo, B., & Zhao, X. (2010). The impact of supply chain integration on performance: A contingency and configuration approach. *Journal of Operations Management*, *28*(1), 58-71.

Fontana, A. and Frey, J. H. (2000). The interview: from structured questions to negotiated text. In N. K. Denzin and Y. S. Lincoln (Eds.), Handbook of qualitative research (2nd ed.) (pp. 645–672). Thousand Oaks, CA: Sage.

Fornell, C. and Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research, 18*(1), 39-50.

Forslund, H. (2007). Measuring information quality in the order fulfillment process. *International Journal of Quality & Reliability Management, 24*(5), 515-24.

Frambach, R. T. (1993). An integrated model of organizational adoption and diffusion of innovations. *European Journal of Marketing, 27*(5), 22-41.

Frambach, R. T., & Schillewaert, N. (2002). Organizational innovation adoption: A multi-level framework of determinants and opportunities for future research. *Journal of Business Research*, *55*(2), 163-176.

Frazer, L., and M. Lawley. 2000. *Questionnaire Design & Administration*. Brisbane, Australia: John Wiley & Sons Australia, Ltd.

Frohlich, M. T. (2002). E-integration in the supply chain: Barriers and performance. *Decision Sciences, 33*(4), 537–556.

Frohlich, M. and Westbrook, R. (2001). Arcs of integration: an international study of supply chain strategies. *Journal of Operations Management, 19*(2), 185-200.

Fugate, B. S., Mentzer, J. T., & Stank, T. P. (2010). Logistics performance: efficiency, effectiveness, and differentiation. *Journal of Business Logistics*,*31*(1), 43-62.

Fynes, B. and Burca, S. D. (2005). Supply chain relationship quality and the competitive environment – A contingency approach. In R. d. Koster and W. Delfmann (eds), *Supply chain management – European perspectives* (1st edition, 115-129). Denmark: Copenhagen Business School Press.

Fynes, B., De Burca, S., & Mangan, J. (2008). The effect of relationship characteristics on relationship quality and performance. *International Journal of Production Economics*, *111*(1), 56-69.

Fynes, B., De Burca, S., & Marshall, D. (2004). Environmental uncertainty, supply chain relationship quality and performance. *Journal of Purchasing and Supply Management*, *10*(4), 179-190.

Fynes, B., De Burca, S., & Voss, C. (2005). Supply chain relationship quality, the competitive environment and performance. *International Journal of Production Research*, *43*(16), 3303-3320.

Ganesan, S. (1994). Determinants of long-term orientation in buyer-seller relationships. *Journal of Marketing, 58*, 1-19.

Gauzente, C. (2003). Measuring franchisees' satisfaction: theoretical considerations and empirical testing. *International Journal of Retail & Distribution Management*, *31*(10), 508-517.

Gefen, D., Straub, D.W. and Boudreau, M. (2000). Structural equation modeling and regression: guidelines for research practice. *Communications of the Association for Information Systems, 4* (7).

Geisser, S. (1975). The predictive sample reuse method with applications. *Journal of the American Statistical Association*, *70*, 320-328.

Gereffi, G. (2002). *The International Competitiveness of Asian Economies in the Apparel Commodity Chain,* Erd Working Paper Series No. 5, Asian Development Bank.

Gimenez, C., van der Vaart, T., & Pieter van Donk, D. (2012). Supply chain integration and performance: the moderating effect of supply complexity. *International Journal of Operations & Production Management*, *32*(5), 583-610.

Giunipero, L. C., and Brand, R. R. (1996). Purchasing's role in supply chain management. *The International Journal of Logistics Management*, *7*(1), 29-38.

Giunipero, L. C., Hooker, R. E., Joseph-Matthews, S. A. C. H. A., Yoon, T. E., & Brudvig, S. (2008). A decade of SCM literature: past, present and future implications. *Journal of Supply Chain Management*, *44*(4), 66-86.

Gligor, D. M., Holcomb, M. C., & Stank, T. P. (2013). A multidisciplinary approach to supply chain agility: Conceptualization and scale development. *Journal of Business Logistics*, *34*(2), 94-108.

Global Manufacturing Outlook. (2015). *Preparing For Battle: Manufacturers Get Ready For Transformation.* Retrieved on October, 11, 2015, from https://www.kpmg.com/CN/en/IssuesAndInsights/ArticlesPublications/Documents/Global-Manufacturing-Outlook-O-201506.pdf

Goffin, K., Lemke, F., and Szwejczewski, M. (2006). An exploratory study of 'close'supplier–manufacturer relationships. *Journal of operations management*, *24*(2), 189-209.

Golicic, S. L., Davis, D. F. and McCarthy, T. M. (2005), A balanced approach to research in supply chain management, in Kotzab, H., Seuring, S., Muller, M. and Reiner, G. (Eds), *Research Methodologies in Supply Chain Management*, Physica Verlag, Heidelberg.

Goranson, T. (1999). *The Agile Virtual Enterprise.* Westport, CT: Quorum Books.

Gordon, G.G. and DiTomoso, N. (1992). Predicting corporate performance from organizational Culture. *Journal of Management Studies*, 35(1), 1-12.

Gowen Iii, C. R., & Tallon, W. J. (2003). Enhancing supply chain practices through human resource management. *Journal of Management Development*, *22*(1), 32-44.

Grant, R.M. and Baden-Fuller, C. (2004). A knowledge accessing theory of strategic alliances. *Journal of Management Studies, 41*(1), 61-84.

Graham, S. T., Daugherty, P.J., and Dudley, W. N. (1994). The long-term strategic impact of purchasing partnerships. *Journal of Supply Chain Management*, *30*(4), 12-13.

Greene, J. C., Caracelli, V. J., and Graham, W. F. (1989). Toward a conceptual framework for mixed-method evaluation designs, *Education Evaluation and Policy Analysis, 11*(3), 255-274.

Grover, V. and Malhotra, M. K. (2003). Transaction cost framework in operations and supply chain management research: theory and measurement. *Journal of Operations Management, 21*, 457-473

Grover, V., and Goslar, M. D. (1993). The initiation, adoption, and implementation of telecommunications technologies in US organizations. *Journal of Management Information Systems, 10*(1), 141–160.

Guba, E. G. and Lincoln, Y. S. (1994). Competing paradigms in qualitative research. In: N. K. Denzin & Y. S. Lincoln (eds), *Handbook of Qualitative Research*. Thousand Oaks, CA: Sage, 105–117.

Guba, E. G., and Lincoln, Y. S. (2005). Paradigmatic controversies, contradictions, and emerging confluences. In N. K. Denzin & Y. S. Lincoln (Eds.), *The Sage Handbook of Qualitative Research* (3rd ed., pp. 191-215). Thousand Oaks: Sage Publications.

Guba, E. G. (1990). *The Paradigm Dialog*. Sage Publications, Newbury Park, CA.

Guinot, C., Latreille, J., and Tenenhaus, M. (2001). PLS path modeling and multiple table analysis: application to the cosmetic habits of women in Ile-De-France. *Chemometrics and Intelligent Laboratory Systems, 58*(2), 247-259.

Gunasekarana, A., Lai, K. and Cheng, T.C. E. (2008). Responsive supply chain: a competitive strategy in a networked economy. *Omega: The International Journal of Management Science, 36*, 549 – 564

Gunasekaran, A., Patel, C., and Tirtiroglu, E. (2001). Performance measures and metrics in a supply chain environment. *International Journal of Operations and Production Management*, *21* (1-2), 71-87.

Ha, B., Park, Y. and Cho, S. (2011). Suppliers' affective trust and trust in competency in buyers: its effect on collaboration and logistics efficiency. *International Journal of Operations & Production Management, 31*(1), 56 - 77

Haider, M. Z. (2007). Competitiveness of the Bangladesh ready-made garment industry in major international markets. *Asia-Pacific Trade and Investment Review*, *3*(1), 3-27.

Hair, J. F., Black W. C., Babin, B. J., and Anderson R.E. (2010). *Multivariate Data Analysis,* Englewood Cliffs, Prentice Hall, NJ.

Hair, J. F., Ringle, C. M. and Sarstedt, M. (2013a). Partial least squares structural equation modeling: rigorous applications, better results and higher acceptance. *Long Range Planning, 46*, 1-12.

Hair, J. F., Hult, G. T. M., Ringle, C. M. and Sarstedt, M. (2013b). *A Primer on Partial Least Squares Structural Equation Modeling*. Sage, Thousand Oaks,.

Hair, J. F., Ringle, C. M. and Sarstedt, M. (2011). PLS-SEM: Indeed a silver bullet. *Journal of Marketing Theory and Practice, 19*(2): 139-151.

Hair, J. F. Jr., Money, A. H., Samouel, P. and Page, M. (2007), Research Methods for Business, John Wiley & Sons Ltd.

Halldorsson, A., Kotzab, H., Mikkola, F. H. & Skjott-Larsen, T. (2007). Complementary theories to supply chain management. *Supply Chain Management: An International Journal, 12* (4), 284–296.

Halldo´rsson, A., Larson, P. D., and Poist, R. F. (2008). Supply chain management: a comparison of scandinavian and american perspectives. *International Journal of Physical Distribution & Logistics Management, 38*(2), 126-142.

Handfield, R. B., & Bechtel, C. (2002). The role of trust and relationship structure in improving supply chain responsiveness. *Industrial marketing management*, *31*(4), 367-382.

Handfield, R. B., & Nichols, E. L. (2006). *Introduction to supply chain management*. New Delhi: Prentice-Hall of India.

Hallgren, M., & Olhager, J. (2009). Lean and agile manufacturing: external and internal drivers and performance outcomes. *International Journal of Operations & Production Management*, *29*(10), 976-999.

Hart, D. (2004). The wise supply chain: Knowledge as a component of its success. *Proceedings 13th Biennial Conference of the Australian Rangeland Society*, Alice Springs, NT, 154-160.

Hartnell, C. A., Ou, A. Y. and Kinicki, A. (2011). Organizational culture and organizational effectiveness: a meta-analytic investigation of the competing values framework's theoretical suppositions. *Journal of Applied Psychology, 96*(4), 677–694.

Helm, S., Eggert, A. and Garnefeld, I. (2010). Modeling the impact of corporate reputation on customer satisfaction and loyalty using Partial Least Squares. In V. E. Vinzi, W. W. Chin, J. Henseler and H. Wang (eds.), *Handbook of Partial Least Squares, Springer Handbooks of Computational Statistics,* (515-534). Verlag Berlin Heidelberg: Springer.

Henderson, J. C. (1990). Plugging into strategic partnerships: the critical IS connection. *Sloan management review*, *31*(3).

Herna´ndez-Espallardo, M., Rodríguez-Orejuela, A. and Sánchez-Pérez, M. (2010). Inter-organizational governance, learning and performance in supply chains. *Supply Chain Management: An International Journal, 15*(2), 101 - 114

Hines, P. (1996). Purchasing for lean production: the new strategic agenda.*International Journal of Purchasing and Materials Management*, *32*(4), 2-10.

Hinton, B. (2003). Knowledge management and communities of practice: an experience from Rabobank Australia and New Zealand. *International Food and Agribusiness Management Review, 5*(3).

Ho, C. F., Chi, Y. P., & Tai, Y. M. (2005). A structural approach to measuring uncertainty in supply chains. *International Journal of Electronic Commerce*, *9*(3), 91-114.

Ho, L. A. (2008). What affects organizational performance? The linking of learning and knowledge management. *Industrial Management & Data Systems*, *108*(9), 1234-1254.

Hobbs, J. E. (1996). A transaction cost approach to supply chain management. *Supply Chain Management: An International Journal, 1*(2), 15 – 27

Hofstede, G. (1991). *Cultures and Organizations: Software of the Mind*. London, McGraw-Hill UK and (1996) New York: McGraw-Hill USA.

Hofstede, G. (1980). *Culture's Consequences: International Differences in Work-Related Values*, Sage Publication, London.

Hohenthal, J. (2006). Integrating qualitative and quantitative methods in research on international entrepreneurship. *Journal of International Entrepreneurship, 4*(4), 175-190.

Holweg, M. (2005). An investigation into supplier responsiveness. *International Journal of Logistics Management, 16*(1), 96-119.

Hong, P. C., Dobrzykowski, D. D., & Vonderembse, M. A. (2010). Integration of supply chain IT and lean practices for mass customization: benchmarking of product and service focused manufacturers. *Benchmarking: An International Journal*, *17*(4), 561-592.

Hsieh, M. H., Tsai, K. H., & Wang, J. R. (2008). The moderating effects of market orientation and launch proficiency on the product advantage–performance relationship. *Industrial Marketing Management*, *37*(5), 580-592.

Hsu, C. C., Tan, K. C., Kannan, V. R., & Keong Leong, G. (2009). Supply chain management practices as a mediator of the relationship between operations capability and firm performance. *International Journal of Production Research*, *47*(3), 835-855.

Hsuan Mikkola, J. and Skjøtt-Larsen, T. (2004). Supply-chain integration: implications for mass customization, modularization and postponement strategies. *Production Planning & Control*, *15*(4), 352-361.

Huang, G. Q., Lau, S. K., and Mak, K. L. (2003). The impacts of sharing production information on supply chain dynamics: A review of the literature. *International Journal of Production Research, 41*, 1483–1517.

Huang, L. S. and Quaddus, M. (2007). Knowledge management system adoption and practice in Taiwan life insurance industry: Analysis via partial least squares. *PACIS 2007 Proceedings*, 89.

Huberman, A. M. and Miles, M. B. (1994). Data management and analysis methods. In N. K. Denzin and Y. S. Lincoln (Eds.), *Handbook of qualitative research* (pp. 428-444). Thousand Oaks, CA: Sage

Hudson, L. A. and Ozanne, J. L. (1988). Alternative ways of seeking knowledge in consumer research. *Journal of Consumer Research, 14*(4), 508-521.

Hulland, J. (1999). Use of partial least squares (PLS) in strategic management research: a review of four studies. *Strategic Management Journal, 20* (2), 195–204.

Hunt, S. D., & Morgan, R. M. (1995). The comparative advantage theory of competition. *The Journal of Marketing*, 1-15.

Huo, B., Zhao, X., & Zhou, H. (2014). The effects of competitive environment on supply chain information sharing and performance: an empirical study in China. *Production and Operations Management*, *23*(4), 552-569.

Hurley, R. F., & Hult, G. T. M. (1998). Innovation, market orientation, and organizational learning: an integration and empirical examination. *The Journal of Marketing*, 42-54.

Iacobucci, D. (2008). *Mediation analysis*. Thousand Oaks, Sage, CA.

Iacovou, C. L., Benbasat, I., & Dexter, A. S. (1995). Electronic data interchange and small organizations: adoption and impact of technology. *MIS quarterly*, 465-485.

Igbaria, M., Guimaraes, T. and Davis, G. B. (1995). An assessment of structure and causation of IS usage. *The Database for Advances in Information Systems, 27*(2), 61–67.

Ireland, R. D., & Webb, J. W. (2007). A multi-theoretic perspective on trust and power in strategic supply chains. *Journal of Operations Management*, *25*(2), 482-497.

Islam, M. A. (2013). Sustainable business environment: a challenge of future. *24th Bangladesh Apparel and Textile Exposition 2013*, 35-37.

Jackson, E. L. (2008). Behavioral determinants of the adoption forwards contracts by Western Australian wool producers. *PhD Thesis*, Curtin University of Technology.

Jacobs, F. R. and Chase, R. B. (2014). *Operations and supply chain management*. McGraw-Hill/Irwin.

Jahed, M. A. & Quaddus, M. (2014). Investigating supply chain management practice, agility and competitive advantage in Bangladesh apparel industry. *Proceeding of the International Scientific Conference on Management & Information Science,* 159.

Jahed, M. A. & Quaddus, M. (2013). A proposed model of supply chain management practice, agility and competitive advantage in Bangladesh apparel industry. *Proceedings of the Mustang International Academic Conference, 3,* 172-176.

Jap, S. D. (2001). 'Pie sharing' in complex collaboration contexts. *Journal of Marketing Research, 38*(1), 86-99.

Jarvenpaa, S. L., and Leidner, D. E. (1998). An information company in Mexico: Extending the resource-based view of the firm to a developing country context. *Information Systems Research*, *9*(4), 342-361.

Jaskyte,K. (2004). *Organizational Culture and Innovation in Nonprofit Organizations*, School of Social Work: Research Report I.

Jarvis, C. B., Mackenzie, S. B., & Podsakoff, P. M. (2003). A critical review of construct indicators and measurement model misspecification in marketing and consumer research. *Journal of Consumer Research, 30*(2), 199-218.

Jeon, S., Kim, Y. G., & Koh, J. (2011a). An integrative model for knowledge sharing in communities-of-practice. *Journal of Knowledge Management*, *15*(2), 251-269.

Jeon, S. H., Kim, Y. G., & Koh, J. (2011b). Individual, social, and organizational contexts for active knowledge sharing in communities of practice. *Expert Systems with applications*, *38*(10), 12423-12431.

Jharkharia, S., & Shankar, R. (2004). Supply chain management: Some insights from Indian manufacturing companies. *Asian Academy of Management Journal*, *9*(1), 79-97.

Jie, F., Parton, K. A., & Cox, R. J. (2007). Supply chain practice, supply chain performance indicators and competitive advantage of Australian beef enterprises: A conceptual framework. In *2007 Conference (51st), February 13-16, 2007, Queenstown, New Zealand* (No. 10116). Australian Agricultural and Resource Economics Society.

Jin, Y., Vonderembse, M., & Ragu-Nathan, T. S. (2013). Proprietary technologies: building a manufacturer's flexibility and competitive advantage. *International Journal of Production Research*, *51*(19), 5711-5727.

Jitpaiboon, T. (2005). *The roles of information systems integration in the supply chain integration context-firm perspective* (Doctoral dissertation, The University of Toledo).

Johnson, J. L. (1999). Strategic integration in industrial distribution channels: managing the interfirm relationship as a strategic asset. *Journal of the Academy of Marketing Science*, *27*(1), 4-18.
Johnson, R. B., Onwuegbuzie, A. J. and Turner, L. A. (2007). Towards a definition of mixed methods research. *Journal of Mixed Methods Research, 1*(2), 112-133.

Johnson, R. B. and Onwuegbuzie, A. J. (2004). Mixed methods research: A research paradigm whose time has come. *Educational Researcher, 33*(7), 14-26.

Jones, R. M. (2002). *The apparel industry*. Oxford: Blackwell Science.

Joshi, A. W. and Stump, R. L. (1999). The contingent effect of specific asset investments on joint action in manufacturer-supplier relationships: an empirical test of the moderating role of reciprocal asset investments, uncertainty, and trust. *Journal of the Academy of Marketing Science, 27*(3), 291-305.

Judd, C. M. and Kenny, D. A. (1981). Process analysis: Estimating mediation in treatment evaluations. *Evaluation Review, 5*, 602-619.

Jun, M., Cai, S., & Shin, H. (2006). TQM practice in maquiladora: Antecedents of employee satisfaction and loyalty. *Journal of operations management*, *24*(6), 791-812.

Kaleka, A. (2002). Resources and capabilities driving competitive advantage in export markets: guidelines for industrial exporters. *Industrial Marketing Management*, *31*(3), 273-283.

Kaplan, B. and Maxwell J. A. (1994). Qualitative research methods for evaluating computer information systems. In *Evaluating health care information systems: Methods and application* eds. J.G. Anderson, C. E. Aydin and S. J. Jay, 45-68, Thousand Oaks, CA: Sage Publications.

Kara, S., & Kayis, B. (2004). Manufacturing flexibility and variability: an overview. *Journal of Manufacturing Technology Management*, *15*(6), 466-478.

Kasouf, C. J., and Celuch, K. G. (1997). Interfirm relationships in the supply chain: The small supplier's view. *Industrial Marketing Management*, *26*(6), 475-486.

Kaufman, A., Wood, C.H., & Theyel, G. (2000). Collaboration and technology linkages: a strategic supplier typology. *Strategic Management Journal, 21* (6), 649–663.

Khan, A. K. and Pillania, R. K. (2008). Strategic sourcing for supply chain agility and firms' performance: A study of Indian manufacturing sector. *Management Decision*, 46 (10), 1508 – 1530.

Khalil, O., Allison, C., & Seliem, A. (2006). Knowledge management: the case of the Acushnet company. *SAM Advanced Management Journal*, *71*(3), 34.

Khazanchi, S., Lewis, M.W. and Boyer, K.K. (2007). Innovation-supportive culture: the impact of organizational values on process innovation. *Journal of Operations Management, 25*(4), 871–884.

Kim, D., Cavusgil, S. T., & Calantone, R. J. (2006). Information system innovations and supply chain management: channel relationships and firm performance. *Journal of the Academy of Marketing Science*, *34*(1), 40-54.

Kim, S. W. (2009). An investigation on the direct and indirect effect of supply chain integration on firm performance. *International Journal of Production Economics*, *119*(2), 328-346.

Kim, S. W. (2006). Effects of supply chain management practices, integration and competition capability on performance. *Supply Chain Management: An International Journal, 11*(3), 241–248.

Koberg, C. S., and Chusmir, L. H. (1987). Organizational culture relationships with creativity and other job-related variables. *Journal of Business research*, *15*(5), 397-409.

Koh, L., Demirbag, M., Bayraktar, E., Tatoglu, E. and Zaim, S. (2007). The impact of supply chain management practices on performance of SMEs. *Industrial Management & Data Systems, 107*(1), 103-24.

Koh, S.C.L. and Tan, K.H. (2006). Translating knowledge of supply chain uncertainty into business strategy and actions. *Journal of Manufacturing Technology Management,* 17(4).

Koh, J. and Venkatraman, N. (1991). Joint venture formations and stock market reactions: an assessment in the information technology sector. *Academy of Management Journal, 34*(4), 869–892.

Kotzab, H., Teller, C., Grant, D. B. and Sparks, L. (2011). Antecedents for the adoption and execution of supply chain management. *Supply Chain Management: An International Journal, 16*(4), 231 - 245

Kotzab, H., Grant, D. B. and Friis, A. (2006). Supply chain management implementation and priority strategies in Danish organizations. *Journal of Business Logistics, 27*(2), 273-301.

Koufteros, X. A., Vonderembse, M. A. and Doll, W. J. (1997). Competitive capabilities: measurement and relationships. *Proceedings Decision Science Institute 3*, 1067-1068.

Koufteros, X. (1999). Testing a model of pull production: a paradigm for manufacturing research using structural equation modeling. *Journal of Operations Management, 17*, 467–488.

Krause, D. R. (1997). Supplier development: current practices and outcomes. *International Journal of Purchasing and Materials Management*, *33*(1), 12-19.

Kuhn, T. S. (1977). *The essential tension: Selected studies in scientific tradition and change*. Chicago: University of Chicago Press.

Kuo-Chung, S., & Li-Fang, S. (2004). Taxonomy in logistics management: A resource-based perspective. *International Journal of Management*, *21*(2), 149.

Kwon, I. W. G., & Suh, T. (2005). Trust, commitment and relationships in supply chain management: a path analysis. *Supply chain management: an international journal*, *10*(1), 26-33.

Kwon, T. H., and Zmud, R. W. (1987, April). Unifying the fragmented models of information systems implementation. In *Critical issues in information systems research* (pp. 227-251). John Wiley & Sons, Inc..

Labowitz, S., & Baumann-Pauly, D. (2015). Beyond the Tip of the Iceberg: Bangladesh's Forgotten Apparel Workers. *NYU Stern Center for Business and Human Rights, Leonard N. Stern School of Business, 44*.

Lado, A. A., Paulraj, A., & Chen, I. J. (2011). Customer focus, supply-chain relational capabilities and performance: evidence from US manufacturing industries. *The International Journal of Logistics Management*, *22*(2), 202-221.

Laeequddin, M., Sahay, B. S., Sahay, V., & Abdul Waheed, K. (2010). Measuring trust in supply chain partners' relationships. *Measuring Business Excellence*, *14*(3), 53-69.

Lambert, D. M. (2004). The eight essential supply chain management processes. *Supply Chain Management Review*, *8*(6), 18-27.

Lambert, D., and Cooper, M. (2000). Issues in supply chain management. *Industrial Marketing Management, 29*(1), 65-83.

Lambert, D. M., Cooper, M. C. and Pagh, J. D. (1998). Supply chain management: implementation issues and research opportunities. *The International Journal of Logistics Management, 9*(2), 1-19.

Lambert, D. M., and Harrington, T. C. (1990). Measuring nonresponse bias in customer service mail surveys. *Journal of Business Logistics, 11*(2), 5-25.

Lancioni, R. A. (2000). New developments in supply chain management for the millennium. *Industrial Marketing Management* 29, 1–6.

Landeros, R., Reck, R., and Plank, R. E. (1995). Maintaining buyer-supplier partnerships. *International Journal of Purchasing and Materials Management*, *31*(2), 2-12.

Lane, C. and Bachmann, R. (1996). The social constitution of trust: supplier relations in Britain and Germany. *Organizational Studies, 17*(3), 365-395.

Langfield-Smith, K. and Smith, D. (2005). Performance Measures in supply chains. *Australian Accounting Review, 15*(1), 39-51.

Lau, C.M. and Ngo, H.Y. (1996). One country many cultures: organizational cultures of firms of different country origins. *International Business Review, 5*(5), 469-86.

Laudon, K., Laudon, J., & Dass, R. (2010). *Management Information System: Managing the Digital Firm*. Pearson Education, Inc.

Lavie, D. (2006). The competitive advantage of interconnected firms: An extension of the resource-based view. *Academy of management review*, *31*(3), 638-658.

Law, K. S., and Wong, C. (1999). Multidimensional constructs in structural equation analysis: an illustration using the job perception and job satisfaction constructs. *Journal of Management, 25*(2), 143-160.

Law, K. S., Wong, C., and Mobley, W. H. (1998). Toward a taxonomy of multidimensional constructs. *Academy of Management Review, 23*(4), 741-755.

Ledyard, M. and Keough, B. (2007). Demand-driven supply chain meets offshoring. *Supply Chain Management Review, 11*(5), 11-12.

Lee, C. W, Kwon, I. W. G., & Severance, D. (2007). Relationship between supply chain performance and degree of linkage among supplier, internal integration, and customer. *Supply chain management: an International journal*, *12*(6), 444-452.

Lee, E., Lee, K., & Moore, M. (2004). Global sourcing and textile and apparel import values: a four-country study as an application of global commodity chains theory. *Journal of Textile and Apparel, Technology and Management, 3*(4), 1-10.

Lee, H. L. (2004). The triple-A supply chain. *Harvard Business Review, October*, 1-12.

Lee, H. L. (2002). Aligning supply chain strategies with product uncertainties. *California management review*, *44*(3), 105-119.

Lee, H. L. (2000). Creating value through supply chain integration. *Supply Chain Management Review*, *4*(4), 30-36.

Lee H., & Billington, C. (1992). Managing Supply Chain Inventories: Pitfalls and Opportunities. *Sloan Management Review*, 33(3), pp.65-73.

Lee, J. N., & Kim, Y. G. (1999). Effect of partnership quality on IS outsourcing success: conceptual framework and empirical validation. *Journal of Management information systems*, 29-61.

Lee, Y., and Kincade, D. H. (2003). US apparel manufacturers' company characteristic differences based on SCM activities. *Journal of Fashion Marketing and Management: An International Journal*, *7*(1), 31-48.

Lehtonen, T. (2014). Attributes and success factors of partnering relations–a theoretical framework for facility services. *Nordic journal of surveying and real estate research*, *2*.

Leidner, D.E. & Kayworth, T., (2006). Review: a review of culture in information systems research: toward a theory of information technology culture conflict. *MIS Quarterly, 30*(2), 357–399

Lenz, R. T. (1980). Environment, strategy, organization structure and performance: patterns in one industry. *Strategic Management Journal, 1*(3), 209-226.

Lesser, E. L. & Storck, J. (2001). Communities of practice and organizational performance. *IBM systems journal*, *40*(4), 831-841.

Lewis, M., Brandon-Jones, A., Slack, N., & Howard, M. (2010). Competing through operations and supply: the role of classic and extended resource-based advantage. *International Journal of Operations & Production Management*, *30*(10), 1032-1058.

Li, D., Chau, P. Y., & Lai, F. (2010). Market orientation, ownership type, and e-business assimilation: evidence from Chinese firms. *Decision Sciences*, *41*(1), 115-145.

Li, H., Zhang, J. and Sarathy, R. (2010). Understanding compliance with internet use policy from the perspective of rational choice theory. *Decision Support Systems, 48*, 635-645.

Li, G., Lin, Y., Wang, S., & Yan, H. (2006). Enhancing agility by timely sharing of supply information. *Supply Chain Management: An International Journal*, *11*(5), 425-435.

Li, S. & Lin, B. (2006). Accessing information sharing and information quality in supply chain management. *Decision Support Systems*, *42*(3), 641-656.

Li, S., Ragu-Nathan, B., Ragu-Nathan, T. S., & Rao, S. S. (2006). The impact of supply chain management practices on competitive advantage and organizational performance. *Omega*, *The International Journal of Management Science*, 34(2), 107-124.

Li, S., Rao, S. S., Ragu-Nathan, T. S., & Ragu-Nathan, B. (2005). Development and validation of a measurement instrument for studying supply chain management practices. *Journal of Operations Management, 23*(6), 618-641.

Li, S. (2002). An integrated model for supply chain management practice, performance and competitive advantage. Doctoral Dissertation, The University of Toledo, Toledo, OH.

Li, X. (2006). Supportive leadership, learning capability, IT support capability, power and value appropriation in IOS supply chain network context. Doctoral Dissertation, The University of Toledo, Toledo, OH.

Li, X., Goldsby, T. J. and Holsapple, C. W. (2009). Supply chain agility: scale development. *The International Journal of Logistics Management, 20*(3), 408 – 424.

Li, X., Chung, C., Goldsby, T. J., & Holsapple, C. W. (2008). A unified model of supply chain agility: the work-design perspective. *The International Journal of Logistics Management*, *19*(3), 408-435.

Li, Y. (2007). A research model for collaborative knowledge management practice, supply chain integration and performance. Doctoral Dissertation, The University of Toledo, Toledo, OH.

Liao, S. H., Hu, D. C., Chen, C. C., and Lin, Y. L. (2013). Comparison of competing models and multi-group analysis of organizational culture, knowledge transfer, and innovation capability: an empirical study of the Taiwan semiconductor industry. *Knowledge Management Research & Practice*, 1-13.

Lin, C. T., Chiu, H., & Chu, P. Y. (2006). Agility index in the supply chain. *International Journal of Production Economics*, *100*(2), 285-299.

Lin, F., Huang, S., & Lin, S. (2002). Effects of information sharing on supply chain performance in electronic commerce. *IEEE Transactions on Engineering Management, 49*(3), 258– 268.

Liu, H., Ke, W., Wei, K. K., Gu, J. and Chen, H. (2010). The role of institutional pressures and organizational culture in the firm's intention to adopt internet-enabled supply chain management systems. *Journal of Operations Management, 28*, 372-384.

Liu, H., Ke, W., Kee Wei, K., & Hua, Z. (2013). Effects of supply chain integration and market orientation on firm performance: Evidence from China. *International Journal of Operations & Production Management*, *33*(3), 322-346.

Liu, Y., Luo, Y. and Liu, T. (2009). Governing buyer–supplier relationships through transactional and relational mechanisms: Evidence from China. *Journal of Operations Management, 27*, 294–309

Lopes de Sousa Jabbour, A. B., Gomes Alves Filho, A., Backx Noronha Viana, A., & José Chiappetta Jabbour, C. (2011). Measuring supply chain management practices. *Measuring Business Excellence*, *15*(2), 18-31.

MacKenzie, S. B., Podsakoff, P. M., and Jarvis, C. B. (2005). The problem of measurement model misspecification in behavioral and organizational research and some recommended solutions. *Journal of Applied Psychology, 90*(4), 710-730.

MacCarthy, B. L., & Jayarathne, P. G. S. A. (2010). Fast fashion: achieving global quick response (GQR) in the internationally dispersed clothing industry. In *Innovative Quick Response Programs in Logistics and Supply Chain Management* (pp. 37-60). Springer Berlin Heidelberg.

MacKenzie, S. B., Podsakoff, P. M. and Podsakoff, N. P. (2011). Construct measurement and validation procedures in MIS and behavioral research: integrating new and existing techniques. *MIS Quarterly, 35* (2), 293-334.

Madhok, A. and Tallman, S.B. (1998). Resources, transactions and rents: managing value through interfirm collaborative relationships. *Organization Science, 9,* 326–339.

Magnan, G. M., Fawcett, A. M., & Fawcett, S. E. (2011). Supply chain success: key initiatives differentiating high-and low-performing firms. *International Journal of Procurement Management*, *4*(2), 181-202.

Malhotra, N. K., Kim, S. S. and Patil, A. 2006. Common method variance in IS research: a comparison of alternative approaches and a reanalysis of past research. *Management Science, 52*(12), 1865-1883.

Malhotra, N. K., Hall, J., Shaw, M. and Oppenheim, P. (2006). *Marketing Research*. Forest: Pearson Education Australia.

Manders, J. (2009). Supply chain flexibility aspects and their impact on customer satisfaction. Master's Thesis. Open University the Netherlands, Netherlands.

Mansur, A. H. (2013). Looking beyond current challenges: Bangladesh RMG sector has a lot to achieve. *24th Bangladesh Apparel and Textile Exposition 2013*, 35-37.

Marcoulides, G.A., and Saunders, C. (2006). PLS: a silver bullet? *MIS Quarterly,* 30(2) iii-ix.

Marsden, D. and Littler, D. (1996). Evaluating alternative research paradigm: A market oriented framework. *Journal of Marketing Management, 12*(7), 645-655.

Marx, M. L., & Larsen, R. J. (2006). *Introduction to mathematical statistics and its applications*. Pearson/Prentice Hall.

Maskell, P., Bathelt, H. and Malmberg, A. (2006). Building global knowledge pipelines: The role of temporary clusters. *European Planning Studies, 14*(8), 997-1013

Mathieson, K., Peacock, E. and Chin, W. W. (2001). Extending the technology acceptance model: the influence of perceived user resources. *Database for Advances in Information Systems, 32* (3), 86-112.

Matell, M. S. and Jacoby, J. (1972). Is there an optimal number of alternatives for Likert-scale items?: Effects of testing time and scale properties. *Journal of Applied Psychology, 56*(6), 506-509.

Matson, J. B., & McFarlane, D. C. (1999). Assessing the responsiveness of existing production operations. *International Journal of Operations & Production Management*, *19*(8), 765-784.

McDermott, C.M. and Stock, G.N. (1999). Organizational culture and advanced manufacturing technology implementation. *Journal of Operations Management, 17*(5), 521–533.

McDermott, P., Khalfan, M., & Swan, W. (2004). An exploration of the relationship between trust and collaborative working in the construction sector.*Construction Information Quarterly*, *6*(4), 140-146.

McIvor, R. (2001). Lean supply: the design and cost reduction dimensions. *European Journal of Purchasing & Supply Management*, *7*(4), 227-242.

Meehan, S., & Dawson, C. (2002). Customer responsiveness: getting it fast and right through impatience and intolerance. *Business Strategy Review*, *13*(4), 26-37.

Mello, J.E. and Stank, T.P. (2005). Linking firm culture and orientation to supply chain success. *International Journal of Physical Distribution & Logistics Management, 35*(8), 542–554.

Melnyk, S.A., Lummus, R., Vokurka, R.J., & Sandor, J. (2007). *Supply Chain Management 2010 and Beyond: Mapping the Future of the Strategic Supply Chain*, Alexandria, VA: APICS E&R Foundation.

Menguc, B., and Auh, S. (2006). Creating a firm-level dynamic capability through capitalizing on market orientation and innovativeness. *Journal of the Academy of Marketing Science*, *34*(1), 63-73.

Menguc, B., Auh, S., & Shih, E. (2007). Transformational leadership and market orientation: Implications for the implementation of competitive strategies and business unit performance. *Journal of Business Research*, *60*(4), 314-321.

Menon, A., and Varadarajan, P. R. (1992). A model of marketing knowledge use within firms. *Journal of Marketing, 56*, 53–71.

Mentzer, J. T., DeWitt, W., Keebler, J. S., Min, S., Niz, N. W, Smith, C. D. and Zacharia, Z. G. (2001). Defining supply chain management. *Journal Business Logistics, 22*(2), 1-25.

Mentzer, J. T., Min, S., & Zacharia, Z. G. (2000). The nature of interfirm partnering in supply chain management. *Journal of Retailing, 76*(4), 549-568.

Meredith, J. R., Raturi, A., Amoako-Gyampah, K., and Kaplan, B. (1989). Alternative research paradigms in operations. *Journal of operations management, 8*(4), 297-326.

Merschmann, U., & Thonemann, U. W. (2011). Supply chain flexibility, uncertainty and firm performance: an empirical analysis of German manufacturing firms. *International Journal of Production Economics*, *130*(1), 43-53.

Michigan State University. Global Logistics Research Team, & Council of Logistics Management (US). (1995). *World class logistics: the challenge of managing continuous change*. Council of Logistics Management.

Miller, L. (2016, Feb 24). Large sized factories are the prime advantage for Bangladesh. Retrieved from http://www.banglaapparel.com/en/

Min, S. and Mentzer, J. T. (2004). Developing and measuring supply chain management concepts. *Journal of Business Logistics, 25*(1), 63-92.

Ming, Y., Grabot, B., & Houé, R. (2014). A typology of the situations of cooperation in supply chains. *Computers & Industrial Engineering*, *67*, 56-71.

Moberg, C. R., Cutler, B. D., Gross, A., and Speh, T. W. (2002). Identifying antecedents of information exchange within supply chains. *International Journal of Physical Distribution & Logistics Management*, *32*(9), 755-770.

Moberg, C. R., Speh, T. W., & Freese, T. L. (2003). SCM: Making the vision a reality. *Supply Chain Management Review, 7(*5), 34-39.

Mohr, J., and Sohi, R. S. (1995). Communication flows in distribution channels: Impact on assessments of communication quality and satisfaction. *Journal of Retailing, 71*(4), 393– 416.

Mohr, J., and Spekman, R. (1994). Characteristics of partnership success: partnership attributes, communication behavior and conflict resolution techniques. *Strategic Management Journal*, *15*(2), 135-152.

Monczka, R. M., Petersen, K. J., Handfield, R. B., and Ragatz, G. L. (1998). Success factors in strategic supplier alliances: the buying company perspective. *Decision Sciences*, *29*(3), 553-577.

Moon, K. K.-L., Yi, C. Y. and. Ngai, E.W.T. (2012). An instrument for measuring supply chain flexibility for the textile and clothing companies. *European Journal of Operational Research, 222*, 191–203.

Moon, K. K.-L., Yi, C. Y. and. Ngai, E.W.T. (2011). Supply chain flexibility in an uncertain environment: exploratory findings from five case studies. *Supply Chain Management: An International Journal, 16*(4), 271 – 283.

Morash, E. A., & Lynch, D. F. (2002). Public policy and global supply chain capabilities and performance: a resource-based view. *Journal of International Marketing*, *10*(1), 25-51.

Morgan, R. M., & Hunt, S. D. (1994). The commitment-trust theory of relationship marketing. *the journal of marketing*, 20-38.

Moulton, P., Lacey, L. M., Flynn, L., Kovner, C. T., and Brewer, C. S. (2008). Addressing the Complexities of Survey Research. *Nursing Policy Research: Turning Evidence-Based Research into Health Policy*, 43.

Mukaddes, A., Rashed, C., Malek, A. and Kaiser, J. (2010). Developing an information model for supply chain information flow and its management. *International Journal of Innovation, Management and Technology*, 1(2), 226-231.

Myers, M. D. and Newman, M. (2007). The qualitative interview in IS research: Examining the craft. *Information and organization, 17*(1), 2-26.

Naor, M., Goldstein, S. M., Linderman, K. W., and Schroeder, R. G. (2008). The role of culture as driver of quality management and performance: Infrastructure versus core quality practices. *Decision Sciences, 39(*4), 671–702.

Narasimhan, R., & Das, A. (1999). Manufacturing agility and supply chain management practices. *Production and Inventory Management Journal*, *40*, 4-10.

Narasimhan, R., Swink, M., & Viswanathan, S. (2010). On decisions for integration implementation: An examination of complementarities between product-Process technology integration and supply chain integration. *Decision Sciences*, *41*(2), 355-372.

Narver, J. C., & Slater, S. F. (1990). The effect of a market orientation on business profitability. *The Journal of Marketing*, 20-35.

Näslund, D. (2002). Logistics needs qualitative research - especially action research. *International Journal of Physical Distribution & Logistics Management, 32*(5), 321-338.

Naudé, P., & Buttle, F. (2000). Assessing relationship quality. *Industrial Marketing Management*, *29*(4), 351-361.

Navarro, A., Losada, F., Ruzo, E., & Díez, J. A. (2010). Implications of perceived competitive advantages, adaptation of marketing tactics and export commitment on export performance. *Journal of world business*, *45*(1), 49-58.

Netemeyer, R.G., Bearden, W.O. and Sharma, S. (2003). *Scaling Procedures: Issues and Applications.* Thousand Oaks, CA: Sage.

Neuman, W.L. (2006). *Social Research Methods- Qualitative and Quantitative Approaches*. Boston: Allyn and Bacon.

Nooteboom, B. (1999). Innovation and inter-firm linkages: new implications for policy. *Research policy*, *28*(8), 793-805.

Nunnally, J. C. (1994). *Psychometric Theory*. 3rd ed. New York: McGraw-Hill.

Nuruzzaman, M., & Haque, A. K. M. (2009). Lead time management in the garment sector of Bangladesh: an avenues for survival and growth. *European Journal of Scientific Research*, *33*(4), 617-629.

Nuruzzaman, M., Haque, A. and Azad, R. (2010). Is Bangladeshi RMG sector fit in the global apparel business? Analyses the supply chain management. *The South East Asian Journal of Management, 4*(1), 53-72

O'Cass, A., and Ngo, L. V. (2007a). Balancing external adaptation and internal effectiveness: Achieving better brand performance. *Journal of Business Research*, *60*(1), 11-20.

O'Cass, A. and Viet Ngo, L. (2007b). Market orientation versus innovative culture: two routes to superior brand performance. *European Journal of Marketing*, *41*(7/8), 868-887.

Ogan, M. Y. (2010). Information sharing with key suppliers: a transaction cost theory Perspective. *International Journal of Physical Distribution & Logistics Management, 40*(7), 550 – 578.

Olavarrieta, S., and Ellinger, A. E. (1997). Resource-based theory and strategic logistics research. *International Journal of Physical Distribution & Logistics Management*, *27*(9/10), 559-587.

Oliver, C. (1997). Sustainable competitive advantage: combining institutional and resource-based views. *Strategic Management Journal, 18*(9), 697-713.

O'Reilly, C. A., Chatman, J., and Caldwell, D. F. (1991). People and organizational culture: A profile comparison approach to assessing person-organization fit. *Academy of management journal*, *34*(3), 487-516.

Orlikowski, W. J. and Baroudi, J. J. (1991). Studying information technology in organizations: research approaches and assumptions. *Information Systems Research, 2*(1), 1-28.

Othman, R., & Abdul Ghani, R. (2008). Supply chain management and suppliers' HRM practice. *Supply Chain Management: An International Journal*, *13*(4), 259-262.

Ou, C. S., Liu, F. C., Hung, Y. C., & Yen, D. C. (2010). A structural model of supply chain management on firm performance. *International Journal of Operations & Production Management*, *30*(5), 526-545.

Owens, G., & Richmond, B. (1995). Best Practices in Retailing: How to Reinvent Your Supply Chain: What Works, What doesn't. *Chain Store Age*, *71* (11), 96-98.

Pagell, M. (2004). Understanding the factors that enable and inhibit the integration of operations, purchasing and logistics. *Journal of Operations Management, 22*(5), 2004.

Pagh, J. D. and Cooper, M. C. (1998). Supply chain postponement and speculation strategies: how to choose the right strategy. *Journal of business logistics*, *19*, 13-34.

Paiva, E. L., Roth, A. V., & Fensterseifer, J. E. (2008). Organizational knowledge and the manufacturing strategy process: a resource-based view analysis. *Journal of Operations Management*, *26*(1), 115-132.

Pandey, P., Bhattacharyya, S., & Kaur, A. (2012). Exploring the role of HR practices in supply chain. *Journal of Advances in Management Research*, *9*(1), 113-123.

Pandey, V. C. and Garg, S. (2009). Analysis of interaction among the enablers of agility in supply chain. *Journal of Advances in Management Research, 6*(1), 99-114.

Panizzolo, R. (1998). Applying the lessons learned from 27 lean manufacturers: The relevance of relationships management. *International Journal of production economics*, *55*(3), 223-240.

Parise, S., & Casher, A. (2003). Alliance portfolios: Designing and managing your network of business-partner relationships. *The Academy of Management Executive*, *17*(4), 25-39.

Paulraj, A. and Chen, I. J. (2007). Strategic buyer-supplier relationships, information technology and external logistics integration. *Journal of Supply Chain Management, 43*(2), 2-14.

Paulraj, A., Chen, I. J., & Lado, A. A. (2012). An empirical taxonomy of supply chain management practices. *Journal of Business Logistics*, *33*(3), 227-244.

Patterson, K. A., Grimm, C. M. and Corsi, T. M. (2003). Adopting new technologies for supply chain management. *Transportation Research, Part E 39,* 95–121

Patton, M. Q. (1999). Enhancing the quality and credibility of qualitative analysis. *Health Services Research*, *34*(5), 1189–1208.

Peck, H. (2006). Reconciling supply chain vulnerability, risk and supply chain management. *International Journal of Logistics: Research and Applications*, *9*(2), 127-142.

Peng, D. X., Verghese, A., Shah, R., & Schroeder, R. G. (2013). The relationships between external integration and plant improvement and innovation capabilities: The moderation effect of product clockspeed. *Journal of Supply Chain Management*, *49*(3), 3-24.

Petersen, K. J. (1999). *The effect of information quality on supply chain performance: an interorganizational information system perspective* (Doctoral dissertation, Michigan State University).

Petersen, K. J., Ragatz, G. L. and Monczka, R. M. (2005). An examination of collaborative planning effectiveness and supply chain performance. *The Journal of Supply Chain Management, Spring 2005*, 14-25.

Petter, S., Straub, D. and Rai, A. (2007). Specifying formative constructs in information systems research. *MIS Quarterly, 31*(4), 623-656.

Pettit, T. J., Croxton, K. L., & Fiksel, J. (2013). Ensuring supply chain resilience: development and implementation of an assessment tool. *Journal of Business Logistics*, *34*(1), 46-76.

Pikousová, K., & Průša, P. (2013). Supplier evaluation: The first step in effective sourcing. *Journal of Transport and Supply Chain Management*, *7*(1), 4-pages.

Podsakoff, N. P., Shen, W., & Podsakoff, P. M. (2006). The role of formative measurement models in strategic management research: review, critique, and implications for future research. In D. J. Ketchen, & D. D. Bergh (Eds.),*Research methodology in strategy and management* (pp. 197-252). Emerald Group Publishing Limited.

Podsakoff, P. M., MacKenzie, S. B. and Podsakoff, N. P. (2012). Sources of method bias in social science research and recommendations on how to control it. *Annual Review of Psychology, 63,* 539–569.

Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y. and Podsakoff, N. P. (2003). Common method biases in behavioral research: a critical review of the literature and recommend remedies. *Journal of Applied Psychology, .88*(5), 879-903.

Podsakoff, P. M., and Organ, D. W. 1986. Self-reports in organizational research: problems and prospects. *Journal of Management, 12*(4), 531–544.

Power, D. (2005). Supply chain management integration and implementation: a literature review. *Supply Chain Management: An International Journal, 10*(4), 252 - 263

Prahalad, C. K. and Hamel, G. (1990). The core competence of the corporation. *Harvard Business Review*, *68*(3), 79-91.

Prajogo, D. I., and McDermott, C. M. (2011). The relationship between multidimensional organizational culture and performance. *International Journal of Operations & Production Management*, *31*(7), 712-735.

Prater, E., Biehl, M. and Smith, M. A. (2001). International supply chain agility: tradeoffs between flexibility and uncertainty. *International Journal of Operations & Production Management, 21* (5/6), 823 - 839.

Premkumar, G. P., Ramamurthy, K., and Nilakanta, S. (1994). Implementation of electronic data interchange: an innovation diffusion perspective. *Journal of Management Information Systems, 11*(2), 157–186.

Premkumar, G. P. (2000): Interorganization systems and supply chain management: an information processing perspective. *Information Systems Management*, *17* (3), 1-14.

Premkumar, G. P., Ramamurthy, K. and Saunders, C. S. (2005). Information processing view of organizations: an exploratory examination of fit in the context of interorganizational relationships. *Journal of Management Information Systems, 22*(1), 257-294.

Primo, M. A., and Amundson, S. D. (2002). An exploratory study of the effects of supplier relationships on new product development outcomes. *Journal of Operations management*, *20*(1), 33-52.

Pulles, N. J., Veldman, J., Schiele, H., & Sierksma, H. (2014). Pressure or pamper? The effects of power and trust dimensions on supplier resource allocation. *Journal of supply chain management*, *50*(3), 16-36.

Quaddus, M. (1995). Diffusion of information technology: An exploration of the stage models and facilitating the user's choice by systems approach. *PACIS 1995 Proceedings*, 58.

Qrunfleh, S. M. (2010). *Alignment of information systems with supply chains: Impacts on supply chain performance and organizational performance* (Doctoral dissertation, University of Toledo).

Qrunfleh, S., & Tarafdar, M. (2013). Lean and agile supply chain strategies and supply chain responsiveness: the role of strategic supplier partnership and postponement. *Supply Chain Management: An International Journal*, *18*(6), 571-582.

Quesada, G. (2004). A study of eProcurement technologies, procurement practices, procurement performance and their relationship. Doctoral dissertation, University of Toledo, Toledo, OH.

Quinn, J. B. (1992). *Intelligent enterprise: a knowledge and serviced based paradigm for industry*, New York: The Free Press.

Raduan, C. R., Jegak, U., Haslinda, A., & Alimin, I. I. (2009). Management, strategic management theories and the linkage with organizational competitive advantage from the resource-based view. *European Journal of Social Sciences*, *11*(3), 402-418.

Ragatz, G. L., Handfield, R. B., and Petersen, K. J. (2002). Benefits associated with supplier integration into new product development under conditions of technology uncertainty. *Journal of Business Research*, *55*(5), 389-400.

Rahman, M. and Anwar, A. (2006). Bangladesh apparel export to the us market: an examination of her competitiveness vis –a-vis chain, CPD, Paper No. 62.

Rai, A., Patnayakuni, R., & Seth, N. (2006). Firm performance impacts of digitally enabled supply chain integration capabilities. *MIS quarterly*, 225-246.

Rajagopal, P. (2002). An innovation—diffusion view of implementation of enterprise resource planning (ERP) systems and development of a research model. *Information & Management*, *40*(2), 87-114.

Rajput, A. and Bakar, A. H. M. (2011). A reprise of supply chain management in consanguinity to the industry of textile, *Marketing & Management, 9*(2), 225-236

Ralston, P. M., Blackhurst, J., Cantor, D. E., & Crum, M. R. (2015). A Structure–Conduct–Performance Perspective of How Strategic Supply Chain Integration Affects Firm Performance. *Journal of Supply Chain Management*, *51*(2), 47-64.

Rana, M. B., & Sørensen, O. J. (2013). Exploring management and entrepreneurial factors in the internationalisation of SMEs: evidence from the Bangladeshi apparel industry. *International Journal of Entrepreneurship and Small Business*, *19*(4), 517-542.

Rashed, C. A. A., Azeem, A., and Halim, Z**.** (2010). Effect of information and knowledge sharing on supply chain performance: a survey based approach. *Journal of Operations and Supply Chain Management, 3* (2), 61-77.

Ravichandran, T., & Lertwongsatien, C. (2005). Effect of information systems resources and capabilities on firm performance: A resource-based perspective. *Journal of management information systems*, *21*(4), 237-276.

Reed, R., Lemak, D. J., & Mero, N. P. (2000). Total quality management and sustainable competitive advantage. *Journal of quality management*, *5*(1), 5-26.

Ren, S. J. F., Ngai, E. W. T., & Cho, V. (2010). Examining the determinants of outsourcing partnership quality in Chinese small-and medium-sized enterprises. *International Journal of Production Research*, *48*(2), 453-475.

Rich, N. and Hines, P. (1997). Supply-chain management and time-based competition: the role of the supplier association. *The International Journal of Physical Distribution and Logistics Management*, *27*(3-4), 210-226.

Richey, R. G., Chen, H., Upreti, R., Fawcett, S. E. and Adams, F. G. (2009). The moderating role of barriers on the relationship between drivers to supply chain integration and firm performance. *International Journal of Physical Distribution & Logistics Management, 39*(10), 826-840.

Ringle, C. M., Sarstedt, M., and Straub, D.W. (2012). Editor's comments: a critical look at the use of PLS-SEM in MIS quarterly. *MIS Quarterly, 36*(1), iii-xiv.

Ringle, C., Wende, S., & Will, A. (2005). Smart-PLS Version 2.0 M3. *University of Hamburg*.

Rindskopf, D. and Rose, T. (1988). Second order factor analysis: some theory and applications. *Mulivariate Behavioral Research, 23*(1), 51-67.

Robb, D.J., Xie, B. and Arthanari, T. (2008), Supply chain and operations practice and performance in Chinese furniture manufacturing. *International Journal of Production Economics, 112*, 683-699.

Rogers, E. M. (2003). *Diffusion of Innovation*. 5th edition. Free Press, New York.

Rogers, E. M. (1991). The 'Critical Mass' in the diffusion of interactive technologies in organizations. *The information systems research challenge: survey research methods*, *3*, 245-271.

Roh, J. J., Hong, P. and Park, Y. (2008). Organizational culture and supply chain strategy: a framework for effective information flows. *Journal of Enterprise Information Management, 21* (4), 361-376

Ross, D. F. (1998). Competing Through Supply Chain Managememnt: Creating Market-Winning Strategies Through Supply Chain Partnership. Chapman & Hall, New York

Ruiz, D. M., Gremler, D. D. Washburn, J. H. and Carri´on, G. C. (2010). reframing customer value in a service-based paradigm: an evaluation of a formative measure in a multi-industry, cross-cultural context. In *Handbook of Partial Least Squares: Concepts, Methods and Application.* Vinzi, V. E.; Chin, W. W.; Henseler, J. and Wang, H. (Eds.), Springer, Germany, 535-566.

Rust, R. T., Kordupleski, R. E., & Zahorik, A. J. (1993). Why improving quality doesn't improve quality (or whatever happened to marketing?). *California Management Review*, *35*(3), 82-95.

Ryu, I., So, S., & Koo, C. (2009). The role of partnership in supply chain performance. *Industrial Management & Data Systems*, *109*(4), 496-514.

Saha, S. (2011a, May 10). Mastering management of supply chain in RMG: the hidden lever to success. *The Daily Star*, Retrieved from http://archive.thedailystar.net/newDesign/news-details.php?nid=184963

Saha, S. (2011b, May 10). Prompt responses to demand. *The Daily Star*, Retrieved from http://archive.thedailystar.net/newDesign/news-details.php?nid=184963

Sale, J. E. M., Lohfeld, L. H. and Brazil, K. (2002). Revisiting the quantitative-qualitative debate: Implications for mixed-methods research. *Quality & Quantity, 36*, 43-53.

Salvador, F., Forza, C., Rungtusanatham, M., & Choi, T. Y. (2001). Supply chain interactions and time-related performances: an operations management perspective. *International Journal of Operations & Production Management*,*21*(4), 461-475.

Sambasivan, M. and Yen, C. N. (2010). Strategic alliances in a manufacturing supply chain: Influence of organizational culture from the manufacturer's perspective. *International Journal of Physical Distribution & Logistics Management, 40*(6), 456 – 474.

Sanders, N. and Premus, R. (2005). Modeling the relationship between firm IT capability, collaboration and performance. *Journal of Business Logistics*, *26*(1), 1-23.

Sánchez, M. A., & Pérez, M. (2005). Supply chain flexibility and firm performance: a conceptual model and empirical study in the automotive industry. *International Journal of Operations & Production Management*, *25*(7), 681-700.

Santosa, P. I., Wei, K. K. and Chan, H. C. (2005). User involvement and user satisfaction with information-seeking activity. *European Journal of Information Systems, 14*, 361-370.

Sanuri Mohd Mokhtar, S. (2013). The effects of customer focus on new product performance. *Business Strategy Series*, *14*(2/3), 67-71.

Saunders, M., Thornhill, A. and Lewis, P. (2012). *Research Methods for Business students*, (6th ed). Harlow, Essex: Pearson Education Ltd.

Saxena, S. B., & Salze-Lozac'h, V. (2010). Competitiveness in the Garment and Textiles Industry: Creating a supportive environment. *A Case Study of Bangladesh*.

Schendel, D. (1994). Introduction to 'Competitive Organizational Behavior: Toward an Organizationally-Based Theory of Competitive Advantage'. *Strategic Management Journal*, *15*(S1), 1-4.

Sen, A. (2004). The US apparel industry: a supply chain review. *online] http://www.bilkent.edu.tr/~ alpersen/Papers/ApparelReview_Sen_October_2004.pdf (accessed 20 March 2012)*.

Shub, A. N., & Stonebraker, P. W. (2009). The human impact on supply chains: evaluating the importance of "soft" areas on integration and performance. *Supply Chain Management: An International Journal*, *14*(1), 31-40.

Shah, R., & Ward, P. T. (2007). Defining and developing measures of lean production. *Journal of Operations Management*, *25*(4), 785-805.

Shah, R., and Ward, P. T. (2003). Lean manufacturing: context, practice bundles, and performance. *Journal of Operations Management*, *21*(2), 129-149.

Shang, K. C., and Sun, L. F. (2004). Taxonomy in logistics management: A resource-based perspective. *International Journal of Management*, *21*(2), 149.

Sharifi, H., & Zhang, Z. (2001). Agile manufacturing in practice-Application of a methodology. *International Journal of Operations & Production Management*, *21*(5/6), 772-794.

Shepetuk, A.J. (1991). Is product development process a tortoise or a hare? *Management Review, 80* (3), 25–27.

Shenawy, E. E., Baker, T., & Lemak, D. J. (2007). A meta-analysis of the effect of TQM on competitive advantage. *International Journal of Quality & Reliability Management*, *24*(5), 442-471.

Sheu, C., Yen, H.R. and Chae, D. (2006). Determinants of supplier-retailer collaboration: evidence from an international study. *International Journal of Operations and Production Management, 26*(1), 24–49.

Shin, H., Collier, D. A., & Wilson, D. D. (2000). Supply management orientation and supplier/buyer performance. *Journal of Operations Management*, *18*(3), 317-333.

Sila, I., Ebrahimpour, M., & Birkholz, C. (2006). Quality in supply chains: an empirical analysis. *Supply Chain Management: An International Journal*, *11*(6), 491-502.

Skjoett-Larsen, T. (1999). Supply chain management: a new challenge for researchers and managers in logistics. *The International Journal of Logistics Management*, *10*(2), 41-54.

Sobel, M. (1982). Asymptotic confidence intervals for indirect effects on structural equation models. In S. Leinhardt (Ed.), *Sociological Methodology*, Jossy-Bass, 290-312.

Solaiman, M. (2013). Marketing of ready-made garments (RMG): productivity and quality are the factors for branding. *11th Chittagong Apparel Fabric & Accessories Exposition 2013*, 44-47.

Soni, G. and Kodali, R. (2012). A critical review of empirical research methodology in supply chain management, *Journal of Manufacturing Technology Management*, 23(6), 753 – 779.

Spekman, R. E., Kamauff Jr, J. W., & Myhr, N. (1998). An empirical investigation into supply chain management: a perspective on partnerships. *International Journal of Physical Distribution & Logistics Management*, *28*(8), 630-650.

Srinivasan, M., Mukherjee, D., & Gaur, A. S. (2011). Buyer–supplier partnership quality and supply chain performance: Moderating role of risks, and environmental uncertainty. *European Management Journal*, *29*(4), 260-271.

Stank, T. P., Davis, B. R., and Fugate, B. S. (2005). A Strategic framework for supply chain oriented logistics. *Journal of Business Logistics, 26*(2), 27-45.

Stock, G. N., Greis, N. P., & Kasarda, J. D. (2000). Enterprise logistics and supply chain structure: the role of fit. *Journal of Operations Management*, *18*(5), 531-547.

Stock, G. N., and McDermott, C. M. (2000). Implementing advanced manufacturing technology: The role of organizational culture. *Production and Inventory Management Journal*, *41*(3), 66-71.

Stock, J.R., Boyer, S.L. and Harmon, T. (2010). Research opportunities in supply chain management. *Journal of the Academy of Marketing Science, 38*(1), 32-41.

Stock, J. R., & Boyer, S. L. (2009). Developing a consensus definition of supply chain management: a qualitative study. *International Journal of Physical Distribution & Logistics Management, 39*(8), 690-711.

Stone, M. (1974). Cross validatory choice and assessment of statistical predictions. *Journal of the Royal Statistical Society*, *36*(2), 111-147.

Storck, J., & Hill, P. A. (2000). Knowledge diffusion through strategic communities. *MIT Sloan Management Review, 41*(2), 63–74.

Strauss, A., and Corbin, J. (1998). *Basics of Qualitative Research Techniques and Procedures for Developing Grounded Theory*. London: Sage Publication.

Stuart, F. I. (1993). Supplier partnerships: influencing factors and strategic benefits. *International Journal of Purchasing and Materials Management*, *29*(3), 21-29.

Su, Q., Song, Y. T., Li, Z., & Dang, J. X. (2008). The impact of supply chain relationship quality on cooperative strategy. *Journal of Purchasing and Supply Management*, *14*(4), 263-272.

Su, Y. F., & Yang, C. (2010). A structural equation model for analyzing the impact of ERP on SCM. *Expert Systems with Applications*, *37*(1), 456-469.

Sum, C., Yang, K., Ang, J. and Quek, S. (1995). An analysis of material requirements planning benefits using alternating conditional expectation. *Journal of Operations Management 13*(1), 35–48.

Svensson, G. (2001). Perceived trust towards suppliers and customers in supply chains of the Swedish automotive industry. *International Journal of Physical Distribution & Logistics Management*, *31*(9), 647-662.

Swafford, P. M., Ghosh, S. and Murthy, N. (2006a). The antecedents of supply chain agility of a firm: scale development and model testing. *Journal of Operations Management, 24*, 170-188.

Swafford, P.M., Ghosh, S. and Murthy, N. N. (2006b). A framework for assessing value chain agility. *International Journal of Operations & Production Management. 26*(2), 118-140

Swafford, P. M., Ghosh, S. and Murthy, N. (2008). Achieving supply chain agility through IT integration and flexibility. *International Journal of Production Economics, 116*(2), 288-297.

Tachizawa, E. M., & Thomsen, C. G. (2007). Drivers and sources of supply flexibility: an exploratory study. *International Journal of Operations & Production Management*, *27*(10), 1115-1136.

Takeuchi, H. and Quelch, J.A. (1983). Quality is more than making a good product. *Harvard Business Review 61*(4), 139–145.

Tan, K. C. (2001). A framework of supply chain management literature. *European Journal of Purchasing & Supply Management*, *7*(1), 39-48.

Tan, K. C. (2002). Supply chain management: practices, concerns, and performance issues. *The Journal of Supply Chain Management, Winter 2002*, 42-53.

Tan, K. C., Kannan, V.R., and Handfield, R. B. (1998). Supply chain management: supplier performance and firm performance. *International Journal of Purchasing and Materials Management*, *34*(3), 2-9.

Tan, K.C., Lyman, S.B. & Wisner, J.D. (2002). Supply chain management: a strategic perspective. *International Journal of Operations and Production Management, 22*(6), 614–31.

Tang, X., & Rai, A. (2012). The moderating effects of supplier portfolio characteristics on the competitive performance impacts of supplier-facing process capabilities. *Journal of Operations Management*, *30*(1), 85-98.

Tashakkori, A. and Teddlie, C. (1998). *Mixed Methodology: Combining Qualitative and Quantitative Approaches*, Sage Publications, Thousand Oaks, California.

Tasin, F. (2013). *The garment sector: strength, prospects and challenges*. http://www.thedailystar.net/beta2/news/the-garment-sector-strengthprospects-and-challenges/ (accessed on June 06, 2014).

Teece, D. J., Pisano, G., and Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal, 18*(7), 509-533.

Teller, C., Kotzab, H., and Grant, D. B. (2012). Improving the execution of supply chain management in organizations. *International Journal of Production Economics*, *140*(2), 713-720.

Temme, D., Kreis, H. and Hildebrandt, L. (2010). A comparison of current PLS Path Modeling Software: features, ease-of-use, and performance. In V. E. Vinzi, W. W. Chin, J. Henseler and H. Wang (eds.), *Handbook of Partial Least Squares, Springer Handbooks of Computational Statistics,* (737-756). Verlag Berlin Heidelberg: Springer.

Tenenhaus, M., Vinzi, V. E., Chatelin, Y. M. and Lauro, C. (2005). PLS path modeling. *Computational Statistics & Data Analysis, 48*(1), 159-205.

Terpend, R., Tyler, B. B., Krause, D. R., & Handfield, R. B. (2008). Buyer–supplier relationships: Derived value over two decades. *Journal of Supply Chain Management*, *44*(2), 28-55.

Thatte, A. A., Rao, S. S., & Ragu-Nathan, T. S. (2013). Impact of SCM practices of a firm on supply chain responsiveness and competitive advantage of a firm. *Journal of Applied Business Research (JABR)*, *29*(2), 499-530.

Theodorakioglou, Y., Gotzamani, K., & Tsiolvas, G. (2006). Supplier management and its relationship to buyers' quality management. *Supply Chain Management: An International Journal*, *11*(2), 148-159.

Thompson, J.D., (1967). *Organizations in Action*. McGraw-Hill, New York.

Tippins, M. J., & Sohi, R. S. (2003). IT competency and firm performance: is organizational learning a missing link?. *Strategic Management Journal*, *24*(8), 745-761.

Tomlin, B., (2006). On the value of mitigation and contingency strategies for managing supply chain disruption risks. *Management Science, 52*(5), 639–657.

Tracey, M., Lim, J. and Vonderembse, M. (2005). The impact of supply-chain management capabilities on business performance. *Supply Chain Management: An International Journal, 10*(3), 179-91.

Tracey, M., Vonderembse, M. A. and Lim, J. S. (1999). Manufacturing technology and strategy formulation: keys to enhancing competitiveness and improving performance. *Journal of Operations Management, 17*(4), 411-428.

Trent, R. J. (2007). *Strategic Supply Management - Creating the Next Source of Competitive Advantage*. J. Ross Publishing.

Trkman, P., Indihar Štemberger, M., Jaklič, J., & Groznik, A. (2007). Process approach to supply chain integration. *Supply Chain Management - An International Journal, 12*(2), 116-128.

Tsang, E. W., Nguyen, D. T., & Erramilli, M. K. (2004). Knowledge acquisition and performance of international joint ventures in the transition economy of Vietnam. *Journal of International Marketing*, *12*(2), 82-103.

Turner, J. R. (1993). Integrated supply chain management: what's wrong with this picture. *Industrial Engineering, 25*(12), 52-55.

Uddin, M. S. & Jahed, M. A. (2007). Garment industry: a prime mover of the socio economic development of Bangladesh. *The Cost and Management*, *35*(1), 59-70.

Upton, D. (1994). The management of manufacturing flexibility. *California management review*, *36*(2), 72-89.

U.S. Census Bureau (2012). The North American Industry Classification System (NAICS). Retrieved on December 05, 2012, from http://www.census.gov/eos/www/naics/

Van der Vaart, T., & van Donk, D. P. (2008). A critical review of survey-based research in supply chain integration. *International Journal of Production Economics*, *111*(1), 42-55.

Van der Vorst, G.A.J. and Beulens, J.M.A. (2002). Identifying sources of uncertainty to generate supply chain redesign strategies. *International Journal of Physical Distribution & Logistics Management, 32*(6), 409-30.

van Hoek, R.I., Voss, R.I. and Commandeur, H.R., (1999). Restructuring European supply chain by implementing postponement strategies. *Long Range Planning, 32*(5), 505–518.

van Hoek, R.I., Harrison, A., & Christopher, M. (2001). Measuring agile capabilities in the supply chain. *International Journal of Operations & Production Management*, *21*(1-2), 126-148.

Verdecho, M., Alfaro-Saiz, J., Rodriguez-Rodrigue, R. and Ortiz-Bas, A. (2012). A multi-criteria approach for managing inter-enterprise collaborative relationships. *Omega, 40,* 249–263

Vestal, W. C., & Lopez, K. (2004). Best practices: Developing communities that provide business value. *Knowledge networks: Innovation through communities of practice*, 142-149.

Vickery, S., Calantone, R., & Droge, C. (1999). Supply chain flexibility: an empirical study. *Journal of Supply Chain Management*, *35*(3), 16-24.

Vickery, S. K., Droge, C., Setia, P., & Sambamurthy, V. (2010). Supply chain information technologies and organisational initiatives: complementary versus independent effects on agility and firm performance. *International Journal of Production Research*, *48*(23), 7025-7042.

Vickery, S. K., Jayaram, J., Droge, C., & Calantone, R. (2003). The effects of an integrative supply chain strategy on customer service and financial performance: an analysis of direct versus indirect relationships. *Journal of operations management*, *21*(5), 523-539.

Vijayasarathy, L. R. (2010). Supply integration: an investigation of its multi-dimensionality and relational antecedents. *International Journal of Production Economics*, *124*(2), 489-505.

Vokurka, R. J. and Lummus, R. R. (2000). The role of just-in-time in supply chain management. *The International Journal of Logistics Management*, *11*(1), 89-98.

Vonderembse, M. A., & Tracey, M. (1999). The impact of supplier selection criteria and supplier involvement on manufacturing performance. *Journal of Supply Chain Management*, *35*(3), 33.

Wagner, S. M., Eggert, A., & Lindemann, E. (2010). Creating and appropriating value in collaborative relationships. *Journal of business research*, *63*(8), 840-848.

Wallach, E. J. (1983). Individuals and organizations: The cultural match. *Training and Development Journal*. 37, 29-36.

Waller, M. A., Dabholkar, P. A. and Gentry, J. J. (2000). Postponement, product customization, and market-oriented supply chain management. *Journal of Business Logistics*, *21*(2), 133-160.

Wassener, B. (2012). In an unlikely corner of Asia, strong promise of growth. *The New York Times*, April 23, 2012.

Welker, G. A., van der Vaart, T., & van Donk, D. P. (2008). The influence of business conditions on supply chain information-sharing mechanisms: a study among supply chain links of SMEs. *International Journal of Production Economics*, *113*(2), 706-720.

Wenger, E. and Snyder, W.M. (2000). Communities of practice: the organizational frontier. *Harvard Business Review, 78*(1), 139-45.

Wenger, E., McDermott, R. A., & Snyder, W. (2002). *Cultivating communities of practice: A guide to managing knowledge*. Harvard Business Press.

Wernerfelt, B. (1984). A resource-based view of the firm. *Strategic Management Journal, 5* (2), 171–180.

Wetzels, M., Odekerken-Schroder, G., and van Oppen, C. (2009). Using PLS path modeling for assessing hierarchical construct models: guidelines and empirical illustration. *MIS Quarterly, 33*(1), 177-195.

Wiengarten, F., Humphreys, P., Cao, G., Fynes, B. and McKittrick, A. (2010). Collaborative supply chain practices and performance: exploring the key role of information quality. *Supply Chain Management: An International Journal*, *15*(6), 463-473.

Williams, L. R. (1994). Understanding distribution channels: an interorganizational study of EDI adoption. *Journal of Business Logistics*, *15*(2), 173-203.

Williamson, O.E. (1975). *Markets and Hierarchies*. Prentice-Hall, Englewood Cliffs, NJ.

Williamson, O.E. (1985). *The Economic Institutions of Capitalism*, Free Press, New York.

Williamson, O.E. (1991). Strategizing, Economizing, and Economic Organization. *Strategic Management Journal*, *12* (Winter Special Issue): 75-94.

Williamson, O.E., (1994). Transaction Cost Economics and Organization Theory. *In: The Handbook of Economic Sociology*. Smelser, N.J., Swedberg, R. (Eds.), Princeton University Press, New Jersey, 77-107.

Williamson, O.E. (2008). Outsourcing: transaction cost economics and supply chain management. *Journal of*

Supply Chain Management, 44(2), 5-16.

Wilson, S. (2013, Jun 28). US suspends trade benefits for Bangladesh over safety conditions. *The Telegraph,* Retrieved from http://www.telegraph.co.uk/news/worldnews/asia/bangladesh/10147521/US-suspends-trade-benefits-for-Bangladesh-over-safety-conditions.html

Winklhofer, H., Pressey, A., and Tzokas, N. (2006). A cultural perspective of relationship orientation: using organisational culture to support a supply relationship orientation. *Journal of Marketing Management*, *22*(1-2), 169-194.

Wisner, D. J., Leong, G.K. & Tan, K. C. (2005). *Principles of Supply Chain Management: A Balanced Approach*. Thomson South-Western.

Wisner, D. J., Leong, G.K. & Tan, K. C. (2005). *Principles of Supply Chain Management: A Balanced Approach*. Thomson South-Western. cit. Keith., O. R., and Webber, M. D. (1982). Supply-chain management: logistics catches up the strategy. *Outlook.* Cit. Christopher, M. G. (1992), *Logistics, the Strategic Issue*. London: Chapman and Hall.

Wittmann, C. M., Hunt, S. D., & Arnett, D. B. (2009). Explaining alliance success: Competences, resources, relational factors, and resource-advantage theory. *Industrial Marketing Management*, *38*(7), 743-756.

Womack, J. P., and Jones, D. T. (2010). *Lean thinking: banish waste and create wealth in your corporation*. Simon and Schuster.

Wong, C. Y., Boon-Itt, S., & Wong, C. W. (2011). The contingency effects of environmental uncertainty on the relationship between supply chain integration and operational performance. *Journal of Operations Management*, *29*(6), 604-615.

Wong, C. Y. and Boon-itt, S. (2008). The influence of institutional norms and environmental uncertainty on supply chain integration in the Thai automotive industry. *Int. J. Production Economics, 115,* 400– 410.

Wu, F., Yeniyurt, S., Kim, D., & Cavusgil, S. T. (2006). The impact of information technology on supply chain capabilities and firm performance: A resource-based view. *Industrial Marketing Management*, *35*(4), 493-504.

Wu, F., Zsidisin, G., & Ross, A. (2007). Antecedents and outcomes of e-procurement adoption: an integrative model. *Engineering Management, IEEE Transactions on*, *54*(3), 576-587.

Wu, I.-L. and Chuang, C. H. (2009). Analyzing contextual antecedents for the stage-based diffusion of electronic supply chain management. *Electronic Commerce Research and Applications, 8*, 302–314.

Wu, L., Chuang, C. H., & Hsu, C. H. (2014). Information sharing and collaborative behaviors in enabling supply chain performance: A social exchange perspective. *International Journal of Production Economics*, *148*, 122-132.

Wuyts, S. and Geyskens, I. (2005). The formation of buyer-supplier relationships: detailed contract drafting and close partner selection. Journal of Marketing, 69(4), 103-117.

Xu, J. (2003). A study of the factors influencing knowledge management systems diffusion in Australia. Doctoral Dissertation, Curtin University, Perth, Australia.

Xu, J. and Quaddus, M. (2005a). Adoption and diffusion of knowledge management systems: an Australian survey. *Journal of Management Development*, *24*(4), 335-361.

Xu, J. and Quaddus, M. (2005b). A six-stage model for the effective diffusion of knowledge management systems. *Journal of Management Development, 24*(4), 362–373.

Yamin, S., Gunasekaran, A., & Mavondo, F. T. (1999). Relationship between generic strategies, competitive advantage and organizational performance: an empirical analysis. *Technovation*, *19*(8), 507-518.

Yang, J. (2014). Supply chain agility: Securing performance for Chinese manufacturers. *International Journal of Production Economics*, *150*, 104-113.

Yang, J., Wang, J., Wong, C. W., & Lai, K. H. (2008). Relational stability and alliance performance in supply chain. *Omega*, *36*(4), 600-608.

Ying, L. (2006). Supply chain flexibility: the antecedents, driving forces and impacts on performance. Doctoral Dissertation, University of Toledo, Toledo, OH.

Yoshino, M. Y. and Rangan, U. S. (1995). *Strategic alliances: an entrepreneurial approach to globalization*. Harvard Business Press.

Yu, M. M., Ting, S. C., & Chen, M. C. (2010). Evaluating the cross-efficiency of information sharing in supply chains. *Expert Systems with Applications*, *37*(4), 2891-2897.

Yusuf, Y. Y., Gunasekaran, A., Musa, A., Dauda, M., El-Berishy, N. M., & Cang, S. (2014). A relational study of supply chain agility, competitiveness and business performance in the oil and gas industry. *International Journal of Production Economics*, *147*, 531-543.

Yusuf, Y. Y., Gunasekaran, A., Adeleye, E. O., & Sivayoganathan, K. (2004). Agile supply chain capabilities: Determinants of competitive objectives. *European Journal of Operational Research*, *159*(2), 379-392.

Zboralski, K. (2009). Antecedents of knowledge sharing in communities of practice. *Journal of Knowledge Management*, *13*(3), 90-101.

Zikmund, W. G. (2003). *Business Research Methods*. 7th edn, Cengage Learning.

Zikmund, W. and Babin, B. (2012). *Essentials of marketing research*: Cengage Learning.

Zahra, S. A., Hayton, J. C., & Salvato, C. (2004). Entrepreneurship in family vs. Non-Family firms: A Resource-Based analysis of the effect of organizational culture. *Entrepreneurship theory and Practice*, *28*(4), 363-381.

Zhang, D. Z. (2011). Towards theory building in agile manufacturing strategies—Case studies of an agility taxonomy. *International Journal of Production Economics*, *131*(1), 303-312.

Zhang, D., Linderman, K., & Schroeder, R. G. (2012). The moderating role of contextual factors on quality management practices. *Journal of Operations Management*, *30*(1), 12-23.

Zhou, H., and Benton, W.C. (2007). Supply chain practice and information sharing. *Journal of Operations Management*, 25 (6), 1348-1365.

Zhou, H., Shou, Y., Zhai, X., Li, L., Wood, C., & Wu, X. (2014). Supply chain practice and information quality: A supply chain strategy study. *International Journal of Production Economics*, *147*, 624-633.

Zhu, S., & He, C. (2014). Global, regional and local: new firm formation and spatial restructuring in China's apparel industry. GeoJournal, 79(2), 237-253.

Appendix A

Interview Guide for Supply Chain Management in Apparel Industry

The primary objective of this study is to explore the present status of Supply Chain Management (SCM) implementation and practice in the apparel manufacturing organizations of Bangladesh. The study will also explore how the SCM practices contribute to improving supply chain agility and competitiveness in the apparel industry of Bangladesh. Your given answers will be treated strictly confidential and completely anonymous. Would you mind if I record this?

Introductory Questions:

Your name: .....

Your position, duties and responsibilities: .....

Type of apparel products your organization manufactures:.....

Total number of employees: .....

(SCM implementation refers to putting formal or informal procedures, policies, principles, processes or some sort of systems in place leading to execution of SCM. The SCM practice refers to the extent of use of such systems/practices incorporating SCM.)

Q1. What formal and informal processes/systems did you put in place to implement SCM in your organization? Briefly describe them.

Probe:

(a) Strategic supplier partnership processes/systems and practices
(b) Customer relationship processes and practices
(c) Information sharing systems and practices
(d) Systems for information quality and their practices
(e) Systems for ensuring operational efficiency and eliminating waste
(f) Systems for deliberately delaying final product manufacturing or distribution until receipt of a customer order
(g) Is there anything else?

Q2. What are the factors that you think influence the implementation of SCM?

Probe:

(a) Organizational norms, beliefs and values
(b) Uncertainty with demand, supplier performance and technological change
(c) Focus on customer based research
(d) Competition intensity
(e) Employee participation in informal networks
(f) Relationship with trading partners (trust, commitment, shared vision & goal)
(g) Are there any other external factors?

Q3. How do you describe your relationship with your trading partners?

Probe:

(a) Do you think it is satisfactory?
(b) Do you think it affects SCM practices?

Q4. Do you have the capability to respond to the unpredictable changes in the market quickly and effectively?

Probe:

(a) What are the requirements for achieving this?

(b) Do you think it affects competitive advantage of your organization?

Q5. How would you describe the competitive edge of your organization?

Probe:

(a) To what extent you attribute it to SCM implementation & practice?

Appendix B

Sample Script

Q1: What formal and informal processes/systems did you put in place to implement SCM in your organization? Briefly describe them.

A1(a): We have implemented a number of systems and procedures for the selection and evaluation of suppliers, performance monitoring, managing procurement procedures and documentations and assurance of materials quality. The aim is to ensure that the suppliers consistently supply the fabrics or other accessories that fully meet our requirements

There is a procedure for contracting suppliers for the purpose of procuring materials. The first step in the supply chain process is developing and getting approval of sample products and components (e.g., fabrics, button etc.) from buyers. Most of the time, there is a three-way collaboration among apparel manufacturers, buyers and suppliers in developing sample products. We negotiate on issues of goods value, party liable for bearing costs of product development and projected development time. We procure fabrics mainly from China. Once we receive an order from a buyer for a new product, we request for the product specifications such as specification of the fabric contents or composition. Based on the specification of the product requirements, we contact our fabric suppliers in China. We order for fabrics when the quality of the fabric is approved by the buyer. Our procurement team handles the matters relating to procurement and logistics including L/C (Letter of Credit) opening, fabric shipment, customs and clearing etc. We are in constant collaboration with one another. We have some formal procedures to follow in procuring our raw materials and managing our joint processes with our suppliers.

Q1(a)(1): How do you select your suppliers?

A1(a)(1): We follow a formal procedure for selecting suppliers based on some criteria. New suppliers are initially selected based on business history, product quality, business experience, market reputation or reference of other buyers, price and credit facilities, delivery performance, potential for long-term business partnership etc. for import and local purchase. There is also a system in place for periodically evaluating suppliers' performance based on different criteria such as quality, suppliers' delivery performance, price, lead time, complaints, technical co-operation, and collaboration on operations planning. We perform this for each of our suppliers on quarterly basis.

There are some buyer-nominated suppliers, and buyers directly negotiate/ communicate with them in setting different standards (e.g., for quality) for the materials or items to be supplied, who (suppliers) are responsible for any discrepancies between expected requirements and actual performance. We procure from these suppliers when the buyers advise us to do so. Then again, where buyer has no such nomination for a supplier we work with our preferred suppliers with whom we have been doing business for many years. The length of lead time is considered to determine whether we should procure

from foreign suppliers or domestic suppliers, i.e. when the lead time is short, we opt to use our local suppliers.

Q1(a)(2): What about any other collaborative efforts?

A1(a)(2): Prior to every manufacturing season, we share our demand forecasts with our suppliers. In the case of woven fabrics they prepare the grey yarn based on projected demand information we provide. Once the color is confirmed, then we instruct them to dye the fabric. In this way, we can minimize the lead time which is beneficial to both parties. With the intention of maintaining a long-term relationship, we do it regularly for ensuring operational efficiency and better delivery.

Q1(a)(3): How often do you evaluate your suppliers' performance?

A1(a)(3): We have standard format for periodic evaluation of our suppliers' performance which covers the issues that a supplier needs to focus on in order to improve their performance. In addition, we provide on-site inspection service to the local suppliers for each consignment which is beneficial for both of us. However, such support is not always possible for all foreign suppliers.

Q1(a)(4): What about suppliers' involvement in your planning process?

A1(a)(4): Suppliers are significantly involved in our planning as fulfilment and on-time delivery of buyers' orders depends on timely receipt of the required fabrics and other accessories from suppliers. Suppliers' provides key inputs including delivery capability information for our internal plan. We usually have 3 month delivery lead time for a buyer order. After receiving an order from our buyer, our planning process checks our internal production capacity and suppliers' ability to timely deliver the required materials. We preserve our production capacity for our buyers and make minor adjustment if there are any changes to be made after order has been received.

Q1(b): What formal and informal processes/practices did you put in place to meet customer requirements and manage customer relationship?

A1(b): We have implemented a system for determining and reviewing customer (buyer) requirements and maintaining communication with buyers. Major customer-related activities include providing unambiguous and accurate information supports to our sales team and buyers, determining and reviewing of buyer requirements related to products and associated service, communication channels for sharing information with buyers and gathering customer feedback and complaints, and determining courses of action based on customer feedback and complaints.

New buyers are introduced to our business capacity through an information sharing practice that includes going through the company's online profile and site visit. During site visit, we show them different check points and processes for assuring product quality and on-time delivery. For example, how we book fabrics and accessories, quality control process and engagement of workers to different checkpoints throughout our internal supply chain operation. We have our own operational manuals in

addition to buyers' manuals to ensure effective management of all operational activities in meeting buyers' requirements. We match our outcome with buyers' technical pack (specifications details) time to time in every step from sample product development to bulk production. Employee training is important for carrying out the plan of action as it has often been a setback to effective communication and coordination of all supply chain activities.

Q1(b)(1): What systems do you have for customer satisfaction evaluation?
A1(b)(1): For our self-evaluation, we have a formal procedure which includes sending a 'Self Evaluation' form to our buyers for evaluation of our performance as a supplier. Using this evaluation format buyers evaluate our performance on different segments such as on-time delivery, on-time sample product development, promptness in responding to e-mails, internal working environment, behavior of employees and on-time negotiation of shipping documents. If the score of the evaluation is less than 80%, then the need for improvement arises. This system of evaluation of customer satisfaction has been useful by which we receive important feedback and suggestions on specific areas.

Q1(b)(2): How important is it for your company to determine future customer needs?
A1(b)(2): We give high importance on this. We arrange monthly meeting with each buyer and discuss their requirements, satisfaction on product quality and customer service received. The challenge that we face now is expansion of our production capacity in relation to demand as it is much higher than our existing capacity. Currently, we have capacity of making one million products per month, but we have made 1.2 million with this existing capacity by focusing on increasing operational efficiency. The long lead time of sample product making is another issue raised by our buyers. Backward linkage is not well developed in our country and quality of most of the locally produced fabrics is poor. Sometimes, it takes 45 days to make a sample product due to long transit time required to collect fabrics from foreign suppliers. Consequently, pressure is there to complete bulk production within short period of time. So, we have our own staff in different fabric manufacturing countries to monitor the supply of fabrics to us.

Q1(b)(3): What about customers' involvement in business planning?
A1(b)(3): If there is no demand, there is no question of making and supply of products. Our internal plan is prepared based on six-month demand projection data provided by each buyer. We prepare a formal plan jointly which is called Time & Action (T&A) plan in which details are laid out about quality approval, fabric color approval, fabric shipment, fabric inspection and in-housing, production trial cutting, production cutting, production start, garment test, and finally, finished garment inspection.
We preserve capacity for each of our buyer according to our production plan. The capacity planning needs to be done carefully and requires continuous adjustment as there are huge seasonal variation in demand in different regions of the world such as Europe, USA and Asia largely in Japan and China. We aggressively plan for production with a target of 110% of capacity utilization, and have been successful

by focusing on operational efficiency and delaying delivery date for few days through mutual understanding with buyers.

Q1(c): What systems and practices have you implemented to share information with suppliers and customers?

A1(c): We have some specific formats for sharing information with our suppliers and buyers. These are used for sharing information on all the events involved in entire supply chain process such as the arrival date of raw materials, date of sample delivery, ordering fabric for bulk production, planned cut date, production start date and order delivery date.

Q1(c)(1): How do you share information?

A1(c)(1): Information is shared mainly using email and ERP system. Our ERP system is integrated across all departments within our business. Although, it is not externally integrated with suppliers and customers in true sense, it is extensively used for information exchange purpose. For example, we extract data files from our ERP system into Excel files, and then share them with buyers and suppliers.

Q1(c)(2): How about informing others in advance of changing needs?

A1(c)(2): We have formal policy of informing all supply chain partners immediately or in advance about any changes or events that may affect them. We are required to update the system with any changes immediately otherwise it can badly affect our total operation. All the supply chain partners need to follow specified deadlines, within which certain changes can be made and information regarding the changes must be shared.

The policy is equally applicable for unexpected or unpredictable changes. Unpredictable and frequent changes in the design specifications by the buyers are common. In this case, we assess the progress of ongoing production and ascertain whether it is possible to accommodate these changes. Sometimes, buyers cut down on an order in the middle of production in instances where sales drop due to seasonality or trend changes in the market. In this case, we need to sort out how the unused resources and planned production capacity can be utilized alternatively. In all of these cases, all supply chain members including our internal departments, need to share information about any changes immediately.

Q1(d): What about information quality?

Q1(d): We have systems and procedures in place to timely and accurate information sharing information timely and accurately. However, from my experience, employees with limited skills are the main challenge for effective information sharing. Information is sometimes misinterpreted or gets distorted when it flows through the hierarchy of communication. Besides electronic information sharing, we talk to the respective person at the receiving end directly and sometimes, arrange meeting with relevant teams to make sure that information is shared accurately and timely. To ensure the quality

of information, proper training of the members of different teams in the areas of sales and merchandizing, procurement, cutting, sewing and quality assurance is important.

Q1(e): What systems or practices did you put in place to ensure efficiency and eliminate waste in your manufacturing process?

A1(e): A number of aspects of lean system have been introduced and practiced in order to improve production efficiency. Production and process layout have been designed as part of the lean system which have been proved as very effective and have huge contribution to our improved operational efficiency. A number of formal teams such as process engineering team (former work study team), planning team, and production team oversee the issues related to improving operation efficiency. As customers are not willing to increase the prices of products, we have no other option than improving our productivity. We cannot offer a low price to our buyers as we have a high cost for skilled employees. We highlight more on our customer service and commitment to our customers than on a competitive price. Meeting on-time delivery requirement of customer is the key to keeping our customers happy.

We are clearly ahead of any apparel manufacturing companies in the country in waste elimination. We focus on efficiently managing machine downtime or set up time. We don't face many problems with the items that are bought as pieces and we can easily determine the number items required for an order. Fabric is the problematic one as it is bought in the measurement of yard or meter, therefore, determining the accurate consumption of fabric is challenging. We pay great attention to efficient consumption of fabrics when developing sample products and apply our own judgment from experience. We use computer software for pattern design, grading, detailing, marker layout and CAD drafting which has improved our efficiency drastically.

Q1(e)(1): Is there anything else?

A1(e)(1): We have implemented a waste water reuse treatment system for efficient use of water for washing of finished products and eliminating waste. Most of our orderings are processed through web-based systems which don't require any paper work. However, in a country like Bangladesh, paper work is still a common practice but is used to the minimum as we have a policy to reduce wastage and become environmentally friendly. For instance, our work stations are totally metal free. We use don't staple in our company. We use plastic clip instead of stapling paper.

Q1(f): Do you deliberately delay final manufacturing or assembly of a product until receipt of a customer so that you can accommodate last-minute changes in the order?

A1(f): Definitely. For example, if we run only one product in a production line, it will take more time. First, we decide what components of the production process can be completed before moving on to the final production. Maximum of 25% of the components are completed outside the production line prior to final assembly which is called 'component advance production'. The remaining, 75% of the

components are processed on the production line. Machine layout is important for Component Advance Production.

Q1(f)(1): Probe: Do you do it before confirmation of order?
A1(f)(1): Definitely after confirmation of order. Our product type does not practically fit with the postponement system. It can be applied to the raw materials that we use. Manufacturer who makes only formal pants can also implement this system by completing some parts of product such as waistbands in advance or getting some parts completed by their suppliers.

Q2: What are the factors that you think influence the implementation of SCM?
QA: The market is volatile and demand changes drastically. It's very challenging for us to survive in this market. As a country, China is the main competitor for Bangladesh. We are competing mainly on quality with China, Vietnam, Sri Lanka and India. On the other hand, price is a competitive factor for the manufacturers in Bangladesh, Thailand, Indonesia and Cambodia. Moreover, living cost in Bangladesh is increasing day by day and pressures to increase wage rate for employees in the apparel industry are also increasing. Hence, we are need to focus more on quality of product and superior customer service e.g., on-time delivery in order to survive in the market.

Q2(a): Do you think that your organizational norms, beliefs and values influence SCM implementation?
A2(a): We are in a customer oriented business and customer satisfaction is the key to survival and success. Now-a-days, buyers from across the globe are emphasizing on compliance related issues and want to ensure that production meets ethical standards. It refers to a minimal code of conduct that directs how employees are treated with regards to wages, working hours, and working environment. It is not only the buyers who have insisted us to implement the necessary measures related to compliance, our top management believe in maintaining ethical standards in business practices. We have been in this business for 25 years now. Since inception, payment of wages has never been delayed and increment has been given timely. We have established a pretty good working environment emphasizing on workplace safety in order to satisfy our internal stakeholders.

Q2(a)(1): How do you describe your internal organizational environment?
A2(a)(1): Cohesiveness among employees and inter-departmental integration are very strong in our organization because of cooperative relationship among employees. A friendly atmosphere has been created where an employee is treated as a member of the family. Line of communication is open and clearly defined and non-cooperative elements have been carefully eliminated. Top management appreciates efforts of the employees and shows concern for any issues faced by employees. Our decision making process is participative. Employees are also receptive to new ideas and practices.

Q2(a)(2): How is your organization's attitude towards innovativeness?

A2(a)(2): We work in an innovative culture. Management emphasize on attracting and maintaining talented workforce, working on new ideas, and seeks suggestions from employees to promote an innovative culture.

We are extremely customer-oriented. Our merchandising and design teams frequently visit different countries around the world in which our customers operate to analyze our existing market and future market trends. Besides, we have subscription with WGSN which provides trend forecasting service for the fashion and design industry. We get ideas from WGSN regarding trends across the globe, new developments and changes in fashion, arts, culture, colour, consumer behaviour, styles, textiles, and the latest movements in business and technology. We innovate on the ideas that we get from our own market study and WGSN and develops a large number of products as seasonal collections. Our top management's target is to get at least ten products in each category accepted by our buyers in each season. Our top management usually echo to us "don't worry whether the buyers will accept or not, but our products must excite them". As we greatly promote innovation in product designs with great variety, many of our products receive appreciation from customers. The more options you can provide, the more products customer will accept. Furthermore, we regularly seek suggestions from our preferred suppliers on how we can improve product quality, design, and overall customer satisfaction.

Q2(b): What types of environmental uncertainty do you face?

A2(b): There is a continuous advancement in production technologies with new functionalities or features. New technology is coming out with great capability of increasing productivity. For, example, a pocket setter which automatically sets and stitch pocket to garment can significantly improves production efficiency and quality of the product by reducing variability. We cannot always adopt new technology due to its initial cost. Thus, we conduct cost-benefit analysis before acquiring new technology. The factors that we consider in this regard are potential long term benefits, alternative use of existing machines in different production lines, and possible disposability of the existing machines to other manufacturers. Investment in technological implementation is also greatly depends on the nature of relationship with our supply chain partners. If there is a long-term commitment or relationship with the trading partners, we take the risk of making such investment.

Q2(b)(1): What uncertainty do you face from the customers' side?

A2(b)(1): We face trouble when actual sales vary with forecasted sales. From our long experience, we have seen that there are some customers whose demands change rapidly and frequently, and request for unreasonable favour. For instance, some customers might cut down order volume in the middle of production and request us to absorb unused materials in our factory or return these to the suppliers. This type of request negatively impacts on our profitability and relationship with suppliers. Therefore, now, we are more cautious and first gather market intelligence about a prospective buyer, analyze their

market image and position. We carefully select a new buyer and try to make a clear understanding about the terms and conditions so that we both can run the business profitably in a win-win situation.
However, problems of uncertainty with customers, with whom we have strategic partnership, are less, but problem arises from changing market situation. We make products in advance for our strategic partners which is a 'make-to-store' situation at their end and 'make-to-order' for us. If the sales go slow in the U.S. market due to economic downturn, the amount of unsold products get accumulated. On other hand, China is recently experiencing excessive cold weather. Consequently, the demand for unusual products in China has increased. Thus, the demand for products with varying order size and specification has become common now-a-days. For instance, we used to get 35% of the total orders from Asia before which increased to 45% last year. Our recent trend shows that the market for the U.S. and European countries has decreased from 55% and 35% to 20% and 15% respectively. However, the market for South America remains steady.

Q2(b)(2): What uncertainty do you face from the suppliers' side?
A2(b)(2): We used to have a culture in which apparel manufacturers dominated their suppliers as their business depends on us (manufacturer). That culture does not exist anymore. The necessity and importance of collaborative relation with suppliers is increasingly perceived to be crucial now-a-days. There is a growing realization of the rewards of working in a win-win business relationship with suppliers. The main problem that we face with our suppliers is in their commitment in terms of delivery time and product quality. However, we don't face this type of problem very often with the suppliers with whom we have long term relationship. This is a common problem with one-off type business relation in which our customer directly orders for materials from the suppliers and does not involves us in the procurement process. Again, we experience supply disruptions when our suppliers face problem with continuous availability of sufficient raw materials.

Q2(c): In your opinion, why is customer focus so important?
A2(c): We highly emphasize on having a customer focus. If we want to survive in market, we have to fulfil the customer demand which is our top most priority. To accomplish this, we need to research on future customer needs and ways of increasing our capability to meet those needs. Therefore, customer focused investment is important here.

Q2(d): How do you describe the competition?
A2(d): We are in the business of intense competition. Competition is everywhere based on quality, price, sourcing, social image, and country image. Competition might be one of the reasons for implementing SCM, but is not the main reason.

Q2(e): How do you see the role employee participation in informal networks within organization or outside the organization?

A2(e): Employees are involved in different informal networks, but potentially valuable information is mostly shared at top management level. For new ideas on product, process, and technology, we give high importance on our formal market intelligence report as our own strategy of intelligence gathering is very strong. Nevertheless, sometimes valuable information on supply source of different raw materials and accessories is received from informal networks. I think others get more benefitted from us than what we get.

Q2(f): How do describe the role of relationship with your trading partners on SCM implementation?

A2(f): Partners' trust and commitment cannot be ascertained if we don't work with them. Long-standing relationships arise from trust gained over many transactions. For selection of new trading partners, we collect and evaluate market intelligence on some key performance indicators (KPIs) such as their current business partners, market reputation, capability in terms of on-time delivery and sample development, price of materials and trust worthiness. We gather information from their current trading partners and information gathering is not always done in an ethical way. We try to ensure that the potential partner is capable of executing our requirements. Then, the relationship builds up when the business grows with them. Commitment is vital for the growth of a relationship between suppliers and manufactures (or customers). There is no alternative of it. If commitment fails then a partner loses their trust on other partners. I think trust and commitment are interdependent. Relationship among all the supply chain partners is impacted when both of us (supplier and manufacturer) think that we are bound to get into a business due to the buyer's nomination and don't show our commitment for each other. So, the relationship is a major factor in SCM and financial capability does not drive away the requirement for maintaining a good relationship with trading partners.

Q3: How do you describe your relationship quality with your trading partners?

A3: Impact of relationship quality is significant. Relationship does not grow in a day rather it grows through working together for a period of time and ongoing communication, assessments, and rewards of each other's efforts. Commitment towards complying with terms of agreement is important. Responding to the requests out of the terms and conditions becomes easy when the parties are happy with their relationship. For example, request for developing and sending a sample product within a day or expediting order delivery lead time is honoured in a cooperative relationship. Good relationship is practically advantageous as parties involved can extend their help or support to each other outside the formal agreements.

Mutual commitment and collaborative relationship are essence of effective SCM. We always desire to work with the customers who are committed to fairness in business dealings and collaborative relationship. This is how trust among the partners increases and partners work for mutual benefit of both parties by sharing the risks and rewards of the relationship.

Q4: What capability do you have for quickly and effectively responding to predictable and unforeseen changes in the marketplace environment?

A4: There is always a fluctuation in the volume of demand in different markets. Changes in the product style or design are also common phenomenon. We consider this capability as flexibility. For this reason, we have developed the capability of flexibility in order to respond to such changes in the market. Production processes are designed and arranged to accommodate changes in market demand. If you don't have this capability, there is no way to survive. We have developed good understanding with buyers and suppliers. Our buyers consider financial compensation for their last minute changes in the orders. For instance, a buyer might cancel an order or cut down an order substantially in the middle of production or shipment. So, our adjustability to a changed situation depends on the stage of our work-in-progress. In cases of unpredictable changes, good understanding and coordination with supply chain partners is critical for developing demand response capability. Market change information need to be shared along the supply chain in a timely manner. I think we are capable of capturing information on market changes and future trends in each market around the world.

Q4(a): Are there any other requirements to attain this capability?

A4(a): Prediction is crucial here. The ability to predict the worldwide market trends, future opportunities and probable threats, to identify the areas that a company need to improve on are the keys to survive in today's market which is fast changing and intensely competitive. Prediction and full preparation based on the prediction are needed to be focused.

Q4(b): What about new product introduction?

A4(b): Because of the intensity of competition, this is an important area to focus on, if you are competing in the high-end apparel market for the world's top brands. We have our own design team that includes expert members from other country. This team gathers market intelligence by physically visiting customers' markets in different countries and using WGSN resource, and other sources to develop seasonal collection of new products with the aim to attract customers. The level of capability that we have developed is rare in Bangladesh context. Fifty percent of the total products are picked from our own design by our customers in each season which indicates that our innovation is appreciated by the customers.

Q4(c): Is there anything else?

A4(c): Integration is very important. There will be disaster if there is no effective integration among all the departments. There is nothing more important than effective communication and integration as there are many departments involved in executing our supply chain processes.

Q5: How would you describe the competitive edge of your company?

A5: We are not competitive if price is the only determining factor. If you consider total package of service, we are amongst the best manufacturer in the world. We continuously work on resolving our challenges and improving our weaknesses. Customers in different market have different priority, for example, USA market emphasizes on price and delivery time. However, quality is the top most priority for Japanese customers.

We are competitive in terms of product innovation and delivery dependability. One of the biggest challenges is the political unrest. We need a stable political environment. We need to develop backward linkage within our country. Textile and accessories sectors need to be developed in accordance with our progress in the garment manufacturing industry. Although, knit based apparel industry is supported by radically improved backward linkage, woven based manufacturers suffer from the lack of support industry. Ninety percent of cotton is being imported from other countries such as India, Pakistan, and Turkey. Infrastructural development is crucial along with stable political environment. As the apparel industry is a large contributor to national economy, a separate government ministry department needs be established to address and oversee the industry.

Appendix C

Curtin University

Memorandum

To	Mohammed Abu Jahed
From	Cecilia Braun
Subject	Protocol Approval GSB 20-12
Date	15 November 2012
Copy	Prof. Mohammed Quaddus

Office of Research and Development

Human Research Ethics Committee

Telephone 9266 2784
Facsimile 9266 3793
Email hrec@curtin.edu.au

Thank you for your "Form C Application for Approval of Research with Low Risk (Ethical Requirements)" for the project titled "An Empirical Investigation of Supply Chain Management Practice, Agility an Competitive Advantage in Apparel Industry of Bangladesh". On behalf of the Human Research Ethics Committee, I am authorised to inform you that the project is approved.

Approval of this project is for a period of twelve months 15/11/2012 to 14/11/2013.

The approval number for your project is GSB 20-12. *Please quote this number in any future correspondence.* If at any time during the twelve months changes/amendments occur, or if a serious or unexpected adverse event occurs, please advise me immediately.

Kind Regards

Cecilia Braun
Program support Officer | Curtin Graduate School of Business

Curtin University
Tel | +61 8 9266 9096
Fax | +61 8 9266 3368

Hours | Mon, Tue, Thu

Email | cecilia.braun@gsb.curtin.edu.au
Web | gsb.curtin.edu.au

Please Note: The following standard statement must be included in the information sheet to participants:
This study has been approved under Curtin University's process for lower-risk Studies (Approval Number 20-12). This process complies with the National Statement on Ethical Conduct in Human Research (Chapter 5.1.7 and Chapters 5.1.18-5.1.21). For further information on this study contact the researchers named above or the Curtin University Human Research Ethics Committee. c/- Office of Research and Development, Curtin University, GPO Box U1987, Perth 6845 or by telephoning 9266 9223 or by emailing hrec@curtin.edu.au.

CRICOS Provider Code 00301J

Appendix D

Research Questionnaire

An Empirical Investigation of Supply Chain Management Practice, Agility and Competitive Advantage in Apparel Industry of Bangladesh

General Instructions

1. *Please answer the questions to the best of your knowledge. Most of the questions require your view or opinion measured on a six-point scale. There is no right or wrong answer. We are only interested in your opinion on the issues.*

2. *Responses to all questions will be kept strictly confidential. Completed questionnaires will be seen only by yourself and the researchers. Any data subsequently presented will be aggregated and therefore will not identify any particular individual.*

Definitions

For the purposes of this survey, we are using the following definitions:

1. **Supply Chain Management (SCM):** The systemic, strategic coordination of the business functions within a particular company and across businesses within the supply chain for the purposes of improving the long-term performance.

2. **SCM Implementation:** putting formal (documented) or informal procedures, policies, processes or some sort of systems in place leading to execution of SCM.

3. **SCM Practice**: the extent of practice/execution of such systems or processes incorporating SCM.

4. **Trading partner** (same as strategic partner)**:** Any external organization that plays an integral role in the company and whose business fortune depends entirely, or in part, on the success of the company. This includes buyers, suppliers, contract manufacturers, and so on.

5. **Networking:** a social process where a group of organizational members voluntarily participates in creating and sharing their knowledge.

If you have any questions or concerns, please contact: Mohammed Jahed at (+614) 5251 8080 (Australia), (+88) 01727 55 26 87 (Bangladesh) or email m.jahed@postgrad.curtin.edu.au or jahedm@gmail.com or Professor Mohammed Quaddus, email Mohammed.Quaddus@gsb.curtin.edu.au

Your cooperation in carefully completing this questionnaire is greatly appreciated

Section 1: General Information

This section consists of some general information regarding you and your firm. For the following question, please fill or check the appropriate response.

1.1 Types of products that your firms make:

[1] Knitwear [2] Woven wear [3] Knit and woven wear

1.2 Number of Machines:

[1] Less than 300 [2] 300-1000 [3] 1001-3000 [4] Over 3000

1.3 Number of employees in your organization: _____

[1] Less than 1000 [2] 1000-2500 [3] 2501-4000 [4] Over 4000

1.4 Average annual sales of your firm (in US millions of $):

[1] Under 5 [2] 5-10 [3] 11-25 [4] Over 25

1.5 Your firm has been in business for:

[1] Less than 2 years [2] 2-5 years [3] 6-10 years [4] Over 10 years

1.6 Your present job title:

[1] CEO/Chairman/Director [2] General Manager/Deputy General Manager

[3] Manager [4] Other (please indicate): _____

1.7 Your present job function (mark all that apply):

[1] Corporate Executive [2] Purchasing/Procurement [3] Production/ Operations

[4] Distribution [5] Sales [6] Merchandizing

[7] Other (please indicate): _____

1.8 The years you have worked for this organization:

[1] Less than 2 years [2] 2-5 years [3] 6-10 years [4] over 10 years

Section 2.1: Organizational Culture							
*Please select the number to indicate the extent to which you agree or disagree with each of the following statements that describe **the beliefs and underlying values shared in your firm.***		**Strongly Disagree**	**Disagree**	**Somewhat Disagree**	**Somewhat agree**	**Agree**	**Strongly agree**
Innovative Culture							
2.1.1	We encourage innovative idea generation within our organization	1	2	3	4	5	6
2.1.2	We encourage creative problem solving within our organization	1	2	3	4	5	6
2.1.3	We take challenges in designing and making new products	1	2	3	4	5	6
2.1.4	We take challenges in adopting new processes or technologies	1	2	3	4	5	6
2.1.5	We are responsive to external environmental changes	1	2	3	4	5	6
Supportive Culture							
2.1.6	We encourage teamwork in problem solving	1	2	3	4	5	6
2.1.7	We encourage participative decision making	1	2	3	4	5	6
2.1.8	We believe in co-operative relationships (helping each other)	1	2	3	4	5	6
2.1.9	We believe that relationships with trading partners are important to us	1	2	3	4	5	6
2.1.10	We believe in equitable treatment of all employees and firms in the supply chain	1	2	3	4	5	6

Section 2.2: External Influence							
*Please select the number to indicate the extent of your agreement with each statement about **the environment of your firm**.*		Strongly Disagree	Disagree	Somewhat Disagree	Somewhat agree	Agree	Strongly agree
Environmental Uncertainty							
*Please select the number to indicate the extent of your agreement with each statement about **the environmental uncertainty your firm experiences***							
2.2.1	Our buyer order quantity fluctuates continually	1	2	3	4	5	6
2.2.2	Our buyers frequently change their product order specifications	1	2	3	4	5	6
2.2.3	Buyer delivery time requirements put pressure on us	1	2	3	4	5	6
2.2.4	We need to follow up with our suppliers to ensure on time delivery of raw materials	1	2	3	4	5	6
2.2.5	We need to closely monitor our suppliers to ensure their material quality	1	2	3	4	5	6
2.2.6	We need to follow newer technology to remain competitive	1	2	3	4	5	6
2.2.7	Competition in our industry is high	1	2	3	4	5	6
2.2.8	Political unrest affects our delivery schedule	1	2	3	4	5	6
Customer Focus							
2.2.9	We are in close contact with our buyers	1	2	3	4	5	6
2.2.10	Buyer satisfaction is our main focus	1	2	3	4	5	6
2.2.11	We anticipate and respond to the evolving needs of customers	1	2	3	4	5	6
2.2.12	Buyer focus is reflected in business planning	1	2	3	4	5	6
2.2.13	We follow up with our customers for quality and delivery performance feedback	1	2	3	4	5	6
Inter-organizational Trust and Commitment							
*Please select the number to indicate the extent of your agreement with each statement about your firm's **TRUST** in your trading partners and their **COMMITMENT** to the relationship with your firm.*							
2.2.14	We believe that our trading partners are open and honest in dealing with us	1	2	3	4	5	6
2.2.15	We feel that our trading partners are reliable	1	2	3	4	5	6

2.2.16	We think that our partners have the required knowledge and capability to do business with us	1	2	3	4	5	6
2.2.17	We believe that our trading partners will be willing to offer us assistance and support in changed circumstances	1	2	3	4	5	6
2.2.18	Our trading partners keep their promises to us	1	2	3	4	5	6
2.2.19	We and our trading partners have a similar understanding of the aims and objectives of the supply chain	1	2	3	4	5	6
	Networking						
2.2.20	Informal networks help in sharing experience and business knowledge among the participants	1	2	3	4	5	6
2.2.21	Informal networks provide information about market changes and opportunities	1	2	3	4	5	6
2.2.22	We receive updates on products, technology and supply sources through networking	1	2	3	4	5	6
2.2.23	Our firm evaluates and use external knowledge	1	2	3	4	5	6

Section 3: Supply Chain Management Implementation and Practice

*Please select the number to indicate the extent of **IMPLEMENTATION** and **PRACTICE** of the following items via **formal and/or informal means (procedures, policies, processes or systems)***

Extent of Implementation							***Extent of Practice or Use***					
None or to a little	**To a some extent**	**To a moderate extent**	**To a considerable**	**To a great extent**	**To a very great extent**		**None or to a little**	**To a some extent**	**To a moderate extent**	**To a considerable**	**To a great extent**	**To a very great extent**
	3.1 Strategic Buyer Partnership											
1	2	3	4	5	6	3.1.1 Interaction with buyers to set standards for buyer requirements	1	2	3	4	5	6
1	2	3	4	5	6	3.1.2 Collaboration with buyers in planning	1	2	3	4	5	6
1	2	3	4	5	6	3.1.3 Periodic evaluation of buyer satisfaction	1	2	3	4	5	6
1	2	3	4	5	6	3.1.4 Striving to establish long term relationships with buyers	1	2	3	4	5	6
1	2	3	4	5	6	3.1.5 Buyer oriented capacity planning	1	2	3	4	5	6
	3.2 Supplier Partnership											
1	2	3	4	5	6	3.2.1 Supplier selection process	1	2	3	4	5	6
1	2	3	4	5	6	3.2.2 Supplier performance monitoring and evaluation	1	2	3	4	5	6
1	2	3	4	5	6	3.2.3 Collaboration with suppliers in planning and goal-setting activities	1	2	3	4	5	6
1	2	3	4	5	6	3.2.4 Problem solving jointly with suppliers	1	2	3	4	5	6
1	2	3	4	5	6	3.2.5 Involvement of key suppliers in product development	1	2	3	4	5	6
1	2	3	4	5	6	3.2.6 Establishing long term relationships with suppliers	1	2	3	4	5	6
	3.3 Information Sharing											
1	2	3	4	5	6	3.3.1 Formal communication procedure to share information	1	2	3	4	5	6
1	2	3	4	5	6	3.3.2 Information sharing support technologies	1	2	3	4	5	6
1	2	3	4	5	6	3.3.3 Keeping each other informed about events/ Issues that may affect other partner	1	2	3	4	5	6
1	2	3	4	5	6	3.3.4 Informing partners in advance of changing needs	1	2	3	4	5	6
1	2	3	4	5	6	3.3.5 Information exchange that help development of business planning	1	2	3	4	5	6

3.4 Information Quality												
1	2	3	4	5	6	3.4.1 Timely information sharing among the trading partners	1	2	3	4	5	6
1	2	3	4	5	6	3.4.2 Accurate information exchange among the trading partners	1	2	3	4	5	6
1	2	3	4	5	6	3.4.3 Complete information exchange among the trading partners	1	2	3	4	5	6
1	2	3	4	5	6	3.4.4 Adequate information exchange among the trading partners	1	2	3	4	5	6
3.5 Lean System												
1	2	3	4	5	6	3.5.1 Work study program to improve operational efficiency	1	2	3	4	5	6
1	2	3	4	5	6	3.5.2 Efficient utilization of machine time (e.g. using SMV, reducing set-up time between product changeovers)	1	2	3	4	5	6
1	2	3	4	5	6	3.5.3 Buyer order based production system	1	2	3	4	5	6
1	2	3	4	5	6	3.5.4 Streamlining operations, ordering and shipping processes	1	2	3	4	5	6
1	2	3	4	5	6	3.5.5 Controlling operational activities to eliminate waste	1	2	3	4	5	6
1	2	3	4	5	6	3.5.6 Continuous quality improvement program	1	2	3	4	5	6

Section 4: Employee Competency							
*Please select the number to indicate the extent to which you agree or disagree with each of the following statements that describe **the level of employee skills, and training facilities in your organization.***		**Strongly Disagree**	**Disagree**	**Somewhat Disagree**	**Somewhat agree**	**Agree**	**Strongly agree**
4.1	The overall level of employee skills are sufficient for executing supply chain management practices	1	2	3	4	5	6
4.2	Training and education for employees with regards to supply chain management are adequate	1	2	3	4	5	6
4.3	We have the facility for continual training and upgrading employee skills	1	2	3	4	5	6

Section 5: Supply Chain Relationship Quality							
*Please select the number to indicate the extent to which you agree or disagree with each of the following statements that describe **the relationship quality between your organization and your trading partners**.*		**Strongly Disagree**	**Disagree**	**Somewhat Disagree**	**Somewhat agree**	**Agree**	**Strongly agree**
5.1	We are satisfied with the outcomes from the collaboration with trading partners	1	2	3	4	5	6
5.2	Our trust in our trading partners has increased over the years	1	2	3	4	5	6
5.3	The benefits of collaboration with trading partners have been fair	1	2	3	4	5	6
5.4	We would be willing to work with our trading partners again in the future	1	2	3	4	5	6

Section 6: Supply Chain Agility							
*Please select the number to indicate the extent to which you agree or disagree with each of the following statements that describe **the capability of your firm, internally, and in conjunction with the key suppliers and buyers to respond in a speedy manner to a changing marketplace environment**.*		**Strongly Disagree**	**Disagree**	**Somewhat Disagree**	**Somewhat agree**	**Agree**	**Strongly agree**
6.1 Demand Response							
6.1.1	Our supply chain is capable of forecasting changes and opportunities in	1	2	3	4	5	6

	a timely manner						
6.1.2	Our supply chain is capable of forecasting market demand	1	2	3	4	5	6
6.1.3	We are able to leverage our partners' competencies to respond to market demand	1	2	3	4	5	6
	6.2 Flexibility						
6.2.1	We are able to provide a wide range of products (different features, sizes, colors)	1	2	3	4	5	6
6.2.2	We are able to quickly adjust capacity in response to changes in customer demand	1	2	3	4	5	6
6.2.3	We have the ability to quickly develop new product samples	1	2	3	4	5	6
6.2.4	We have backup capacity of materials, equipment, and workforce to quickly increase production if needed	1	2	3	4	5	6
	6.3 Integration						
6.3.1	There is a high level of communication and coordination between all functional departments in our firm	1	2	3	4	5	6
6.3.2	We have real-time data on the location and status of supplies and finished goods	1	2	3	4	5	6
6.3.3	Our supply chain is able to quickly exchange information	1	2	3	4	5	6
6.3.4	There are many joint planning activities with supply chain partners	1	2	3	4	5	6
	6.4 Customer Responsiveness						
6.4.1	We respond quickly and effectively to changing requirements of design specifications	1	2	3	4	5	6
6.4.2	Improving our level of customer service is a high priority	1	2	3	4	5	6
6.4.3	Improving delivery reliability is a high priority	1	2	3	4	5	6
6.4.4	We have a short order-to-delivery cycle time	1	2	3	4	5	6
6.4.5	We have fast buyer response time	1	2	3	4	5	6

Section 7: Competitive Advantage							
*Please select the number that accurately reflects the extent of your **firm's competitive advantage** on each of the following*		**Strongly Disagree**	**Disagree**	**Somewhat Disagree**	**Somewhat agree**	**Agree**	**Strongly agree**
7.1	We offer competitive prices	1	2	3	4	5	6
7.2	Our buyers perceive our products as being of higher quality	1	2	3	4	5	6
7.3	We provide dependable delivery	1	2	3	4	5	6
7.4	We provide customized products to meet buyer needs	1	2	3	4	5	6
7.5	We respond well to buyer demands for "new" features	1	2	3	4	5	6
7.6	We have fast product development time	1	2	3	4	5	6

Section 8: Organizational Performance							
*Please select the appropriate number which best indicates your **firm's overall performance since SCM implementation and practice in your firm***		**Significance Decrease**	**Decrease**	**Somewhat Decrease**	**Somewhat Increase**	**Increase**	**Significant Increase**
8.1	Market share	1	2	3	4	5	6
8.2	Return on investment	1	2	3	4	5	6
8.3	Buyer retention rate	1	2	3	4	5	6
8.4	Sales growth	1	2	3	4	5	6
8.5	Growth in return on investment	1	2	3	4	5	6
8.6	Profit margin on sales	1	2	3	4	5	6
8.7	Reduction in per unit production time	1	2	3	4	5	6
8.8	Overall competitive position	1	2	3	4	5	6

If you wish to receive a copy of the executive summary of results of this survey, please provide the following information or attach your business card:

Your name: _____ **Company: _____**

Address: _____

Tel: _____ **Email address: _____**

Thank you very much for your valuable time and assistance in completing this questionnaire!

Appendix E

Curtin University

Memorandum

To	Mohammed Abu Jahed, Graduate School of Business
From	Cecilia Braun
Subject	Protocol Approval 16-13
Date	2 July 2013
Copy	Prof. Mohammed Quaddus, Graduate School of Business

Office of Research and Development

Human Research Ethics Committee

Telephone 9266 2784
Facsimile 9266 3793
Email hrec@curtin.edu.au

Thank you for your "Form C Application for Approval of Research with Low Risk (Ethical Requirements)" for the project titled *"An Empirical Investigation of Supply Chain Management Practice, Agility and Competitive Advantage in Apparel Industry of Bangladesh"* On behalf of the Human Research Ethics Committee, I am authorised to inform you that the project is approved.

Approval of this project is for a period of 4 years **01/07/2013** to **01/07/2017**

Your approval has the following conditions:

(i) Annual progress reports on the project must be submitted to the Ethics Office.

(ii) **It is your responsibility, as the researcher, to meet the conditions outlined above and to retain the necessary records demonstrating that these have been completed.**

The approval number for your project is **16-13**. Please quote this number in any future correspondence. If at any time during the approval term changes/amendments occur, or if a serious or unexpected adverse event occurs, please advise me immediately.

Cecilia Braun
Program support Officer | Curtin Graduate School of Business

Curtin University
Tel | +61 8 9266 9096
Fax | +61 8 9266 3368

Hours | **Mon, Tue, Thu**

Email | cecilia.braun@gsb.curtin.edu.au
Web | gsb.curtin.edu.au

Please Note: The following standard statement must be included in the information sheet to participants:
This study has been approved under Curtin University's process for lower-risk Studies (Approval Number 16-13). This process complies with the National Statement on Ethical Conduct in Human Research (Chapter 5.1.7 and Chapters 5.1.18-5.1.21). For further information on this study contact the researchers named above or the Curtin University Human Research Ethics Committee. c/- Office of Research and Development, Curtin University, GPO Box U1987, Perth 6845 or by telephoning 9266 9223 or by emailing hrec@curtin.edu.au.

CRICOS Provider Code 00301J