

Copyright is owned by the Author of the thesis. Permission is given for a copy to be downloaded by an individual for the purpose of research and private study only. The thesis may not be reproduced elsewhere without the permission of the Author.

Supply Chain Collaboration

By

Togar Mangihut Simatupang

Massey University

2004



CANDIDATE'S DECLARATION

This is to certify that the research carried out for my Doctoral thesis entitled "Supply Chain Collaboration" in the Institute of Information Sciences and Technology, Massey University, Palmerston North, New Zealand is my own work and that the thesis material has not been used in part or in whole for any other qualification.

Candidate's Name: Togar Mangihut Simatupang

Signature

: 

Date

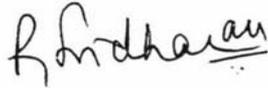
: 29-01-2004



SUPERVISOR'S DECLARATION

This is to certify that the research carried out for the Doctoral thesis entitled "Supply Chain Collaboration" was done by Togar Mangihut Simatupang in the Institute of Information Sciences and Technology, Massey University, Palmerston North, New Zealand. The thesis material has not been used in part or in whole for any other qualification, and I confirm that the candidate has pursued the course of study in accordance with the requirements of the Massey University regulations.

Supervisor's Name: Dr. R. Sridharan

Signature : 

Date : 29 JANUARY 2004



CERTIFICATE OF REGULATORY COMPLIANCE

This is to certify that the research carried out in the Doctoral Thesis entitled "Supply Chain Collaboration" in the Institute of Information Sciences and Technology at Massey University, New Zealand:

- (a) is the original work of the candidate, except as indicated by appropriate attribution in the text and/or in the acknowledgements;
- (b) that the text, excluding appendices/annexes, does not exceed 100,000 words;
- (c) all the ethical requirements applicable to this study have been complied with as required by Massey University, other organisations and/or committees which had a particular association with this study, and relevant legislation.

Ethical Authorisation code(s): the Massey University Human Ethics Committee PN Protocol 02/107.

Candidate's Name:
Togar M. Simatupang

Supervisor's Name:
Dr. R. Sridharan

Signature :

Signature :

Date

: 29-01-2004

Date

: 29 JANUARY 2004

Supply Chain Collaboration

A thesis presented in
partial fulfilment of the requirements for
the degree of Doctor of Philosophy
in Decision Science
at Massey University

Togar Mangihut Simatupang

2004

Copyright © 2004 by Togar M. Simatupang
All rights reserved.

Abstract

There is general acceptance within the literature that supply chain collaboration will become a focus area for research in supply chain management. Although collaboration has been examined widely in a variety of different contexts, relatively little attention has been given to systematically drawing them together. This study is thus conducted to offer an integrative framework in the context of an interorganisational supply chain to define collaboration by identifying its different elements and provides empirical evidence to support the theoretical framework. This framework would further allow the participating members to understand and examine the strategic importance of these elements of collaboration and what needs to be done to gain the benefits of collaboration.

The study includes a literature review, the discontent model, a theoretical framework for supply chain collaboration, measuring the level of supply chain collaboration, supporting the theory with empirical evidence, an innovative scheme for benchmarking, and an empirical study of benchmarking supply chain collaboration.

The theoretical framework offered in the study incorporates the five elements of collaboration, namely, a collaborative performance system, information sharing, decision synchronisation, incentive alignment, and streamlined intercompany business processes. To provide empirical evidence, supply chain collaboration between retailers and suppliers was chosen as a unit of analysis and data were collected from a survey of New Zealand companies.

Based on the survey results, the three empirical studies reported in this thesis provide the basis for testing a new measure for the extent of supply chain collaboration, testing the hypotheses on the relationship between supply chain collaboration and operational performance, and presenting the benchmarks for classifying high and low performing supply chains. Empirical evidence shows that collaboration between retailers and suppliers has a significant influence on operational performance.

Why Collaboration?

As iron sharpens iron, so one man sharpens another.
Proverbs

Two are better than one, because they have a good return for
their work.
Ecclesiastes

Acknowledgments

In the effort of completing this thesis over the past four years, a great many people have provided me with invaluable help along the way. I must acknowledge those whose help made this work possible. I would like to thank my doctoral supervisor, Ramaswami Sridharan, for his guidance and constant encouragement throughout this research. Sri has been a thoughtful guru and a good friend of mine who spent a lot of time with me in debating and discussing the subject matter and kept me on the right track. I am also grateful to my co-supervisor, Alan C. Wright, for his counsel and support. Alan has been instrumental in developing my critical thinking ability to analyse and synthesise the subject matter.

The research would not have been possible without the kind participation of and assistance provided by New Zealand companies. I would like to thank all those individuals involved for their willingness to respond to the research survey. I also appreciate the assistance from Pekka Orpana for allowing me to investigate his retailing company. Special thanks are dedicated to John Francis and Paul for their participation as research informants.

I would like to thank the Massey University Human Ethics Committee (MUHEC) for its approval of the survey questionnaire. I also acknowledge financial support received from the New Zealand Ministry of Foreign Affairs and Trade (MFAT). My gratitude is extended to the staff of the International Students' Office at Massey University: Charles Chua, Sylvia Hooker, Dianne Reilly, and Sue Flynn, for their support and encouragement over the last four years. The members of the Institute of Information Sciences and Technology always gave me much help by way of administrative support. I especially would like to thank Bob Hodgson, Christine Alport, Christine Bond, and Wendy Brown for their helpful support. I also would like to thank the staff of the Doctoral Research Committee (DRC): Kylie Shirley and Jackie Koenders for their administrative support.

I am grateful to Professor Pat Nolan who effectively convened the oral examination. Similarly, I am indebted to the examiners: Chuda Basnet (Waikato University, New Zealand), Professor Ishwar Murthy (IIM Bangalore, India), and Professor Bill Bailey (Massey University, New Zealand). Their comments are invaluable in improving the presentation of this thesis.

I should thank my following colleagues who provided helpful feedback on my research: Terry McGrath, Batara Simatupang, Achmad Muliadiredja, Paul Stock, Dermawan Wibisono, Antonius Priantoro, Indah Victoria, Matthew Hook, Utomo Putro, Arivin Rivaie, and Indra Surbakti. I would like to acknowledge Karen Stanley for her constructive reading and comments on earlier versions of this study. She is always positive and never tired of providing me with constructive criticism that significantly improved the exposition of my research papers. My fellow discussion group: Novia Widyaningtyas, Tjahyo Budi Setyawan, Thomas Ariawan, Maya Sugiarto, Lilis Indah, and Hariadi Sugiarto provide constant encouragement.

On a more personal note, I am indebted to my parents, Muara Tua Simatupang and Flora Diana Panggabean, who made great sacrifices to support my education. Their love, prayer, and support have encouraged me to keep pursuing challenges in my life. I am also grateful for the presence of my daughter, Ivy Devorah, in the final stage of completing this study. Finally, my wife, Indah Victoria, relentlessly encouraged me to be creative and patient in every stage of my research. I would like to thank Indah for her sustaining love, kindness, and faith in me. It is to her that I dedicate this work.

Table of Contents

Title page	i
Abstract	iii
Acknowledgements	v
Table of Contents	vii
List of Tables	xi
List of Figures	xii
CHAPTER 1:	
INTRODUCTION	1
1.1. Background	1
1.2. Justification of the Study	3
1.3. Problem Statement	7
1.4. Research Method	9
1.5. Contributions of the Study	13
1.6. Outline of the Study	16
CHAPTER 2:	
A TAXONOMY OF SUPPLY CHAIN COLLABORATION	19
2.1. Introduction	19
2.2. Prior Research Reviews	21
2.3. Building A New Taxonomy	24
2.4. Review of Supply Chain Collaboration	28
2.4.1. Interorganisational Information Systems	28
2.4.2. Interorganisational Business Processes	32
2.4.3. Interorganisational Incentive Schemes	37
2.4.2. Interorganisational Performance Systems	39
2.5. Discussion	44
2.6. Concluding Remarks	47

CHAPTER 3:	
SUPPLY CHAIN DISCONTENT	49
3.1. Introduction	49
3.2. Dysfunctional Behaviour of Supply Chain Discontent	52
3.3. Sources of Supply Chain Discontent	53
3.4. Antidotes for Supply Chain Discontent	57
3.4.1. Mutual Strategic Objectives	60
3.4.2. Appropriate Performance System	60
3.4.3. Coordination Structure	61
3.4.4. Streamlined Intercompany Business Processes	65
3.5. Discussion	65
3.6. Concluding Remarks	70
CHAPTER 4:	
A THEORETICAL FRAMEWORK FOR SUPPLY CHAIN	
COLLABORATION	73
4.1. Introduction	73
4.2. Building the Framework for Collaboration	75
4.2.1. Collaborative Performance System	78
4.2.2. Information Sharing	79
4.2.3. Decision Synchronisation	80
4.2.4. Incentive Alignment	81
4.2.5. Integrated Supply Chain Processes	83
4.3. Augmenting CPFR with SCF	83
4.4. Discussion	88
4.5. Concluding Remarks	93
CHAPTER 5:	
AN EMPIRICAL STUDY OF SUPPLY CHAIN	
COLLABORATION	97
5.1. Introduction.....	97
5.2. Conceptual Model	100
5.3. Research Method	104
5.3.1. Data Collection	107
5.3.2. Data Analysis	109
5.4. Findings	111
5.5. Discussion and Concluding Remarks	114

CHAPTER 6:	
THE COLLABORATION INDEX: A MEASURE FOR SUPPLY CHAIN COLLABORATION	117
6.1. Introduction	117
6.2. Collaboration Index	119
6.3. Research Method	120
6.4. Findings	124
6.4.1. Reliability and Validity Test	124
6.4.2. Profiles of Collaboration Index	125
6.4.1. Effects of Collaborative Practices on Performance	129
6.5. Concluding Remarks	132
CHAPTER 7:	
A CONCEPTUAL MODEL FOR BENCHMARKING SUPPLY CHAIN COLLABORATION	135
7.1. Introduction	135
7.2. Benchmarking Supply Chain Collaboration	138
7.3. Collaborative Performance System	140
7.3.1. Exception Cycle	142
7.3.2. Improvement Cycle	146
7.3.3. Review Cycle	147
7.4. Collaborative Enablers	148
7.4.1. Information Sharing	149
7.3.2. Decision Synchronisation	150
7.3.3. Incentive Alignment	150
7.5. A Conceptual Framework for Benchmarking Collaboration	151
7.6. Concluding Remarks	155
CHAPTER 8:	
BENCHMARKING SUPPLY CHAIN COLLABORATION: AN EMPIRICAL EVIDENCE	157
8.1. Introduction	157
8.2. Conceptual Model	159
8.3. Research Method	160
8.4. Findings	160
8.4.1. Reasons for Collaboration	160
8.4.2. Patterns of Collaborative Achievement	161
8.4.3. Comparison of Low and High Performers	164
8.5. Managerial Implications	168
8.6. Concluding Remarks	170

CHAPTER 9:	
CONCLUSIONS AND FUTURE RESEARCH	173
9.1. Introduction	173
9.2. Research Conclusions	174
9.3. Implications of the Findings	176
9.4. Future Research	178
REFERENCES	181
APPENDIX A: Statistical Analysis for An Empirical Study	197
APPENDIX B: Statistical Analysis for the Collaboration Index ..	211
APPENDIX C: Statistical Analysis for A Benchmarking Study ..	223
VITA	229

List of Tables

Table 2.1. Distinguishing the four research streams of supply chain collaboration .	26
Table 3.1. Comparisons with selected approaches for mitigating discontent	68
Table 4.1. The use of five features of collaboration	94
Table 5.1. Descriptive statistics of respondents	109
Table 5.2. Measurement statistics for predictor variables	110
Table 5.3. Standardised beta coefficients for realised performance	111
Table 5.4. Standardised coefficients of moderated regression analysis	112
Table 6.1. Measurement for three dimensions of collaboration	122
Table 6.2. The sensitivity test	128
Table 6.3. Analysis of variance for the effects of collaborative practices on operational performance	130
Table 6.4. The mean differences in responsiveness between high and low levels of information sharing practices	132
Table 7.1. Characteristics of collaborative performance system	143
Table 8.1. Differences in means in the use of information sharing practices between high and low performers	165
Table 8.2. Differences in means in the use of decision synchronisation practices between high and low performers	166
Table 8.3. Differences in means in the use of incentive alignment practices between high and low performers	168

List of Figures

Figure 2.1. The taxonomy of research on supply chain collaboration	25
Figure 3.1. Identifying multiple sources of supply chain discontent	54
Figure 3.2. Antidotes for supply chain discontent	59
Figure 3.3. A value creation path model	60
Figure 3.4. Displaying the spectrum of coordination structure	62
Figure 3.5. The discontent model: identifying and mitigating discontent	66
Figure 4.1. A simple structure of a collaborative supply chain	76
Figure 4.2. The collaborative supply chain framework (CSCF)	77
Figure 4.3. The generic model of CPFR	85
Figure 5.1. A hypothesis framework for supply chain collaboration	101
Figure 6.1. The concept of the collaboration index	120
Figure 6.2. A scatter plot of collaboration index versus performance index	126
Figure 6.3. Unweighted and weighted mean scores of IS, DS, and IA	127
Figure 7.1. A conceptual model for collaborative performance system	141
Figure 7.2. The framework for collaborative enablers	149
Figure 7.3. A conceptual framework for collaborative benchmarking	153
Figure 8.1. The collaboration-performance profiles	162
Figure 8.2. The four types of collaboration	163