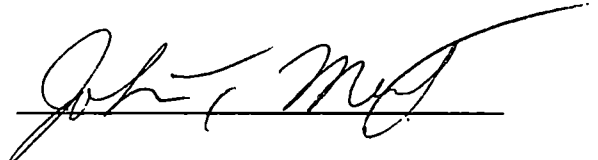


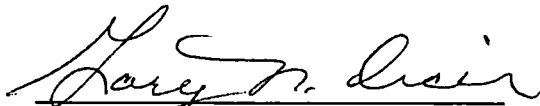
To the Graduate Council:

I am submitting herewith a dissertation written by Nancy W. Nix entitled "Attributes, Consequences and Value of the Global Integration of Supply Chain Activities and Processes in the Global Company: Applying Means-End Theory and the Value Hierarchy." I have examined the final copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Business Administration.

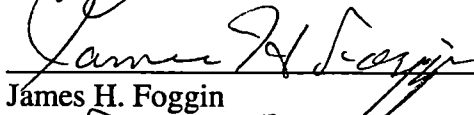


John T. Mentzer, Major Professor

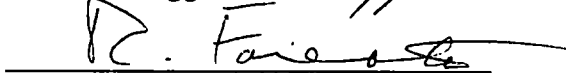
We have read this dissertation
and recommend its acceptance:



Gary N. Dicer

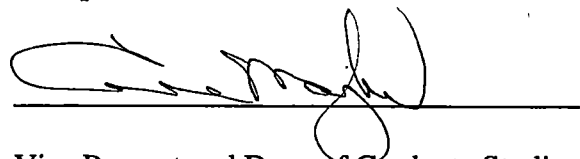


James H. Foggin



Ronald Foresta

Accepted for the Council:



Vice Provost and Dean of Graduate Studies

**ATTRIBUTES, CONSEQUENCES AND VALUE OF THE GLOBAL
INTEGRATION OF SUPPLY CHAIN ACTIVITIES AND PROCESSES
IN THE GLOBAL COMPANY: APPLYING MEANS-END THEORY AND
THE VALUE HIERARCHY**

**A Dissertation
Presented for the
Doctor of Philosophy
Degree
The University of Tennessee, Knoxville**

**Nancy W. Nix
December 2001**

Copyright © 2001 by Nancy W. Nix

All rights reserved

DEDICATION

This dissertation is dedicated to my husband

Clifford E. Nix

who has given me tremendous encouragement throughout the journey. Without his
patience and support, this would not have been possible.

ACKNOWLEDGEMENTS

There are many people whose contribution to this dissertation I would like to acknowledge. The encouragement and support of the Marketing and Logistics faculty have been invaluable throughout the doctoral program. I would like to thank the members of my Doctoral Committee, Dr. John T. Mentzer, Dr. Gary N. Dicer, Dr. James H. Foggin, and Dr. Ronald Foresta, for giving their time and energy through this process. I am especially grateful to Dr. John T. Mentzer for his encouragement and counsel, and for being a role model in so many ways.

I would like to express my appreciation to the companies who gave of their time and resources to assist in this research. I would also like to thank Cheryl Handler and Ann Morrow for their invaluable contribution toward ensuring objectivity and completeness in the analysis process.

Finally, I would like to express my gratitude to my parents, George and Amanda Martin, for giving me a great appreciation for continuing education and life-long learning.

Abstract

This study investigated the value of global integration of supply chain activities and processes for global companies. In-depth interviews were conducted with thirty-five managers in three global businesses, and included representatives from across supply chain functions and geographic regions. The participating businesses represented three industries with different environmental influences. Means-end theoretical frameworks and research methodologies were applied in the analysis process. Hierarchical value maps developed for each business provided a visual representation of the attributes, consequences, goals and values of global integration important to each. Similarities across businesses were examined to identify processes important to achieve global integration. The costs and benefits to the firm, and overall contribution to the firm's goals or objectives were also identified. Differences across firms were examined to explain the influence of environmental and organizational factors.

Theoretical frameworks and research propositions were developed to describe the relationships between environmental factors and the attributes, consequences, goals, and values of global integration for three distinct areas: (1) at the supplier interface, (2) at the customer interface, and (3) across supply chain functions. The three participating businesses differed in the focus of their global integration initiatives, as well as the degree of cross-functional integration considered important. However, in every case, global integration of specific supply chain activities and processes were important to the firm's ability to achieve business objectives.

Global integration at the supplier and customer interface results in increased bargaining power and/or improved relationships with important global suppliers and customers. Global integration of cross-functional supply chain processes results in operating flexibility to dynamically balance global sources of supply with global demand. Such operating flexibility allows the firm to dynamically realign scarce supply to selectively satisfy demand globally. As a result, firms can optimize their product mix and more effectively utilize raw materials and production capacity. Such operating flexibility also gives firms the ability to exploit geographic differentials in growth and profitability, and minimize the risk associated with demand variability.

TABLE OF CONTENTS

CHAPTER 1: INTRODUCTION.....	1
BACKGROUND.....	1
The "Multinational" versus the "Global" Company.....	4
Global Integration Strategy Choices.....	9
Supply Chain Activities and Processes in the MNC.....	11
Means-End Theory and the Value Hierarchy.....	16
The Global Integration Value Hierarchy.....	19
Personal Construct Theory.....	20
THE PURPOSE OF THIS RESEARCH.....	22
RESEARCH APPROACH.....	23
DISSERTATION ORGANIZATION.....	26
 CHAPTER 2: LITERATURE REVIEW.....	 28
INTRODUCTION.....	28
DRIVERS FOR GLOBAL INTEGRATION.....	29
THE EVOLUTION OF THE MNC AND MNC INQUIRY.....	33
CONCEPTUAL FOUNDATIONS IN GLOBAL STRATEGY.....	35
SUPPLY CHAIN IMPLICATIONS OF GLOBAL STRATEGY.....	45
CURRENT RESEARCH ON GLOBAL INTEGRATION	
OF SUPPLY CHAIN ACTIVITIES AND PROCESSES.....	51
THE VALUE OF GLOBAL INTEGRATION.....	53
The Value Equation.....	54
Means-End Theory.....	58
THE GLOBAL INTEGRATION VALUE HIERARCHY.....	63
Environmental and Organizational Influences.....	64
Attributes of Global Integration.....	65
Consequences of Global Integration.....	66
Value of Global Integration – Desired Goals or Purposes.....	67
FOCUS OF THIS RESEARCH.....	67
Domain.....	68
Research Questions.....	69
A Priori Assumptions.....	69
SUMMARY.....	71
 CHAPTER 3: RESEARCH METHODOLOGY.....	 73
INTRODUCTION.....	73

QUALITATIVE RESEARCH.....	75
DATA COLLECTION.....	79
Sampling.....	79
Soliciting Participants.....	84
The Interview Process.....	85
The Interview Guide.....	87
DATA ANALYSIS.....	92
Content Analysis and Coding.....	92
Documentation of the Research Process.....	96
Research Protocol.....	97
VALIDITY, RELIABILITY AND CREDIBILITY.....	97
How can we know whether to have confidence in the findings?.....	98
How do we know the degree to which the findings apply in other contexts?.....	100
How do we know the findings would be repeated if the study were replicated?	100
How do we ensure objectivity of the research?.....	102
Is there subject bias in the results?.....	102
LIMITATIONS OF THIS RESEARCH.....	103
SUMMARY OF RESEARCH METHODOLOGY.....	104
 CHAPTER 4: DATA ANALYSIS AND FINDINGS.....	106
INTRODUCTION.....	106
THEORETICAL SATURATION AND REPRESENTATIVENESS.....	106
Sample Demographics.....	106
THE DATA ANALYSIS PROCESS.....	108
Introduction.....	108
Data Preparation.....	111
Identification of Important Concepts or Themes.....	111
Identification of Important Relationships.....	119
Identification of Dominant Patterns.....	122
ANALYSIS & FINDINGS.....	131
Business Profiles.....	131
Analysis of Hierarchical Value Maps.....	142
Relationships Among Theme Categories.....	145
Supply Chain HVM's.....	151
Goal-Related Themes.....	183
RESEARCH CONCLUSIONS.....	189
Objectives of Global Integration of Supply Chain Activities and Processes.....	190
Balancing Global Supply and Demand.....	190

Managing Relationships with Influential Global Supply Chain Partners.....	203
Summary.....	210
ASSESSMENT OF A PRIORI ASSUMPTIONS.....	211
SUMMARY.....	215
 CHAPTER 5: CONCLUSIONS AND IMPLICATIONS.....	217
INTRODUCTION.....	217
RESEARCH BACKGROUND.....	218
GLOBAL INTEGRATION OF CROSS-FUNCTIONAL SUPPLY CHAIN PROCESSES.....	219
Global Integration Value Hierarchy.....	220
Differentiation among Dimensions of Supply Chain Activities and Processes.....	227
Environmental and Organizational Factors.....	228
Theoretical Model and Research Propositions.....	232
Summary.....	237
GLOBAL INTEGRATION AT THE SUPPLIER INTERFACE.....	238
Global Integration Value Hierarchy.....	238
Differentiation among Dimensions of Supply Chain Activities and Processes.....	246
Environmental and Organizational Factors.....	247
Theoretical Model and Research Propositions.....	249
Summary.....	253
GLOBAL INTEGRATION AT THE CUSTOMER INTERFACE.....	253
Global Integration Value Hierarchy.....	254
Differentiation among Dimensions of Supply Chain Activities and Processes.....	259
Environmental and Organizational Factors.....	261
Theoretical Model and Research Propositions.....	262
Summary.....	265
SUMMARY CONCLUSIONS.....	266
Global Integration Value Hierarchy.....	266
Differentiation among Dimensions of Supply Chain Activities and Processes.....	268
Environmental and Organizational Factors.....	272
Summary.....	273
CONTRIBUTIONS OF THIS RESEARCH.....	273
Theoretical Implications.....	273

Managerial Implications.....	277
RESEARCH LIMITATIONS.....	282
SUGGESTIONS FOR FUTURE RESEARCH.....	284
CONCLUDING REMARKS.....	287
REFERENCES.....	289
APPENDICES.....	298
APPENDIX A-1: RESEARCH PROTOCOL	299
APPENDIX A-2: INTERVIEW GUIDE.....	305
APPENDIX A-3: SOLICITATION LETTER.....	308
APPENDIX A-4: DOCUMENTATION OF THE CODING PROCESS.....	313
APPENDIX A-5: SUMMARY OF UNIQUE THEMES.....	321
APPENDIX A-6: SUMMARY IMPLICATION MATRICES.....	329
APPENDIX A-7: DESCRIPTIONS OF THEMES	332
APPENDIX A-8: HIERARCHICAL VALUE MAPS FOR GENERIC THEME CATEGORIES.....	338
VITA.....	347

LIST OF TABLES

Table 2.1	Approaches to Globalization.....	36
Table 4-1.	Sample Demographics by Business and Region.....	109
Table 4-2.	Sample Demographics by Business and Managerial Function.....	109
Table 4-3.	Summary Overview of the Analysis Process.....	110
Table 4-4.	Inter-judge Reliability in Initial Coding of Attributes, Consequences, Goals and Values.....	115
Table 4-5.	Inter-judge Reliability in Coding of Unique Themes.....	117
Table 4-6.	Summary Data - Identification of Important Linkages Between Themes.....	121
Table 4-7.	Generic Theme Categories and Definitions.....	124
Table 4-8.	Supply Chain Related Themes.....	126
Table 4-9.	Goal Related Themes.....	127
Table 4-10.	Organizational Themes.....	128
Table 4-11.	Information Related Themes.....	128
Table 4-12.	Business Process Management Themes.....	130
Table 4-13.	Participant Company Business Profiles.....	132-134
Table A-4.1.	Coding for Levels in the Value Hierarchy.....	318
Table A-4.2.	Coding for Supply Chain Dimensions.....	319
Table A-4.3.	Coding for Other Factors.....	320
Table A-5.1.	Communications Technologies – Goal Related Themes.....	321
Table A-5.2.	Global Chemicals – Goal Related Themes.....	321
Table A-5.3.	Leading Edge Fibers – Goal Related Themes.....	322

Table A-5.4. Communications Technologies - Consequence Themes.....	323
Table A-5.5. Global Chemicals Consequence Themes.....	324
Table A-5.6. Leading Edge Fibers Consequence Themes.....	325
Table A-5.7. Communications Technologies Attribute Themes.....	326
Table A-5.8. Global Chemicals Attribute Themes.....	327
Table A-5.9. Leading Edge Fibers Attribute Themes.....	328
Table A-6.1. Communications Technologies Summary Implication Matrix (Total Direct and Indirect Linkages).....	329
Table A-6.2. Global Chemicals Summary Implication Matrix (Total Direct and Indirect Linkages).....	330
Table A-6.3. Leading Edge Fibers Summary Implication Matrix (Total Direct and Indirect Linkages).....	331
Table A-7.1. Descriptions of Supply Chain Related Themes.....	332-333
Table A-7.2. Descriptions of Goal Related Themes.....	334
Table A-7.3. Descriptions of Organizational Themes.....	335
Table A-7.4. Descriptions of Information Related Themes.....	336
Table A-7.5. Descriptions of Business Process Management Themes.....	337

LIST OF FIGURES

Figure 1-1. A Framework for Global Strategy.....	10
Figure 1-2. Dimensions of Global Integration of Supply Chain Activities and Processes.....	14
Figure 1-3. The Value Hierarchy.....	17
Figure 1-4. Global Integration Value Hierarchy.....	20
Figure 1-5. Focus Areas for Research.....	24
Figure 4-1. Communications Technologies: Category-Level Hierarchical Value Map.....	146
Figure 4-2. Global Chemicals: Category-Level Hierarchical Value Map.....	147
Figure 4-3. Leading Edge Fibers: Category-Level Hierarchical Value Map.....	148
Figure 4-4. Communications Technologies: Supplier Related Hierarchical Value Map.....	152
Figure 4-5. Global Chemicals: Supplier Related Hierarchical Value Map.....	153
Figure 4-6. Leading Edge Fibers: Supplier Related Hierarchical Value Map.....	154
Figure 4-7. Communications Technologies: Firm Level Themes Hierarchical Value Map.....	161
Figure 4-8. Global Chemicals: Firm Level Themes Hierarchical Value Map.....	162
Figure 4-9. Leading Edge Fibers: Firm Level Themes Hierarchical Value Map.....	163
Figure 4-10. Communications Technologies: Customer Related Hierarchical Value Map.....	175
Figure 4-11. Global Chemicals: Customer Related Hierarchical Value Map.....	176
Figure 4-12. Leading Edge Fibers: Customer Related Hierarchical Value Map.....	177
Figure 4-13. Communications Technologies: Goal Related Hierarchical Value Map.....	184

Figure 4-14. Global Chemicals: Goal Related Hierarchical Value Map.....	185
Figure 4-15. Leading Edge Fibers: Goal Related Hierarchical Value Map.....	186
Figure 4-16. Globally-Integrated Management of Cross-Functional Supply Chain Activities and Processes.....	192
Figure 4-17. Managing Process for Realigning Scarce Interchangeable Sources of Supply to Strategic Global Demand.....	195
Figure 4-18. Approach to Global Integration.....	199
Figure 4-19. Globally Integrated Management of Supplier Related Activities and Processes.....	204
Figure 4-20. Globally-Integrated Management at the Customer Interface.....	209
Figure 5-1. Global Integration Value Hierarchy for Cross-Functional Supply Chain Processes.....	221
Figure 5-2. Theoretical Model of Global Integration of Cross-Functional Supply Chain Processes.....	233
Figure 5-3. Global Integration Value Hierarchy at the Supplier Interface.....	239
Figure 5-4. Theoretical Model of Global Integration at the Supplier Interface.....	250
Figure 5-5. Global Integration Value Hierarchy at the Customer Interface.....	255
Figure 5-6. Theoretical Model of Global Integration at the Customer Interface.....	264
Figure A-8.1. Communications Technologies: Organizational Themes Hierarchical Value Map.....	338
Figure A-8.2. Global Chemicals: Organizational Themes Hierarchical Value Map.....	339
Figure A-8.3. Leading Edge Fibers: Organizational Themes Hierarchical Value Map.....	340
Figure A-8.4. Communications Technologies: Information Related Themes Hierarchical Value Map.....	341

Figure A-8.5. Global Chemicals: Information Related Themes Hierarchical Value Map.....	342
Figure A-8.6. Leading Edge Fibers: Information Related Themes Hierarchical Value Map.....	343
Figure A-8.7. Communications Technologies: Business Process Management Themes Hierarchical Value Map.....	344
Figure A-8.8. Global Chemicals: Business Process Management Themes Hierarchical Value Map.....	345
Figure A-8.9. Leading Edge Fibers: Business Process Management Themes Hierarchical Value Map.....	346

CHAPTER 1: INTRODUCTION

BACKGROUND

The globalization of businesses is a topic that has received a great deal of press in recent years. Increasingly, firms look to foreign markets for growth opportunities, or to foreign suppliers for improved sourcing opportunities. This increased interest in foreign business has been reflected in several trends. The value of world exports has grown from \$108 billion in 1958 to more than \$8 trillion in 1999. Foreign direct investment (FDI), which has been utilized by firms as a means to expand into foreign markets and access foreign supply, has grown faster than world trade (Kreinin 1998; World Bank 2000). By the end of 1999, total outward FDI was estimated at \$4.7 trillion, and an estimated 63,000 parent firms had 690,000 foreign affiliates with sales of approximately \$14 trillion in 1999 (UNCTAD 2000).

The pressure of global competition is frequently cited as a primary driver for greater customer demands for improved products and services. These increased demands have caused businesses to pursue a number of initiatives in an effort to improve their competitive position. Such initiatives include global integration to achieve economies of scale and scope and operating flexibility (Kogut 1985; Prahalad and Doz 1987; Kogut 1989; Yip 1992; Bartlett and Ghoshal 1998), implementation of just-in-time (JIT) and quick-response (QR) inventory management policies, business re-engineering, and supply chain management (Houlihan 1985; Jones and Riley 1987; Ellram 1991). There is no shortage of improvement opportunities for firms. However, each of those opportunities

requires ongoing investment of precious resources, and it is unlikely that a firm can effectively pursue every opportunity that presents itself at any given time.

In examining supply chain management initiatives in the chemical industry, through a series of in-depth interviews and group discussions with more than 15 companies, Partsch, et. al. (1998) found that firms pursued improvements in an evolutionary manner, and the path of that evolution was different for different firms. The decision about which initiative to pursue at any given time appeared to be driven by: (1) the perception of the benefit or value that could be derived from that particular initiative, and (2) the current state of resource capability in the company, which dictated what kind of investment of time and resources would be required to pursue that particular initiative.

Interestingly, for these firms in the chemical industry, global integration was cited as a critical driver for success and yet most companies were not managing supply chain activities and processes on a global basis. While there was consensus that global integration could be very beneficial, without the appropriate tools (i.e., information systems) in place this was not considered to be a viable alternative. In other words, for these firms, until the basic resources and capabilities were in place, the costs of pursuing global integration initiatives appeared to outweigh the potential benefits.

Based on a review of the literature, it appears there are 3 distinct paths of supply chain improvement initiatives to be considered in the management of a global company: (1) integration of supply chain processes, (2) strategic management of supply chain activities, and (3) global integration (globally integrated management) of supply chain processes and activities. Much of the emphasis on global integration is found in the

strategy literature and is focused on the importance of global integration to the competitive position of global companies (most frequently referred to as multinational companies or MNC's). However, in this body of literature, no attention is given to the multiple dimensions of supply chain (or value-chain) activities to be considered as candidates for global integration. The focus on supply chain process integration can be found in literature pertaining to supply chain management, but here little attention is given to supply chain issues unique to global companies. Similarly, little attention has been given to the global integration of supply chain activities and processes in global companies. Finally, the focus on strategic management of supply chain activities can be found in literature pertaining to the respective supply-chain related disciplines (e.g., purchasing, logistics, and customer service), but limited attention has been given to the issue of integrated management of those supply-chain disciplines in the global company.

What is missing in the extant literature is an integrated framework that can help managers in global companies make choices among the many global supply chain improvement opportunities available to them. Much of the literature is normative, positing that a company "must" pursue the initiative of interest to remain competitive. And yet, it is the ability of the firm to focus scarce resources on those opportunities with the greatest potential to add value that is likely to dictate the competitive success of the firm. The focus of this research was to understand the cost and value trade-offs in a multi-dimensional portfolio of global supply chain integration initiatives available to the global company.

The "Multinational" versus the "Global" Company

The term "multinational company" or "MNC" has traditionally been used to describe companies who own assets and conduct business in multiple regions of the world. The UN defines the MNC as "enterprises which own or control production or service facilities outside the country in which they are based," who have at least 25 – 30% of revenues from foreign operations and are managed on a world-wide basis. Thus defined, the multinational company (MNC) plays a significant role in the global economy. By the late 1990's, there were an estimated 63,000 MNC's worldwide, with more than 690,000 affiliates (UNCTAD 2000). According to 1990 UN estimates, 80% of foreign direct investment worldwide are attributed to the largest 500 MNC's, and roughly one third of the world's private sector productive assets are under the governance of MNC's (UNCTAD 1994). As of 1993, an estimated one third of worldwide exports took place on an intra-firm basis. Worldwide exports grew from an estimated \$4.3 trillion in 1993 to \$8.3 trillion by 1999. According to 1999 estimates, the largest 100 MNC's have \$2 trillion in foreign sales, and the largest 25 MNC's have \$2 trillion in foreign assets (UNCTAD 1995; UNCTAD 2000). These estimates clearly demonstrate the significance of the MNC in the global economy.

As indicated previously, the primary focus of the global strategy literature is the multinational company (MNC), but this same focus is not evident in the literature pertaining to supply chain management or supply chain related disciplines. Yet the role of the multinational company in the global economy is significant and the supply chain

decisions to be made are uniquely complex, such that the focus of this research on the "MNC" seems warranted.

Wilkins (1997 p. 37) notes that the MNC is, and will likely continue to be, a "vital institution in the world economy." As a result, understanding why such an enterprise exists, where a firm chooses to expand, what options are available and when specific options are adopted, and how its management goes about making strategic decisions are important issues for international business inquiry (Wilkins 1997). Wilkins also notes that a theory of the MNC cannot simply look at inputs and outputs, but must also look internally at management of the firm, to understand "what happens within the firm as well as in the firm's relationships to external markets" (Wilkins 1997 p. 37). However, the MNC has seldom been the focus of discipline-based research (Doz and Prahalad 1991). Of a total of 28 articles surveyed related to international purchasing, logistics and supply chain management, more than 70% were unrelated to the MNC, and only four (or 14%) were related to the managing processes of the MNC. Of those four, two were descriptive case studies of a single firm. This suggests that little has been done to understand the strategies, objectives, organization and managing processes of the MNC regarding global integration of supply chain activities.

While the term MNC has been used to describe firms owning assets and operating in multiple regions, distinctly different business models can be observed among such firms. Bartlett and Ghoshal (1998) identified four distinct business models that differentiate businesses operating in multiple countries. The generic reference to the MNC as a company owning assets and operating in multiple business regions serves as an

umbrella term encompassing all four models, and these authors characterize only one of the four models as the multinational company. The other business models are characterized as the international company, the global company, and the transnational company. Each model has different strategic thrusts, organizational structures, and management processes, and each requires a different approach to global integration.

In the first business model, the *multinational company* typically has operations in multiple countries that operate with a great deal of freedom and autonomy from corporate headquarters or other company operations. The second model, the *international company*, is one in which the firm is focused primarily on transferring and adapting the parent company's products and ideas to foreign markets. The third model, the *global company*, treats world markets as an integrated whole, and manages their worldwide operations to serve the global marketplace. In the case of the global company business model, globally integrated management of business activities and processes becomes a much more significant issue than in the first two business models.

These three models have been utilized historically by companies operating on a global scale. Bartlett and Ghoshal (1998) suggest that, in the past, each of these three models could be effective, so long as the firm's approach fit the strategic demands of its business. However, increasing pressures toward global integration, local differentiation, and world-wide innovation will require firms to manage toward global efficiency, local responsiveness, and world-wide transfer of knowledge and capability simultaneously. Thus, in order to compete in the future, Bartlett and Ghoshal (1998) argue that a firm must manage its global operations with a different model utilizing a more balanced

approach, or must become what they describe as a *transnational company*. The transnational company will operate a dispersed, interdependent, and specialized network of assets and capabilities, leveraging globally where it makes sense, yet being responsive to differences in local markets where required. Supply chains will, likewise, take advantage of global networks to achieve scale and operating flexibility, but operate locally when advantageous.

Ohmae (1989; 1999) suggests the need for moving away from centralized global management toward a model of multiple regional headquarters, with a corporate management process that is "equidistant" from global customers. In this *multiregional company* model, regional organizations have responsibility for strategy, planning and operations within their respective regions, while corporate headquarters maintains corporate service and resource allocation functions. The strategic thrust of this model is one of maintaining a global focus on corporate strategy, while maintaining an "insider" perspective on customers to be able to understand and respond to local customers' needs. In this model, as in the multinational model, the emphasis is on local responsiveness to customers. However, unlike the multinational model, individual country units are not autonomous, but rather take direction from regional headquarters in terms of strategy, planning and operations, and remain dependent on corporate headquarters for resources.

Questions regarding the value of globally integrated management of supply chain activities and processes, which is the focus of this research, are particularly relevant for global and/or transnational companies in the Bartlett and Ghoshal (1998) business model framework. For the global company, which treats world markets as an integrated whole,

and manages their worldwide operations to serve the global marketplace, integrated management of supply chain activities and processes is likely to be critical. For the transnational company described by Bartlett and Ghoshal (1998), the importance of balancing both global efficiency and local responsiveness increases, and selectivity in the decisions about what will be managed on a global basis and where global activities will be located may be greater. The transnational model is described as an integrated network in which the flows of components, products, resources, people and information must be managed. The management process in the transnational company must integrate tasks and perspectives by establishing “rich and complex communication linkages, work interdependencies, and formal and informal systems” across a global network of assets and resources (Bartlett and Ghoshal 1998 p. 70). The need is for highly flexible coordination processes, but scarce resources must be allocated to the coordination task based on a careful assessment of specific demands. In other words, while global management is required to achieve global economies of scale and world-wide innovation, the multinational firm must be selective in determining which activities should be coordinated on a global basis and which activities should be managed at a regional or local level.

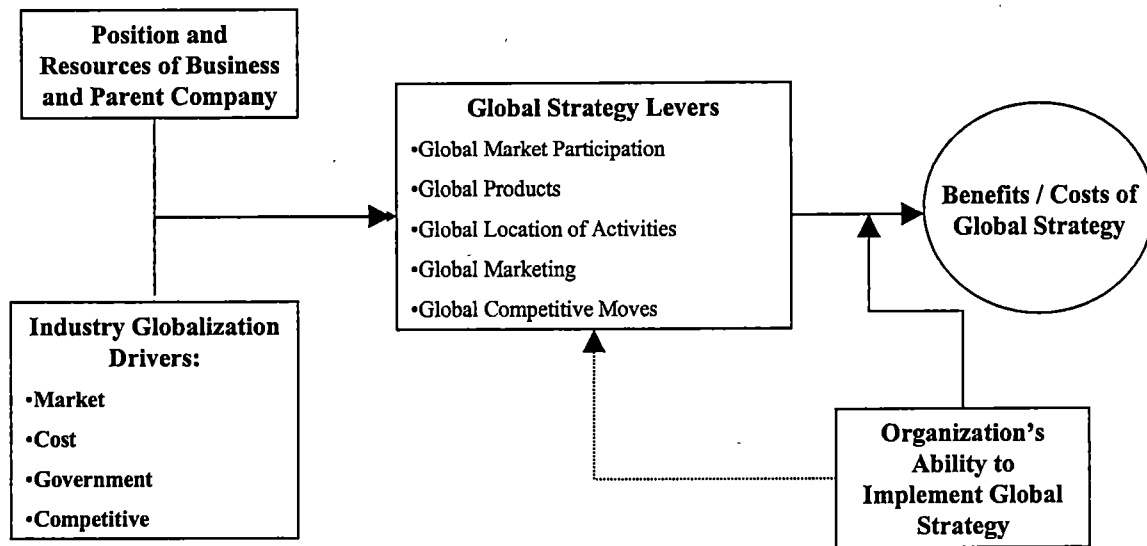
As pointed out by Bartlett and Ghoshal (1998), historically firms exhibited characteristics described in the multinational, the international and the global business models. They suggest, however, that companies increasingly strive to adopt the characteristics described in the transnational model. While those firms adopting a global business model will be relevant to this research, it is likely that those same companies

will be striving to become more transnational, and may exhibit characteristics attributed to both models in the Bartlett and Ghoshal (1998) framework. Both models are applicable to this research, and companies participating in this research exhibit characteristics of both. However, for purposes of clarity and consistency, firms of interest in studying this phenomenon and firms participating in this particular research will be referred to in subsequent discussion as *global companies*. *MNC or multinational company* will be used to reference any company owning and operating assets in multiple countries, or to be consistent with terminology used in cited publications.

Global Integration Strategy Choices

Yip (1992) developed a framework for global strategy that identifies drivers for globalization, as well as global strategy levers that can be employed by global companies (see Figure 1-1). As shown in Figure 1-1, both the drivers for globalization and the choice of strategy levers influence the benefits and costs of pursuing a global strategy. Drivers for globalization include industry characteristics related to: (1) market conditions or the nature of the customers, distribution channels and marketing in the industry, (2) cost structure or the economics of the business, (3) government rules in countries in which a firm has a presence, and (4) the competitive environment (i.e., the actions of competitors). Yip (1992) suggests each of these drivers will influence the potential benefit to be achieved from globalization in a different way.

Yip (1992) notes that global strategy is multidimensional, and that a firm must make choices along a number of strategic dimensions characterized as strategy levers.



Source: Yip (1992)

Figure 1-1. A Framework for Global Strategy

One of the strategy levers identified by Yip (1992) is *location of value-adding activities*. Yip (1992) differentiates between a “global” strategy with an integrated approach across countries and regions and a “multilocal” strategy that treats competition in each country or region independently from other regions. Yip's global strategy is analogous to Bartlett and Ghoshal's (1998) global or transnational business models, while the “multilocal” strategy is analogous to the multinational business model.

Location of value-adding activities may be either global or local. Global activity location is defined as “deploying one integrated, but globally dispersed, value chain or network that serves the entire worldwide business.” Yip (1992) suggests every functional or value-adding activity, from research to manufacturing to customer service, is a candidate for global integration. This research examined the value to global firms of

such globally integrated management of the various supply chain activities, as well as the cross-functional processes embedded within the value chain. The focus was on firms exhibiting characteristics of the global or transnational business model, hereafter referred to as global companies or firms.

Supply Chain Activities and Processes in the MNC

Typically, a supply chain is considered to be a network of three or more companies through which products and services flow to deliver value to downstream customers (Mentzer, et. al. 2000). Supply chain management is considered to be somewhere between vertically integrated systems with common ownership of supply chain entities, a common characteristic of the MNC, and a market system where channel members operate independently (Cooper and Ellram 1993). However, the MNC has unique characteristics that suggest supply chain concepts are particularly applicable to the MNC's intra-firm relationships in a global context. Ghoshal and Bartlett (1990) described the MNC as an "internally differentiated interorganizational network," and suggest that because of the dispersed geographical and differentiated environmental influences, internal linkages and coordination mechanisms typically important in inter-organizational exchange relationships are also characteristic of the relationships between sub-units of the MNC. If the MNC is viewed as a "network of exchange relationships," insights about the relationships between subsidiary and corporate organizations can be gained using concepts typically associated with inter-firm phenomena (Ghoshal and Bartlett 1990).

Several authors suggest the importance of global strategy to the MNC lies in the differential advantage to be gained from operational flexibility achieved by managing the flows within the multinational network on a globally integrated basis (Kogut 1989; Roth and Morrison 1992). The value of such operating flexibility lies in the ability to exploit differences in factor, capital and product markets, to transfer learning and innovation throughout the firm, and to manage uncertainty in the economic or political environment in different countries or regions (Kogut 1985; Kogut 1989). Given this focus on managing flows in the multinational network to achieve operating flexibility, the ability of a firm to achieve this objective is dependent on the management of the firm's supply chain activities and processes.

Over the past decade, increasing attention has been given to managing supply chain activities and processes more effectively as a means of improving performance and enhancing competitive advantage. Supply chain management (SCM) concepts have focused on the integration of intra-firm and inter-firm business processes, and operational and strategic capabilities, to deliver value to customers through reduced cost and improved service (Mentzer, et. al. 2000). While the primary focus of supply chain management is on the integration of business processes with upstream and downstream partners, a critical component of supply chain management is the integrated management of internal functional activities and business processes (Cooper, Lambert and Pagh 1997; Mentzer, et. al. 2000).

Roth and Morrison (1992) note that if the MNC has replicated the value chain in various countries or regions, it is then faced with the dual challenge of linking different

value activities across locations (i.e., production and marketing), as well as linking similar activities across locations (i.e., purchasing activities across multiple regions). Thus, multiple dimensions of supply chain activities and processes must be considered in the global integration decision (see Figure 1-2). In Figure 1-2, the functional dimensions of supply chain activities are shown on the horizontal axis (purchasing and supplier relationship management, R&D, production, sales and marketing, logistics, customer service, and customer relationship management). Each of these functional dimensions is also differentiated by managerial level on the vertical axis (e.g., strategy, planning and operations). In other words, for each supply chain function or activity, the value of global integration may differ based on managerial level. At the same time, global integration from a cross-functional perspective must also be considered at the strategy, planning and operations level. Also note in Figure 1-2 that a third dimension represents a continuum from local to regional to global management. It may be more appropriate, for example, to manage certain activities or processes at the regional level than at the global or local level. Thus, Figure 1-2 provides a graphical representation of the multiple dimensions of supply chain activities and processes for which the global integration decision must be made.

A well-balanced organization requires a mix of global and local perspectives (White and Poynter 1989). A key question becomes how to determine the appropriate mix of global integration and local management across the multiple dimensions reflected in the management of supply chain activities and processes. For example, decisions about global integration of supply chain processes that cut across functions or different

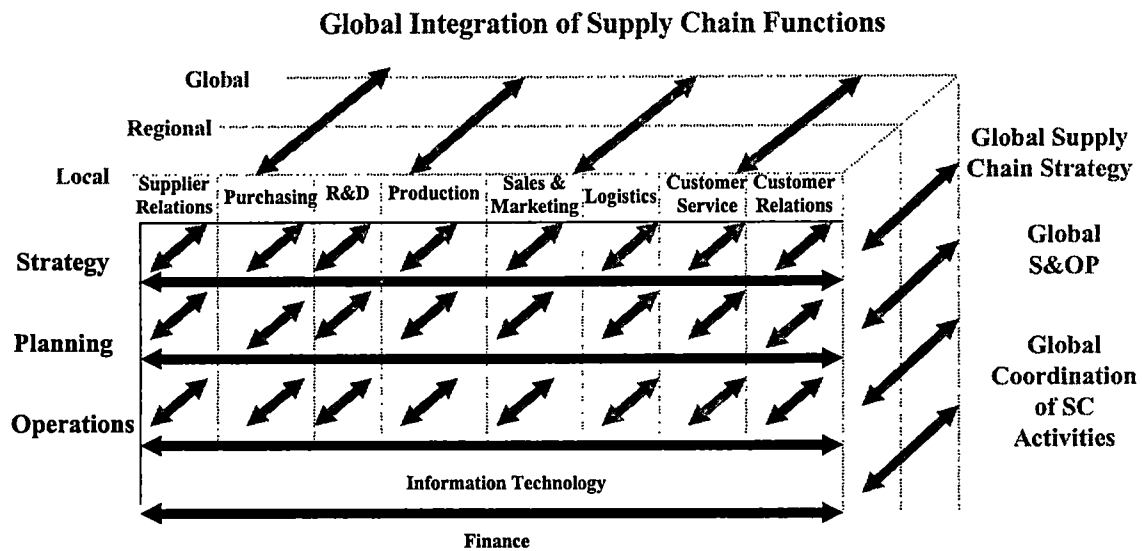


Figure 1-2. Dimensions of Global Integration of Supply Chain Activities and Processes

value chain activities must consider at what level global integration is appropriate. For one firm, a global supply chain strategy and/or a global planning process may deliver the greatest value, whereas local operational management may be more appropriate. For another firm, global integration at the operational level may also be important. Likewise, global integration of similar activities, such as purchasing, logistics or customer service may contribute more value than global integration across functions under certain conditions. The appropriateness of global integration of these supply chain functions and related activities must also be considered along the dimensions of strategy, planning or operations.

Global integration can be a difficult and costly objective to achieve (Kogut 1989). Given the multiple dimensions of supply chain activities and processes to be considered by the global company, the question of where to concentrate resources to achieve the

greatest value for the firm is complex. Thus, there is a need to understand global integration across the multiple dimensions of supply chain activities and processes in several distinct areas. (1) What is required to achieve global integration? (2) What are the costs and benefits of global integration? (3) What is the value ultimately achieved through global integration? (4) What are the environmental and firm-specific factors that influence the answers to these questions?

Clearly, the decision making process about which supply chain activities should be globally integrated is a complex one. Yet the implications of these decisions on a firm's ability to achieve its globalization strategies are significant. The global strategy model developed by Yip (1992) suggests this decision making process will be based on the trade-off between the costs and benefits associated with each choice. The manager in the global company is faced with a complexity of choices and trade-offs, and the need to allocate finite resources to those initiatives that will deliver the greatest benefit or value. Thus, what is needed is a theoretical framework to help managers identify the value associated with global integration decisions across the multiple dimensions of supply chain activities and processes within the firm.

While the concept of value has its roots in many disciplines, such as psychology, economics, marketing and management, a great deal of value research has been specific to customer value (Woodruff and Gardial 1996). Customer value typically reflects the relative importance to the customer of the various elements of perceived costs and benefits of owning or using the product or service (Zeithaml 1988). Applying the concept of value to global integration, value is expected to reflect the relative importance

to the organization of the various elements of perceived cost and benefits of pursuing global integration. This parallel with customer value research suggests the theoretical frameworks used to understand customer value may be useful in gaining a better understanding of the value of global integration. Two dominant theoretical frameworks used in customer value research that have been applied to this research are means-end theory and the value hierarchy.

Means-End Theory and the Value Hierarchy

Means-end theory suggests that product attributes or activities that people engage in are means to achieving some desired end state (Gutman 1982; Reynolds and Gutman 1988; Woodruff and Gardial 1996). These desired end states are typically referred to as the goals or values of an individual or an organization (see Figure 1-3). Similarly, actions taken to integrate global activities or processes may be perceived as a means to achieve desired goals or end-states.

A critical component of means-end theory is the hierarchical representation of products and their ability to deliver value important to customers, with each level in the hierarchy becoming increasingly abstract (Woodruff and Gardial 1996). At the middle level of the hierarchy, there are consequences that occur as a result of owning or using a product or taking a specific action. These consequences may be psychological or physiological, desirable or undesirable, and are likely to differ across individuals or firms. Not everyone views the same actions as leading to the same consequences or

Desired End States, Goals or Purposes
Describes the goals of the person or organization



Consequences
Describes the user / product interaction



Attributes
Describes the product / service

Source: Woodruff and Gardial (1996)

Figure 1-3. The Value Hierarchy

desired end states (Woodruff and Gardial 1996). For example, one manager or firm may pursue coordinated planning to achieve operating flexibility, while another may pursue coordinated planning to achieve reduced cost. Additionally, the path of the means-end chain may be quite complex, with direct consequences leading to indirect consequences, which ultimately contribute to the desired end states of the individual or organization (Gutman 1982).

It is at the consequences level of the hierarchy that the costs and benefits must be weighed against each other in evaluating the potential outcomes of a particular action. An individual will weigh the positive and negative consequences of pursuing a specific action or using a particular product, as well as the relative importance of their desired end states, in their choice processes.

It is also important to note that an individual's value hierarchy may differ on multiple dimensions. Differences may exist at the level of attributes, consequences or desired end states; in the importance attached to particular attributes, consequences or desired end states; or in the patterns of linkages between these levels. Actions viewed by one individual or organization as appropriate to achieve a particular consequence or desired end state may be very different from those considered appropriate by another individual or organization. For example, one individual may consider changing the organizational structure as the most appropriate tool to achieve global integration, while another may perceive changing reward structures as the most appropriate tool. Differences may also exist in the relative importance attached to a specific attribute,

consequence or value, as well as to particular value hierarchies (patterns of linkages between attributes, consequences and values).

Thus, the dominant patterns in the value hierarchy of a given individual or organization for a single product or activity may differ at multiple levels: (1) at the level of attributes (specific actions taken or specific characteristics or functions of an action or product), (2) at the level of consequences (direct or indirect and positive or negative costs and benefits), (3) at the level of desired end states (goals, values or purposes of the individual or organization), and (4) in relative importance placed on various aspects of the value hierarchies. Situational or environmental factors are likely to influence differences in patterns between individuals or firms. The influence of situational or environmental variables on value hierarchies is discussed in detail in Chapter 3.

The Global Integration Value Hierarchy

In Figure 1-4, the Yip (1992) global strategy model has been reconfigured to represent a value hierarchy, reflecting the application of means-end theory to the concept of global integration. The cost and value drivers which result from environmental conditions and organizational capabilities can be considered as situational or environmental influences which will have an effect on the value hierarchy. The attributes of global integration are represented by the actions required or the tools that must be acquired or utilized to achieve global integration. Consequences are the specific, mid-level abstractions of the costs and benefits that can be anticipated from achieving global

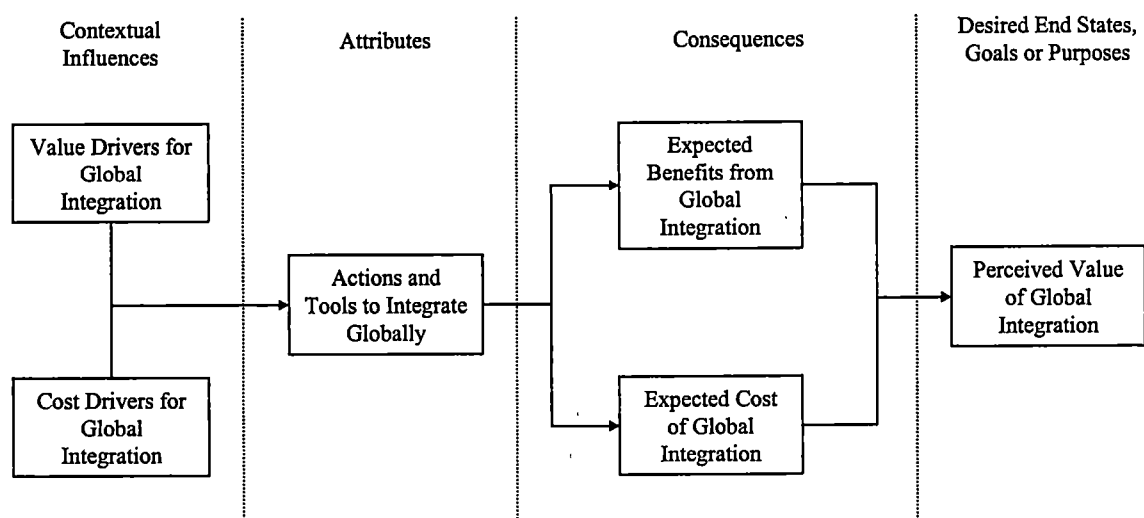


Figure 1-4. Global Integration Value Hierarchy

integration, or from taking specific actions and acquiring and applying specific tools. Finally, at a higher level of abstraction, the perceived value of global integration can be represented as the desired (or anticipated) end states, goals or purposes to be achieved through global integration. When reconfigured in this manner, the cause and effect relationships embedded in the concept of global integration can be represented in the form of a value hierarchy.

Personal Construct Theory

While some of the costs and benefits, or goals and purposes, associated with global integration may be quantifiable, others may not. For example, many of the expected benefits from global integration, such as operating flexibility, knowledge transfer or competitive leverage, are abstract concepts that are not easily measured.

Additionally, for those benefits that are theoretically quantifiable, data may not be available on a global basis to appropriately evaluate them. Similarly, the costs associated with global integration, such as coordination costs, opportunity costs associated with the allocation of resources, and the costs associated with loss of autonomy in subsidiary units, are often not easily measured. Given the complexity of variables and abstract benefits associated with global integration, the value of global integration may be best identified and understood by accessing the cognitive structures of key managers.

Means-end theory, like value theory, has its roots in psychology and was derived from personal construct theory. Personal construct theory suggests that human beings can be viewed as scientists (Kelly 1970), “collecting data about all aspects of the world, formulating hypotheses, testing those hypotheses, revising personal theories based on results and new data, and formulating new hypotheses” (Gengler, Howard and Zolner 1995 p. 290 - 291). Based on their knowledge and experience, individuals infer cause and effect relationships and anticipate future events (Kelly 1970).

Personal constructs or cognitive structures represent the experience and knowledge of the individual in terms of causal relationships and predictions about the future based on these causal relationships. They are abstractions of reality as observed by the manager or individual consumer. Thus, understanding the cognitive structures of managers regarding global integration, and identifying the dominant patterns and structural linkages imbedded in those cognitive structures can provide important insights into cause and effect relationships related to global integration.

THE PURPOSE OF THIS RESEARCH

Because of the lack of substantive research in the arena of global integration of supply chain activities and processes in the global company, the purpose of this research was to develop substantive theory using existing related theoretical frameworks, rather than develop and test specific hypotheses. Thus, a qualitative approach was utilized, aimed at developing a deeper understanding of the phenomenon of global integration of supply chain activities and processes, and with the following objectives:

- To understand managers' perceptions of the key elements of the attributes (actions and tools), consequences (positive and negative) and value (contribution to organizational goals) of global integration of supply chain activities and processes.
- To identify the dominant structural linkages between the actions and tools, perceived consequences (both positive and negative) and value.
- To understand organizational and environmental influences at each level of the value hierarchy.
- To demonstrate the applicability of means-end theory and hierarchical value map analysis to develop theory based on the personal constructs of managers.

The focus of this research was the global company for several reasons. (1) As highlighted earlier, MNC's represent a significant presence in the global business environment. (2) The question of global integration is a strategic one given the global nature of the operating environment of the MNC. (3) In the rapidly changing global economic environment, the success of the MNC is increasingly dependent on the ability

to appropriately integrate its global activities or to adopt a global or transnational business model (Prahalad and Doz 1987; Yip 1992; Bartlett and Ghoshal 1998).

Because of the broad scope of functions and the multiple levels of management activity encompassed within the domain, it was necessary to focus on a subset of supply chain activities and processes for this research. The functional areas of focus for this research were the strategy, planning and operations elements related to: (1) supplier relationship management, (2) purchasing, (3) logistics, (4) customer service, and (5) customer relationship management, as highlighted by the three ovals in Figure 1-5. These functional areas are typically emphasized in organizations, as well as by researchers, as key supply chain activities. Additionally, the global integration across supply chain functions, with a focus on strategy, sales and operational planning, and operations, was also considered in this research. Given the strategic nature of supply chain integration, the implications for contribution to global strategy of this cross-functional perspective are likely to be significant.

RESEARCH APPROACH

The interviewing and analysis methodologies used in this research have frequently been used in customer value determination studies. The “grand tour” is a one-on-one interviewing technique commonly used to develop an understanding of how individuals, typically consumers, translate attributes of products into meaningful associations with their personal values (Woodruff and Gardial 1996). By asking an

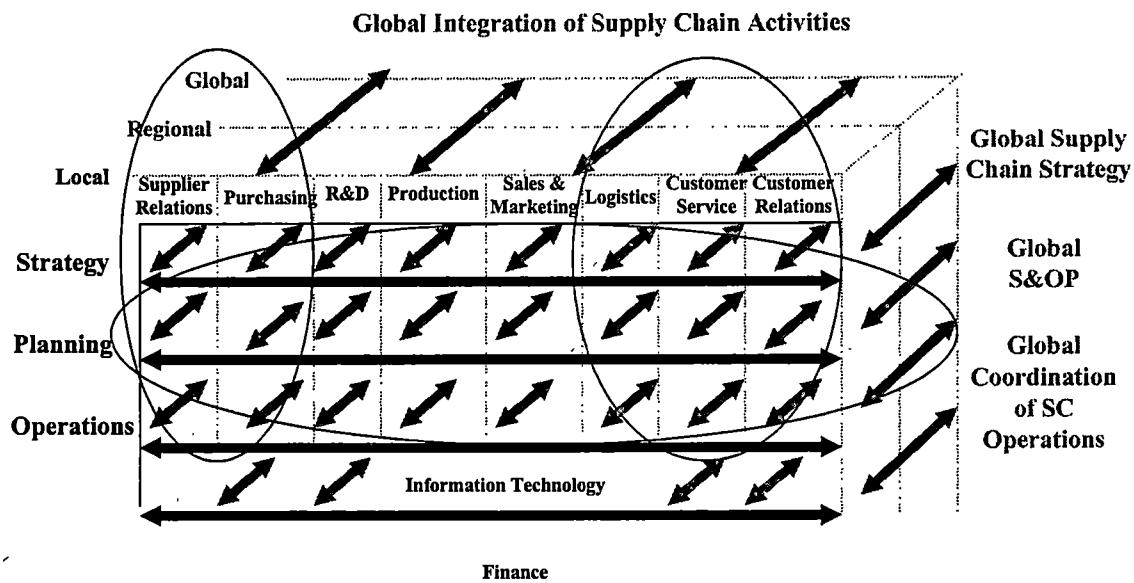


Figure 1-5. Focus Areas for Research

individual to talk in depth about his or her experience with a product or service in a particular use situation, the researcher can gain a rich understanding of the individual's value hierarchy. Through a combination of open-ended questioning and directed probes, an interviewer can determine linkages between the key perceptual elements related to attributes, consequences and values. This methodology has been frequently used in a consumer context to identify dominant attributes, consequences and values, and patterns of linkages between them, associated with the use of a product. These patterns and linkages may be analyzed both quantitatively and qualitatively, and are represented graphically in a tree diagram referred to as a hierarchical value map (HVM) (Woodruff and Gardial 1996).

For this research, grand tour interviewing techniques were used to develop an understanding of the value of global integration, by exploring the knowledge and experience of managers and analyzing managers' hierarchical value maps (HVM's) across a variety of settings. Simple quantitative techniques, such as frequency counts and percentages, were used to identify dominant patterns in the data. Qualitative analysis of differences in patterns across the dimensions of supply chain activities and processes and the influence of environmental and organizational factors was also done. This approach contributed to theory in the following ways.

- Dominant structural linkages were identified, providing evidence of causal relationships and contributing to theory development.
- Elicitation of the key elements of attributes, consequences and values provided information about important constructs, and operational measures of those constructs.
- A comparison of hierarchical value maps across organizations provided important clues about organizational influences on the attributes, consequences and values of global integration.
- Analysis of situational or environmental influences on managers' HVM's provided important information to develop conceptual frameworks that provide useful insights to guide managerial decision-making.

DISSERTATION ORGANIZATION

This dissertation is presented in five chapters, as follows: Chapter 1 is the introduction; Chapter 2 provides a review of relevant literature; Chapter 3 discusses the research methodology; Chapter 4 provides an analysis of the results; and Chapter 5 reports the conclusions from the research and highlights future research stemming from the dissertation.

Chapter 1 provides the background and underlying logic of the research. This chapter highlights the importance of the phenomenon of interest, and highlights the theoretical concepts utilized. It also provides a brief discussion of the purpose of the research and the approach utilized. Finally, an overview of the organization of the dissertation is provided.

Chapter 2 provides a more in-depth review of the literature relevant to this research. The sections included in Chapter 2 are: (1) introduction; (2) drivers for global integration; (3) the evolution of the MNC and MNC inquiry; (4) conceptual foundations in global strategy; (5) supply chain implications for the MNC; (6) current research on global integration of supply chain activities and processes; (7) the value of global integration (8) the global integration value hierarchy – the theoretical framework for this research, (9) the focus of this research, and (10) concluding comments.

Chapter 3 provides the research methodology used to investigate the value hierarchy of global integration. In this chapter, sampling issues, research protocol, interview guide, steps to ensure reliability and validity, and data analysis procedures are discussed.

Chapter 4 discusses the data analysis process and provides a complete discussion about the sampling and interviewing process, demographics of research participants, results of value hierarchy analysis, and steps taken to ensure reliability and validity of results. Conclusions from the analysis are discussed and conceptual frameworks describing the cause and effect relationships in the global integration of supply chain activities and processes are presented.

Chapter 5 examines the contributions of this research. The implications of the findings and conclusions to the existing body of research are examined, the implications for managers are discussed, and the limitations of the research and directions for future research are highlighted.

CHAPTER 2: LITERATURE REVIEW

INTRODUCTION

In Chapter 2, literature from several disciplines is reviewed to provide the conceptual foundations and theoretical underpinnings for this research. Section one, the introduction, provides an overview of the content of this chapter. Section two, drawing from international business and strategy literature, highlights the drivers for globalization and discusses the implications of those drivers for the global company. Section three discusses the evolution of the MNC and MNC inquiry, highlighting the significance of the MNC in the global environment and the need for research focused on the supply chain activities and processes of the MNC. In section four, the conceptual foundations from the strategy literature that form the basis for this research are discussed. Section five highlights the supply chain implications of global strategy, while section six discusses the limited research that has been done to understand the phenomenon of global integration from a supply chain perspective. In section seven, the relationship between global integration and value is explored, and the application of means-end theory and the value hierarchy in the study of customer value is discussed. In section eight, means-end theory and the value hierarchy are applied to the phenomenon of global integration to develop the theoretical framework for this research. Section nine describes the focus of this research, gives a broad description of the approach that was utilized, and reiterates the research questions. Finally, in section ten, concluding remarks provide an overview of the chapter.

DRIVERS FOR GLOBAL INTEGRATION

Over the past several decades, a number of factors have led to the increasing globalization of the world economy, and as a result the competitive environment faced by firms has changed dramatically. Drivers of this globalization include: (1) decreasing tariffs, (2) improving transportation, communications and information technology, (3) globalization of products, services and markets, (4) global competition, and (5) economic regionalism. Trade barriers have been dramatically reduced under GATT (General Agreement on Tariff and Trade), with average tariff rates for manufactured goods in many developed countries reduced from a range of 10 – 25% in the 1950's to approximately 3.9% in the 1990's (Hill 1997). Technological improvements in transportation, communications, and information processing have made global production increasingly viable and have also contributed to the development of global markets. These changes have enabled global competitors to make products and services available to consumers worldwide, and the result has been a proliferation of choices for consumers, and a need for firms to offer greater product and service quality at lower cost in order to remain competitive. These pressures have led to increased emphasis on reengineering internal business processes, integrating dispersed global organizations and working more collaboratively with customers and suppliers to better integrate planning and operations throughout the supply chain as a means to reduce costs and improve service.

Changes in technology and globalization of products and services have also resulted in increasingly dynamic markets and greater uncertainty in customer demand.

Consumers have greater access to more goods and services, and the introduction of new products is occurring at faster rates. Thus, a firm's competitive position depends on their ability to understand changes in consumer demands and respond appropriately with goods and services that will meet those demands. Supply chain management tools and techniques are seen as mechanisms that allow a firm to respond to these environmental changes. By working more collaboratively across internal organizations and with supply chain partners, a firm can better understand changes in customer requirements and respond more quickly to those changes. As firms have searched for ways to enhance their competitive position, global integration and supply chain management concepts have emerged as increasingly important.

Another factor influencing the global strategies of firms is the increasing trend toward economic regionalism that is reconfiguring the economic boundaries in many regions. Although there are numerous trade agreements in place today, two of the most prominent examples of economic regionalism are the European Union (EU) and the North America Free Trade Agreement (NAFTA). The removal of tariffs and trade barriers between EU member countries has provided incentives for firms to reconfigure networks of production and distribution to achieve greater economies of scale within the region. Firms in non-EU countries are also pursuing new investment strategies in the region to gain access to what has become the world's largest consumer market. NAFTA, which eliminates tariffs and opens trade between the US, Canada, and Mexico over a 15-year period, provides the same incentives for consolidation and/or investment in the North American region.

Rules of origin and content requirements that products must meet to qualify for reduced tariffs in these economic regions also provide incentives for firms to develop new procurement and production strategies that allow them to meet the content rules. Such a reconfiguration of sourcing, production, and distribution patterns in response to the formation of regional trading blocs requires strategic management of a firm's global supply chain.

Convergence of taste and life-styles across countries and increased travel of consumers create global markets for consumer goods, while increasing integration of customer organizations and growth in global and regional distribution channels create globalization opportunities in a business-to-business context. From a cost perspective, capital intensive industries benefit from global economies of scale, while industries dependent on rapid technological innovation can benefit from global leverage of research and development (R&D). Examples of government policy changes that increase the potential benefits of globalization include decreasing tariffs or non-tariff barriers, creation of trade blocs, privatization and the shift to open market economies which has taken place in Eastern Europe. Finally, the rise of global competitors and the increase in global strategic alliances are examples of competitive drivers that increase the potential need for or benefit from globalization (Prahalad and Doz 1987; Yip 1992). Prahalad and Doz (1987) also note that access to raw materials and energy can be a driving force for globalization. From a supply chain perspective, the presence of global suppliers is also likely to increase the potential benefits of global integration.

These changes in the global economy offer a number of opportunities and challenges for firms. Differences in industries or between firms result in different drivers, and perhaps different priorities, for a firm's globalization efforts. One firm's globalization efforts may be driven by the need to access raw materials with superior quality or at lower cost or to access superior technology from global sources, while another firm's efforts may be driven by the desire to access new markets. Still other firms may be driven to expand globally by the desire to take advantage of global economies of scope or scale. Differences in the drivers are likely to lead to differences in strategic thrust and approach to global integration in the management of the firm's supply chain activities and processes.

In a series of exploratory interviews with more than 15 companies in the chemical industry, this difference in focus on global integration initiatives was evident (Partsch, et. al. 1998). For example, implementing an integrated sales and operational planning process with the potential to improve customer service, inventory management and asset utilization was the key supply chain initiative for several companies. However, for other companies, initiatives were focused on developing a more strategic approach in critical supply chain activities. For example, rationalizing the supplier base and developing closer relationships with strategic global suppliers to leverage the overall relationship was seen as the more critical initiative in some companies.

Doz and Prahalad (1991) note that the diversified MNC is multidimensional, covering multiple geographic markets with multiple product lines and multiple functional activities. As a result of this multidimensionality, MNC's are confronted with the

question of how to best structure the interfaces between these multiple dimensions of global management. The advantages of globalization, as well as the need for local responsiveness, are also quite varied across businesses, countries and functions in the MNC, and thus a differentiated approach which allows trade-offs between the multiple dimensions is required (Doz and Prahalad 1991). The multidimensional nature of the global integration versus local management decision in supply chain activities and processes was the focus of this research.

THE EVOLUTION OF THE MNC AND MNC INQUIRY

Early MNC theory suggests that, after exhausting the home market for its products, firms expand abroad to access new markets for existing products. Expansion first occurs through exporting, and then through establishing production facilities abroad once the market is sufficiently developed (Nohria and Ghoshal 1997). Eventually, once the product is matured and standardized across a wide geographic scope, the firm reconcentrates production in the lowest cost location, and might eventually export the product back to the home country. For firms that do not expand product diversity or foreign sales, the local or regional subsidiaries begin to operate as autonomous units, while firms who expand product diversity are more likely to adopt a “world-wide product division” structure. For firms that expand both product diversity and foreign sales from subsidiary units, the global matrix structure is likely to be adopted (Nohria and Ghoshal 1997).

The emergence of the MNC as a phenomenon gained the attention of academic scholars in the 1960's (Doz 1997). Early on, international business research focused on the evolution of trade flows, and the reasons for foreign direct investment. As MNC's expanded abroad, the focus of research turned to the headquarters-subsidary relationship. In the 1970's and 1980's, transaction cost theories and agency theories, with their roots in economics, were applied to the problems of understanding the advantages of ownership and the control issues in contractual relationships facing the MNC (Doz 1997). At this point, little attention was paid to the structure of and relationships among the subsidiary units. Each was treated independently in terms of its relationship with corporate headquarters, and connections were viewed from a "hub-and-spoke" perspective (Nohria and Ghoshal 1997).

Only in the mid-1970's did strategic management researchers begin to examine the relationships between strategic choices, organizational structures and management processes in the MNC (Doz 1997). During the late 1970's and early 1980's, the emergence of global competition also began to suggest the hub-and-spoke approach was no longer viable. With improved transportation and communication technologies and converging consumer tastes, global competitiveness became increasingly dependent on the strategic interdependence among MNC markets and subsidiaries (Nohria and Ghoshal 1997), or a transnational approach. The emergence of transnational coalitions in the 1980's required a redefinition of the domain of international business (IB) inquiry (Toyne 1997). Because of the "increasing reliance on social relationships, the transfer of knowledge, skills and technology, ... and the need to transfer and cross-nationally control

functional activities,” the study of transnational coalitions would necessarily include organization theory, social relationships, organizational boundaries and corporate strategy” (Toyne 1997 p. 73).

CONCEPTUAL FOUNDATIONS IN GLOBAL STRATEGY

In keeping with the evolving nature of the MNC, Bartlett and Ghoshal (1998) identified four distinct business models that differentiate businesses operating in multiple countries. Each model has different strategic thrusts, organizational structures, and management processes, which suggest different approaches to supply chain management. These four models are (1) the multinational company, (2) the international company, (3) the global company, and (4) the transnational company. A fifth business model identified by Ohmae (1989; 1999) is that of the multiregional company (see Table 2-1).

The business model adopted by a firm is a reflection of the specific drivers and strategic thrusts for the firm’s globalization efforts. For example, the ability to access foreign markets may require local responsiveness, the ability to capture global economies of scope or scale may require global efficiency, and the desire to access technology may require the transfer of knowledge. Thus, a firm’s approach to globalization is influenced by the specific globalization drivers of the firm, as well as the global environment within which they are operating.

Characteristics of the five approaches to globalization differ in terms of how assets and capabilities are configured, the role of corporate headquarters versus overseas

Table 2-1. Approaches to Globalization

	Multinational	International	Global	Transnational	Multiregional
Strategic Thrust	Local Responsiveness	Transfer of Knowledge and Competencies	Global Efficiency	Balance of Local Responsiveness, Global Efficiency and Transfer of Knowledge and Competencies	Focus on Local Responsiveness, Global Deployment of Human, Financial and Technological Resources Globally
Configuration of Assets and Capabilities	Decentralized and nationally self-sufficient	Sources of core competencies centralized, others decentralized	Centralized and globally scaled	Dispersed, interdependent, and specialized	Managed and located regionally to maintain insider status
Role of Overseas Operations	Sensing and exploiting local opportunities	Adapting and leveraging parent company competencies	Implementing parent company strategies	Differentiated contributions by national units to integrated worldwide operations	Regional headquarters responsible for strategy, planning and operations to meet the needs of local and regional customers
Development and Diffusion of Knowledge	Knowledge developed and retained within each unit	Knowledge developed at the center and transferred	Knowledge developed and retained at the center	Knowledge developed jointly and shared worldwide	Knowledge developed locally / regionally and shared globally
Supply Chain Implications	- Multiple domestic supply chains operating in different political, economic and cultural contexts. - Decentralized development of SCM capability - Limited sharing of knowledge and resources across borders	- Supply chain operations across multiple borders and in multiple countries - Centralized development of SCM capability - Transfer of knowledge and resources from corporate headquarters to other countries	- Integrated management of a global network of supply and demand - SCM aimed at efficiency and operating flexibility - Centralized development of SCM capability - SCM processes and policies dictated by corporate headquarters	- Supply chain network integrated to achieve economies of scale, but locally responsive to different markets - Skills and capabilities developed and shared worldwide - Joint decision-making, with appropriate global / local balancing	- Supply chain network integrated regionally to be locally responsive to customers - Global linkages among regions to serve global market segments

Sources: Bartlett and Ghoshal (1998), Ohmae (1999)

operations, and how knowledge is developed and diffused. Each also has different implications for a firm's approach to supply chain management (see Table 2-1).

In the first model, the *multinational company* typically has operations in multiple countries that operate with a great deal of freedom and autonomy from corporate headquarters or other company operations. This approach allows a firm to focus on building a local presence and responding to national differences in local markets. In this model, a firm manages multiple domestic supply chains in different countries with differing political, economic, and cultural contexts. Skills and capabilities are developed independently within each country, with little sharing of knowledge and resources across borders. In this model, requirements for global integration are minimal or non-existent.

The second model, the *international company*, is one in which the firm is focused primarily on transferring and adapting the parent company's products and ideas to foreign markets. The parent maintains centralized control, and multinational subsidiaries have limited independence and autonomy. This approach allows a firm to exploit the company's knowledge and expertise through global diffusion and adaptation. In this model, a firm may be heavily export oriented, or may duplicate corporate systems and processes in other countries. Multiple supply chains may operate both across national boundaries and within multiple foreign countries. Skills and capabilities are developed and maintained centrally, and processes and procedures are dictated to operations in other countries. In this model, there is likely to be some advantage to integration across regions, but the requirement for global integration of the total network is limited.

The third model, that of the *global company*, treats world markets as an integrated whole, and manages worldwide operations to serve the global marketplace. The firm's focus tends to be on centralized management of global operations to achieve cost advantages through economies of scale and to minimize risk. For firms adopting this approach, supply chain management focuses on managing a global network of supply and demand to achieve global economies of scale and on providing operating flexibility to respond to political or economic changes, thus reducing the risk of operating on a global basis. In this model, global integration of the supply chain network becomes critical.

While these three models have been utilized historically by companies operating on a global scale, Bartlett and Ghoshal (1998) suggest that none of these will be sufficient in the future. Increasing pressures toward global integration, local differentiation, and world-wide innovation require firms to manage toward global efficiency, local responsiveness, and world-wide transfer of knowledge and capability simultaneously. Bartlett and Ghoshal (1998) argue that, in order to compete in the future, a firm must manage its global operations with a more balanced approach, or must become what they describe as a *transnational company*. The transnational company operates a dispersed, interdependent, and specialized network of assets and capabilities, leveraging globally where it makes sense, yet being responsive to differences in local markets where required. Supply chains, likewise, take advantage of global networks to achieve scale, but operate locally when advantageous. Skills and capabilities are developed jointly among world-wide operations, and shared across the entire network. In this model, the

ability to appropriately tailor the mix of global integration and local autonomy is a critical success factor.

In the fifth model, the *multiregional company* "decomposes the corporate center into several regional headquarters" so that the regional units can operate as insiders within the region, with the business focused on understanding and meeting local customers needs (Ohmae 1989; 1999). The corporate headquarters task is to maintain equal distance from global markets and customers, and deploy its human, financial and technological resources on a global scale. In this model, there is an emphasis on supply chain strategy over a long-term planning horizon, for example global investments in production capacity or new product development are determined at a corporate level. However, over a shorter planning horizon, strategic, planning and operational decisions are made and executed at a regional level in response to local customers.

Clearly, there is no single "best" approach to global integration or global management of the supply chain. The multinational firm may manage independent domestic supply chains in multiple countries, in which case the firm may rely on local managers, suppliers and transporters, and will not be faced with managing across borders. On the other hand, international firms may manage imports and exports across national borders, or local supply chains in multiple countries, with supply chain knowledge and expertise maintained in corporate headquarters in the home country. A global company may manage supply chains across multiple national borders, operating in an integrated global environment and managing a global network of supply and demand. In this case, an integrated approach to sales and operational planning on a global basis is likely to be

critical, and information technology which gives the firm global supply chain visibility and allows decision making on a global scale will be required. Finally, the transnational firm is selective in managing supply chain activities both globally and locally, taking advantage of global scale where appropriate, while establishing local management and responsiveness where appropriate. Knowledge and expertise are developed and shared across operations world-wide. In the case of the transnational firm, collaborative planning between local and corporate managers and decision support systems that allow the firm to understand and manage trade-offs become critical.

While early work in global strategy focused on firms whose competitive position in one national market was significantly affected by its competitive position in another market, current research on global strategy is linked to "how the firm structures the flow of tasks within its world-wide value-adding system" (Ghoshal 1987 p. 426).

Prescriptions for global strategies have been different, and often contradictory, suggesting such approaches as product standardization, exploiting economies of scale, exploiting economies of scope, cross-subsidization, and multiple sourcing or production shifting to benefit from advantageous factor costs and exchange rates. Ghoshal (1987) notes that corporate objectives are multidimensional, and often mutually contradictory, and that identifying the trade-offs between these objectives is required to understand the potential costs and benefits of different strategic alternatives. He identifies three broad categories of goals of an organization that must be balanced in the strategic actions of a firm: (1) achieving efficiency in current activities, (2) managing risks associated with current

activities, and (3) developing internal learning capabilities to enable innovation and adaptation to future changes.

The first strategy highlighted by Ghoshal (1987) is that of achieving efficiency in the current activities of the firm. In a global context, efficiency can be enhanced through three fundamental approaches: exploiting differences in input factors and markets in different countries, exploiting economies of scale, and exploiting economies of scope. The achievement of this objective requires optimizing the configuration of a firm's supply chain to achieve efficiency in the use of resources. Efficiency of current activities is also typically a key objective of supply chain management, and is accomplished through streamlining activities and reducing operating costs across firms.

The second objective of risk management must consider four broad categories of risk (Ghoshal 1987): (1) macroeconomic risks, (2) policy risks, (3) competitive risks, and (4) resource risks. Macroeconomic risks include cataclysmic events and economic shifts in factors such as wage rates, interest rates, exchange rates, and prices, factors often cited as important in a supply chain context. Policy risks arise from actions of national governments. Changes in legal requirements, technical standards, duty and tax structures, and trade policies have significant implications for a firm. Competitive risks arise from uncertainty about competitor response to a firm's strategy. For example, differences in industry structure, culture, and laws may lead to differences in competitive behavior. Resource risks are the risks that the adopted strategy will require resources beyond the firm's capability. To manage resource risk effectively, differences in capability of resources in multiple countries must be understood and considered as part of

strategic planning. Managing these risks in such a complex environment becomes a critical issue for global firms. Tailoring organizational structure and control systems appropriately to monitor risk factors inherent in the global environment, such as exchange rate fluctuations or changes in legal requirements, and to allow operating flexibility to respond to changes is posited as a key factor in a firm's performance. Managing operating risks in such an environment becomes a strategic issue for a firm, and structural configuration and operating flexibility of a firm's supply chain are both critical to the process (Ghoshal 1987; Govindarajan 1988).

The third objective that must be considered in strategy is that of innovation, learning, and adaptation. Potential drivers for globalization include exploiting existing technology or capability and accessing additional technology or capability. This objective can only be accomplished through appropriate inter-organizational processes that allow the diffusion of technology or capability to occur. Thus, this objective also influences the strategic choices a firm makes relative to how a supply chain is managed. For example, the desire to access technology or knowledge in a global venture may cause a firm to configure work flows and operating controls in a way that best facilitates the diffusion of technology and knowledge across national borders (Gupta and Govindarajan 1991a).

While globalization is recognized as an important factor in a firm's strategy, limited research has been done as to how to best manage the firm's supply chain activities and processes to deal with the issues of complexity and uncertainty inherent in global operations. Differences in corporate strategy require different strategies and objectives

for managing supply chain activities and processes. The pursuit of global efficiency requires a global approach to planning, and appropriate information technology to allow global coordination and visibility. Global learning and technology transfer to take advantage of innovation worldwide require the structuring of workflows and organizational interfaces to allow the transfer of knowledge across borders. The need to balance local responsiveness and global efficiency requires a great deal of collaboration among organizations in multiple countries. Managers must understand the differences in strategic requirements, and develop supply chain approaches consistent with the firm's overall objectives.

The strategy literature suggests that firms operating in the global environment become increasingly dependent on their ability to appropriately integrate global supply chain activities and processes to be successful. Managing the flows between a network of inter-organizational units, developing operating flexibility to deal with environmental uncertainty, and transferring skills and capabilities across operating regions are all dependent on the degree to which the management of the supply chain activities and processes is globally integrated. In other words, it is anticipated that the configuration of supply chain systems and processes are critical to the capability of a firm to achieve the strategic objectives of globalization.

Kogut (1997) notes that in spite of the wide appeal of the idea of the multinational firm as a network, empirical evidence of the benefits associated with managing it as such is scarce. Mascarenhas (1997) cites two studies that indicate firms pursuing a domestic strategy maintained higher returns than more international firms, and

suggests the barriers to global integration may have been underestimated by the MNC. Kogut (1997) asserts that the benefits may not be fully realized because of the inability of firms to take advantage of the networks. He suggests organizational barriers or the lack of understanding when and how to use the flexibility options provided by the network prevent firms from achieving their global objectives. Consequently, an important issue for future research has to do with the "organizational underpinning of a strategy of multinational flexibility" (Kogut 1997).

The difficulty in achieving the benefits of a balanced approach to global integration and local responsiveness lies in the ability to balance control and autonomy. While the matrix structure has been suggested as the prescription for achieving this balance, research suggests the use of matrix organizations has produced mixed results (Hitt 1997). Several additional tools are suggested as important in achieving this balance. For example, corporate culture that socializes managers to use similar decision premises and assumptions encourages coordination of decentralized operations – with shared values as the vehicle to regulate behavior. Other corporate governance mechanisms include incentive compensation, and selective use of financial and strategic goals and metrics (Hitt 1997). Hierarchical structures are designed to facilitate vertical coordination, while matrix structures are designed to facilitate both vertical and horizontal coordination, a requirement for global integration. Other horizontal coordination mechanisms used as an overlay to organizational structure include the use of integrators, teams, task forces and coordination committees. Hitt (1997) suggests more research is needed to understand the organizational arrangements that facilitate

implementation and operations of multinational networks. In other words, “we need to understand how to achieve the transnational capability suggested by Barlett and Ghoshal (1988)” (Hitt 1997).

The majority of literature on international strategic management focuses on issues of strategy design, with a relative void in literature dealing with implementation of these strategic prescriptions (Kim 1997; Mascarenhas 1997). Hitt (1997) suggests the most significant implementation issues relate to the organization of the multinational firm, given the difficulty of achieving global integration of operations while allowing local autonomy to respond appropriately to local markets. Kim (1997) further suggests the disciplines of social psychology and sociology can make a valuable contribution to understanding the internal motive system of the multinational, i.e., understanding the underlying forces that drive and motivate individuals and subunits is an area worthy of future study.

SUPPLY CHAIN IMPLICATIONS OF GLOBAL STRATEGY

While the relatedness of the literature on global strategy to supply chain management is implied rather than overt, there is significant commonality between the two. As noted in Chapter 1, a supply chain is typically considered to be a network of three or more companies through which products and services flow to deliver value to downstream customers (Mentzer, et. al. 2000). Supply chain management is considered to be somewhere between vertically integrated systems with common ownership of supply chain entities, a common characteristic of the MNC, and a market system where

channel members operate independently (Cooper and Ellram 1993). However, intra-subsidary transfers are often a significant part of the MNC network. Ghoshal and Bartlett (1990) describe the MNC as an “internally differentiated interorganizational network,” and suggest that because of the dispersed geographical and differentiated environmental influences, internal linkages and coordination mechanisms typically important in inter-organizational exchange relationships are also characteristic of the relationships between sub-units of the MNC (Ghoshal and Bartlett 1990). This conceptualization of the MNC as a “network of exchange relationships,” suggests that supply chain management concepts are applicable to inter-subsidary relationships in the MNC.

Concepts of supply chain management are also frequently linked to strategy in the literature, suggesting commonality between the two. Houlihan (1988) suggests that what were once seen as logistics issues have become significant issues of *strategic management*, and that supply chain management becomes a strategic tool to be incorporated into overall company strategy. Others link supply chain management to *strategic alliances* (Gentry and Vellenga 1996), *strategic decision making* (Houlihan 1988; Ellram, LaLonde and Weber 1989), *strategic planning* (Cooper 1993; Bechtel and Jayaram 1997), *strategic lead time* (Horscroft and Braithwaite 1990), and *strategic alignment* (Gattorna, Chorn and Day 1991). A common theme in the supply chain literature is the idea that effective supply chain management is or should be related to a firm's strategy. However, the influence of the firm's strategy on supply chain strategy or tactics has not received adequate attention, and the influence of global strategies has

received even less attention. Stevens (1990) suggests the focus of traditional approaches to supply chain management is at the operational and planning levels, rather than on strategic needs of the business. Yet, objectives and policies for the supply chain must be developed in terms of overall business strategies if supply chain management is to be used as a weapon for competitive advantage (Stevens 1990).

Multiple definitions of supply chain management can be found in the literature. In an attempt to pull together the various perspectives, Mentzer, et. al. (2000) define SCM as “the systemic, strategic coordination of the traditional business functions within a particular company and across businesses within the supply chain, for the purposes of improving the long-term performance of the individual companies and the supply chain as a whole.” This “systemic, strategic coordination” is focused on optimizing the flow of products, services, information and finances across traditional functions within the firm and throughout the supply chain to create value for downstream customers, and to benefit individual members and the supply chain as a whole (Mentzer, et. al. 2000).

Several authors suggest the importance of global strategy to the MNC lies in the differential advantage to be gained from operational flexibility from managing the flows within the multinational network on a globally integrated basis (Kogut 1989; Roth and Morrison 1992). Given this focus on managing flows in the multinational network, the ability of a firm to achieve operating flexibility is dependent on the management of the firm’s supply chain activities and processes.

While the primary focus of supply chain management is on the integration of business processes with upstream and downstream partners, it is recognized that a critical

component of supply chain management is the integrated management of internal functional activities and business processes (Cooper, Lambert and Pagh 1997; Mentzer, et. al. 2000). Supply chain management (SCM) involves the integration of both intra-firm and inter-firm business processes, as well as operational and strategic capabilities, in order to reduce cost, improve service, and deliver greater value to customers (Mentzer, et. al. 2000). This research was focused on the globally-integrated management of internal functional activities and business processes, and the implications of that global integration at the interface with both upstream and downstream members of the supply chain. It was not, however, extended to include the integration between a firm and its upstream and downstream partners.

Cooper, Lambert and Pagh (1997) delineate three major elements of supply chain management: (1) business processes, (2) management components, and (3) the structure of the supply chain. Business processes are defined as activities that produce a specific output of value to the customer which cross intra-firm and inter-firm boundaries, such as demand management, customer relationship management, order fulfillment, product development and commercialization, and procurement. From a process perspective, the traditional functional activities of purchasing, logistics and customer service must be related to the key supply chain processes. Management components are those components by which the business processes are structured and managed, and examples include planning and control, work structure, organization structure, management methods, and risk and reward structure. Management components necessarily include both functional activities and business processes. Supply chain structure is the

configuration of companies within the supply chain, which is dependent on the complexity of products, the number and configuration of suppliers and customers, and the availability of raw materials (Cooper, Lambert and Pagh 1997). In the MNC, supply chain structure equates to the structure of the multinational network. Each of these three elements of supply chain management (business processes, management components, and structure) must be considered by the global firm in determining how to best manage its network of supply chain assets and capabilities.

As noted by Roth and Morrison (1992), the global company is faced with the challenge of linking cross-functional activities across locations (i.e., production and marketing), as well as linking similar activities across locations (i.e., purchasing activities across multiple regions). For each of these alternatives, environmental factors and organizational capabilities at various points in the supply chain are expected to have an influence on the potential for value through global integration. Thus, multiple dimensions of supply chain activities and processes must be considered in the global integration decision, as shown in Figure 1-2.

Figure 1-2 provides a graphical depiction of the multiple dimensions of supply chain activities and processes that must be considered as candidates for global integration by the MNC. Along the horizontal axis, the traditional business functions are represented. As noted by Roth and Morrison (1992), each of these traditional functions is a candidate for global integration. Within each of these functions, the global integration question must include at what level of management the integration takes place. For example, significant value may be derived from a globally integrated strategy and

planning process, whereas local or regional operational execution may be most appropriate. Prahalad and Doz (1987 p. 14) actually differentiate between global integration and strategic coordination, defining global integration as “the centralized management of geographically dispersed activities on an ongoing basis” and strategic coordination as the “central management of resource commitments across national boundaries in the pursuit of a strategy.” For purposes of this research, global integration was used as an umbrella term that encompasses all facets of management of supply chain activities and planning (both functional and cross functional activities and processes at the strategy, planning and operations levels of management). An additional level of complexity arises from the fact that the question of global integration is not dichotomous. Rather, some level of integration along a continuum from global to regional to local may be appropriate. Strategy may be developed globally, planning may be done regionally and execution may be done locally along any given functional or cross-functional dimension. As suggested in Figure 1-2, the question of global integration of supply chain activities and processes faced by the global company is multi-dimensional and complex.

Given the multiple dimensions of supply chain activities and processes to be considered by the global company, the question of where to concentrate resources to achieve the greatest value for the firm is complex. In spite of the complexity, a well-balanced organization requires a mix of global and local perspectives (White and Poynter 1989). Since global integration can be a difficult and costly objective to achieve (Kogut 1989), it is important that firms understand where the greatest potential for value lies when making global integration decisions. Therefore, two of the key questions addressed

in this research included: (1) How does the value of global integration versus regional or local management differ across the multiple dimensions reflected in the management of supply chain activities and processes? (2) What environmental and organizational factors influence those differences in value?

CURRENT RESEARCH ON GLOBAL INTEGRATION OF SUPPLY CHAIN ACTIVITIES AND PROCESSES

Limited attention has been given to the issue of global integration in supply chain related disciplines. Much of the research pertaining to global purchasing and logistics is descriptive in nature, and has included examination of: the patterns, benefits, and problems of international sourcing or logistics (Carter and Narasimhan 1990; Min and Galle 1991; Birou and Fawcett 1993); characteristics of international relationships (Ellram 1992; Dominguez and Zinn 1994); and complexities of the international business environment (Davies 1987; Wood 1990). There are, however, several articles dealing with global integration of supply chain activities that should be highlighted.

Monczka and Trent (1991) analyzed the progression of international global sourcing strategies as a four-phase development process, with globally integrated sourcing the most sophisticated stage. In this stage of development, firms realize greater benefits through integration and coordination of sourcing requirements on a global basis. These authors note the requirements for global sourcing as encompassing "worldwide information systems, sophisticated personnel capabilities, coordination mechanisms, an effective organizational structure, and top management support" (Monczka and Trent

1991). They also suggest the need for cross-functional integration in support of global sourcing strategy and execution. Through global sourcing, firms are expected to maximize buying leverage on a global basis to achieve superior price, delivery, security of supply and access to supplier technology.

The need for globally integrated information systems is a common theme that has received some attention from researchers. Bagchi (1992) describes the need for a globally integrated logistics information system to effectively coordinate worldwide manufacturing operations, purchasing and distribution. Because of the high cost of managing interdependence among the various global entities in such a network, a fully integrated International Logistics Information System (ILIS) is seen as critical. Similarly, Min and Eom (1994) describe the need for an integrated global decision support system to manage the planning, tactical and operational elements of the supply chain and improve inter-departmental coordination. They see such a globally integrated system as a critical tool for improving interdepartmental coordination, coordinating international distribution plans, and evaluating global logistics trade-offs.

Several authors have examined the increasing importance of international sourcing and logistics (Carter and Narasimhan 1990; Min and Galle 1991; Birou and Fawcett 1993; Fawcett, Birou and Taylor 1993). However, typically there is a lack of coordination between worldwide business units in the MNC (Monczka and Trent 1991), and purchasing and logistics have not adequately considered the strategic requirements of supporting global operations (Fawcett, Birou and Taylor 1993).

THE VALUE OF GLOBAL INTEGRATION

The decision making process about which supply chain activities and/or processes should be globally integrated is a complex one. Yet the implications of these decisions on a firm's ability to achieve its globalization strategies are significant. The global strategy model developed by Yip (1992) suggests this decision making process is based on the benefits and costs associated with each choice (see Figure 1-1). The manager in the MNC is faced with a complexity of choices and trade-offs, and the need to allocate finite resources to those initiatives that will deliver the greatest benefit. Based on knowledge of the environment and the capabilities of the firm, conclusions may be drawn about the potential costs and benefits, and ultimately the more abstract value that can be achieved through global integration.

The global strategy framework developed by Yip (1992) points to the industry globalization drivers associated with market structure, cost structure, government policies and the competitive environment as the determinants of the potential for benefit from globalization. However, that is only part of the equation. The choice of strategy levers by the firm, as well as the organizational capability of the firm to implement a global strategy, ultimately determine the actual benefits to be achieved and the cost incurred in order to achieve those benefits. This set of relationships is illustrated in Figure 1-1. While Yip (1992) does not differentiate between the costs and benefits of pursuing a global strategy and the value to be achieved for the firm, he does suggest managers must understand the trade-offs between costs and benefits in determining appropriate global strategies. Since the concept of value is frequently thought of as a trade-off between cost

and benefits, Yip's framework is suggestive of the importance of value in the global strategy decision. Kogut (1989) also notes that global integration is costly and difficult to achieve, and firms vary widely in both their perceptions of the value to be achieved as well as in their ability to achieve it. Given this relationship between global integration and value, an examination of concepts related to value is warranted for this research.

The Value Equation

While multiple definitions of value can be found in the literature, Schwartz and Bilsky (1987) identified five features that are common to most. Values are generally defined as: (1) concepts or beliefs, (2) about desirable end-states and behaviors, (3) that transcend specific situations, (4) guide selection or evaluation of behavior or events, and (5) are ordered by relative importance. Thus values are representative of goals and are assumed to come from culture, society, organizations or institutions and personality (Gutman 1997). Research on value has examined the structural content of value, cultural differences in the structure of values, and the motivational effects of values (Rokeach 1973; Schwartz and Bilsky 1987; Durgee, O'Connor and Veryzer 1996).

While the concept of value has its roots in many disciplines, such as psychology, economics, marketing and management, a great deal of value research has been specific to customer value. Woodruff and Gardial (1996 p. 54) define customer value as "the customers' perception of what they want to have happen (i.e., the consequences) in a specific use situation, with the help of a product or service offering, in order to accomplish a desired purpose or goal." Unlike early marketing research on value and

consumer choice, which examined the influence of personal values on brand or product choice, recent research using means-end theory focuses more directly on the product, rather than the person (Durgee, O'Connor and Veryzer 1996). Means-end theory and laddering or grand tour interview techniques are used to move from products to values, rather than from values to products. This approach allows the researcher to understand the linkages between specific products or product attributes and the consequences and value related to the use of that particular product. Since the purpose of this research was to understand the attributes, consequences and value of global integration (the "product"), the means-end theoretical approach of relating a specific product, in this case "global integration," to value was utilized. Developing a broader understanding of organizational goals and values, and the implications of those, is beyond the scope of this research.

Among the various definitions of customer value found in the literature, there are several distinct approaches. One suggests value is synonymous with economic utilities, in terms of form, place, time, and possession utilities (Fawcett and Fawcett 1995). However, research has shown the meaning of value held by the customer may differ at a higher level of abstraction, suggesting that utility models that do not distinguish between product and service attributes and more abstract meanings of value are insufficient (Zeithaml 1988). Zeithaml (1988) found four different perceptions of value among consumers: (1) value is low price, (2) value is whatever I want in a product, (3) value is the quality I get for the price I pay, and (4) value is what I get for what I give. For those who equated value with low price, the most significant dimension of value seemed to be what they had to give up. For those customers equating value with "whatever I want in a

product,” benefits seems to be the critical element in their perception of value. This might equate to a utility approach to value (Zeithaml 1988). For consumers who viewed value as the quality received in exchange for the price paid, value was perceived as the trade-off between a single benefit (quality) and a single sacrifice (price). Finally, those consumers who viewed value as “what I get for what I give” seemed to consider all of the relevant benefits as well as all the relevant sacrifices or costs (Zeithaml 1988). Thus, customer value is based on the relative importance to the customer of the various elements of perceived price, perceived total cost of acquisition and use, and perceived benefits of owning or using the product or service.

A key element of customer value is also that it is as perceived or experienced by the customer (Zeithaml 1988; Narver and Slater 1990; Day 1994; Novack, Langley and Rinehart 1995; Woodruff and Gardial 1996; Goodstein and Butz 1998). Goodstein and Butz (1998) describe value as the customer’s perception of how well his or her needs are met, while Narver and Slater (1990) describe value as the difference between what the buyer perceives as expected benefits and expected sacrifice (total acquisition and use costs). While there are differences in precise definitions of what constitutes value, there is consensus that value is created through the experience and perspective of the customer, and is not inherent in the products or services offered by a firm (Woodruff and Gardial 1996).

Several parallels can be drawn between this conceptualization of customer value and the value of global integration. The concept of global integration can be treated as the product, and the manager as the customer. The manager is likely to relate global

integration to specific “attributes,” or to specific actions or tools that are associated with the concept of global integration. Based on the experience of the manager, certain specific consequences (benefits and costs) will be associated with those attributes (actions and tools). Some evaluation of the trade-offs between the costs and benefits is likely to result in the perceived value associated with global integration. Value is also likely to differ across managers and across organizations. However, given the shared experience and knowledge base of managers in a given organization, it is likely that dominant patterns can be identified which are representative of the environmental and organizational realities of a particular firm (Calori, Johnson and Sarnin 1994).

While some of the costs and benefits associated with global integration may be quantifiable, many are likely to be abstract or not easily measured. For example, the cost reductions that can result from economies of scale achieved through global integration are theoretically concrete and measurable. However, there may be a lack of standard or readily accessible data across country or regional units, so that the data may not be available to assess the potential cost reduction up front, or the specific costs to be reduced may not be easily isolated and identified. More abstract goals, such as operating flexibility or competitive leverage, may be much more abstract and not easily measured. Similarly, the costs associated with global integration are often not easily measured. Coordination costs, opportunity costs associated with the reallocation of resources, or the costs associated with loss of autonomy in subsidiary units are not easily identifiable or measurable.

Calori, Johnson and Sarnin (1994) note that managers cope with complex problems by constructing simplified cognitive structures or mental models that represent such abstract realities. Such complex and abstract concepts and relationships are likely to be best understood by understanding the cognitive structures or mental models of key decisions-makers in a firm. Just as customers' perceptions of value are dependent on the importance they attach to the costs and benefits, managers' perceptions of value may differ based on differences in the importance attached to perceived cost or benefits. However, key decision makers in a firm are likely to interact and produce collective interpretations of their environment through social interchange (Calori, Johnson and Sarnin 1994). Therefore, it was expected that the dominant cognitive structures of key managers are representative of the constructs and relationships important in understanding the value of global integration in a particular firm context.

Means-End Theory

Means-end theory suggests that product attributes or activities that people engage in can be viewed as a means to achieving some desired end state (Gutman 1982; Reynolds and Gutman 1988; Woodruff and Gardial 1996). These desired end states are typically referred to as the goals or values of an individual or an organization (see Figure 1-3). Individuals may engage in similar activities, but for very different reasons. For example, exercise is an activity that an individual may engage in to achieve very different end states. One individual may exercise to achieve good health and long life, another

may run to achieve a sense of self-esteem, and yet another may run to enhance their social well-being.

Another critical component of means-end theory is the hierarchical representation of products and their ability to deliver value held by customers, with each level in the hierarchy becoming increasingly abstract (Woodruff and Gardial 1996). At the middle level of the hierarchy, there are consequences that occur as a result of owning or using a product or taking a specific action. These consequences may be either psychological or physiological, desirable or undesirable, and are likely to differ across individuals. Extending the exercise analogy, one individual may choose to exercise because it gets their heart rate up, thus contributing to the desired end state of good health and long life. Another may exercise because it makes them feel better and gives them more energy, allowing them to become more productive, thus contributing to a sense of accomplishment and self-esteem. Yet another may exercise because it burns calories, helps them lose weight and look better, which makes them more attractive to others and enhances their social life. Two key points are illustrated in this example. First, consequences are a result of the interaction between the actor and the action, or the user and the product (Woodruff and Gardial 1996). In other words, not everyone views the same actions as leading to the same consequences or desired end states. This view may differ at either the consequence level of abstraction or the desired end state (value) level of abstraction, or at both. Secondly, the path of the means-end chain may be quite complex, with direct consequences leading to indirect consequences that ultimately contribute to the desired end state of the individual (Gutman 1982).

It is at the consequences level of the hierarchy that the costs and benefits must be weighed against each other in evaluating the potential outcomes of a particular action. For example, while exercise may contribute to better health or greater self-esteem, a negative consequence may be that it takes time away from other activities that are also important. For example, an individual may feel that spending time exercising takes time away from family or work, contributing to a feeling of selfishness, thus lowering his or her sense of self-esteem. Theoretically, the individual will weigh the positive and negative consequences of exercising, as well as the relative importance of their desired end states, in making the decision as to whether or not to engage in exercise.

It is also important to note that there may be different perceptions of the appropriate actions to take to achieve a particular consequence or desired end state. For example, one individual may select running as the exercise of choice because it requires less time than other alternatives, thus minimizing the negative consequence of time spent away from family or work. Another may select walking, because it is not as hard on joints as running, and thus contributes to a greater sense of health and well-being. Thus the value hierarchy of a given individual for a single product or activity category may differ at multiple levels: (1) at the level of attributes (specific actions taken or specific characteristics or functions of an action or product), (2) at the level of consequences (direct or indirect and positive or negative costs and benefits), and (3) at the level of desired end states (goals, values or purposes of the individual or organization).

Another aspect of the means-end model relates to the influence of situation or context on the value hierarchy. It is likely that a consumer or actor will make different

judgments about the value of using a particular product or taking a particular action based on the situation. Once again, using the exercise analogy, individuals may perceive the consequences of exercising very differently when they are pressed to meet a deadline at work versus when they are on a two-week vacation at the beach. In the case where the individual is pressed to meet a deadline, the negative consequence of time required to exercise (or time away from meeting the deadline at work) may carry more importance weighting than the positive consequence of feeling good. Time spent on work may be seen as a means of achieving the indirect consequence of succeeding at work, thus contributing to a sense of accomplishment and security. Conversely, during a two-week vacation, the individual is likely to attach less significance to the negative consequence of time required to exercise, and more significance to the consequence of feeling good. Thus, a single individual's value hierarchy related to an identical action, and consequently the motivation to take action or behave in a particular behavior, will differ based on situational influences.

Means-end theory provides a useful framework for understanding the relationships between a product or action and the related consequences and value for the individual or organization. These relationships are based on previous experience and knowledge, or learned associations between particular actions and consequences, as well as on the anticipation of the achievement of important goals associated with a given set of actions. Means-end theory, like value theory, has its roots in psychology and was derived from personal construct theory. Personal construct theory, developed in the early 1950's, postulates that the behavior of individuals is not governed by simple stimulus-response,

nor is it determinant. Rather, the individual can be viewed as a scientist (Kelly 1970), “collecting data about all aspects of the world, formulating hypotheses, testing those hypotheses, revising personal theories based on results and new data, and formulating new hypotheses” (Gengler, Howard and Zolner 1995 p. 290 - 291). Thus, based on knowledge and experience, the individual infers cause and effect relationships and anticipates future events. It is the personal constructs of these relationships and predictive assumptions that form the basis of personal choices, as well as interpretation of future events (Kelly 1970).

In the managerial literature, the personal constructs of managers have alternatively been referred to as: mental maps, frames of reference, mindsets, cognitive base, beliefs, schemata, cognitive structures, and cognitive maps (Calori, Johnson and Sarnin 1994). In the consumer behavior literature, terms such as means-end hierarchy and hierarchical value maps have been utilized. For purposes of this research, the terminology used to describe these cognitive structures was “hierarchical value map” or HVM.

Whatever terminology is used, these personal constructs or cognitive structures represent the experience and knowledge of the individual in terms of causal relationships and predictions about the future based on these causal relationships. They are abstractions of reality as observed by the manager or individual consumer. Thus, understanding the HVM’s of managers, and identifying the dominant patterns and structural linkages can provide important insights into cause and effect relationships

related to global integration for the purpose of developing substantive theory about global integration of supply chain activities and processes.

THE GLOBAL INTEGRATION VALUE HIERARCHY

The theoretical framework utilized as the foundation for this research was the “Global Integration Value Hierarchy” shown in Figure 1-4. This value hierarchy is an adaptation of the Yip (1992) global strategy framework shown in Figure 1-1, modified to reflect the cause and effect relationships imbedded in means-end theory. In order to draw parallels from customer value research, global integration can be thought of as a product that can be characterized as having certain attributes, i.e., actions taken and tools required. Associated with each of these actions and tools is a set of consequences or outcomes, both positive and negative. The positive and negative outcomes can be characterized as the costs and benefits of global integration highlighted in the Yip (1992) framework. The value of global integration can be characterized as the desired end states, or goals and purposes of the organization that can be achieved through global integration. Finally, the cost and value drivers for globalization can be characterized as the situational or environmental influences on the value hierarchy.

Most of the discussion on each of these components of the global integration value hierarchy can be found in the strategy literature, and deals with the influence of strategic challenges for the firm as the unit of analysis. Very little attention is given to any of these elements in the literature pertaining specifically to supply chain activities and processes. Below, brief descriptions of the environmental influences, attributes,

consequences (benefits and costs) and value (goals or purposes) associated with global integration found in the literature are provided. These descriptions are not meant to be comprehensive, rather are provided as a frame of reference or guide for this research.

Environmental and Organizational Influences

Descriptions of the environmental influences on the globalization strategies of firms are generally consistent across authors. These are characterized in terms of: (1) globalization of competition, (2) globalization of markets and customer preferences, (3) rapid technological change, (4) need to access global sources of raw materials and technology, (5) uncertainty in economic and political conditions, and (6) reconfiguration of economic regions through trade agreements (Prahalad and Doz 1987; Yip 1992; Min and Eom 1994; Bartlett and Ghoshal 1998). Several authors also note that capital intensity makes the need for coordination more significant (Prahalad and Doz 1987; Fawcett, Birou and Taylor 1993). While there is a recognition that different environmental factors may influence the need for global integration differently across functions, little attention has been given to what those differences are or to influences specific to supply chain activities and processes.

Kogut (1989) notes that firms vary widely in their ability to achieve global integration. Yip (1992) argues that organizational factors influence both the nature of what the firm's global strategy should be and the ability of the organization to implement. Four key organizational factors that determine the firm's ability to implement are: organization structure, management processes, people and culture (Yip 1992). Inappropriate structure and processes, lack of skills and capability of people, and lack of

fit between organizational culture and strategy or lack of a shared vision can all be impediments to successful global integration. Bartlett and Ghoshal (1998) argue a critical component of strategy implementation is understanding and addressing the company's administrative heritage in these areas. However, just as these organizational factors can be impediments to integration, appropriate structure, managing processes, human resource management and culture are also critical to success. Thus, appropriate choices in these areas become the tools for global integration.

Attributes of Global Integration

Some of the key attributes of global integration (actions and tools required to achieve global integration) fall into three major categories: communication, coordination and control (Eccles and Nolan 1993; Konsynski and Karimi 1993; Malone and Rockart 1993). Global integration requires complex communication systems that facilitate the flow of information and transfer of knowledge, promote interpersonal understanding and enable the coordination required for globally integrated management. Global information systems are seen as key enablers of global integration, facilitating all three processes - improving communications, coordination and control.

The organizational factors identified by Yip (1992) are mechanisms that either impede or facilitate global integration through their influence on communications, coordination and control. Organizational structure has frequently been viewed by firms as the key mechanism for implementing strategy. Traditionally, organizational structure has been the dominant influence on information flows, decision-making authority and

control mechanisms. However, hierarchical structures are designed to facilitate vertical coordination, while global integration is also highly dependent on horizontal coordination. Examples of horizontal coordination mechanisms that might overlay formal structure include the use of integrators, teams, task forces and coordination committees (Hitt 1997). Corporate culture that socializes managers to use similar decision premises and assumptions also encourages coordination of decentralized operations – with shared values as the vehicle to regulate behavior. Other corporate governance mechanisms include human resource managing processes, such as incentive compensation, and selective use of financial and strategic goals and metrics (Hitt 1997).

Consequences of Global Integration

Multiple potential benefits of global integration cited in the literature are highlighted here. For purposes of clarity, linkages between the benefits and desired goals are also noted in this section. Reducing the duplication of resources, exploiting economies of scale, exploiting differences in factor costs, maintaining flexibility versus currency changes, and enhancing bargaining position are positive consequences of global integration that can contribute to reduced cost (a desired goal). Focusing efforts and establishing more consistent quality control (consequences) can contribute to improved quality performance and customer satisfaction (desired goals) (Yip 1992). The transfer of knowledge is also seen as a positive benefit that can contribute to a firm's ability to innovate (Gupta and Govindarajan 1991a; Gupta and Govindarajan 1991b). A specific benefit of globally integrated sourcing or purchasing identified by Monczka and Trent

(1991) is that of maximized buying leverage, leading to improved price, delivery, security of supply and access to supplier technology.

Several costs (or drawbacks) associated with global integration are also identified in the literature. These include coordination costs, lack of customer focus, loss of flexibility in specific markets, more rigorous training requirements, and huge start-up costs associated with information infrastructure (Prahalad and Doz 1987; Yip 1992; Min and Eom 1994)

Value of Global Integration – Desired Goals or Purposes

In addition to the goals of cost reduction, improved quality, customer satisfaction and worldwide innovation highlighted above, operating flexibility and risk minimization are benefits of global integration (Kogut 1985; Kogut and Kulatilaka 1994). The linkage of these goals to higher-order corporate objectives is often implied rather than overt, but achievement of these goals is expected to contribute to improved competitive position, profitability and shareholder value.

FOCUS OF THIS RESEARCH

While much of the focus on global integration has been on strategy, there is a need to focus on implementation and operations issues (Spivey and Thomas 1990; Kim 1997; Mascarenhas 1997). Fawcett, Birou and Taylor (1993) note that firms have not typically considered strategically the logistics and purchasing support requirements for global operations. To develop an understanding of the implementation and operations

issues, it is necessary to move beyond the firm as the level of analysis and explore global integration at the level of functions and business processes. Developing an understanding of the attributes, consequences and value of global integration among the multiple dimensions of supply chain activities and processes is a first step in this direction.

Domain

While management of the supply chain encompasses all of the traditional intra-business functions (Mentzer, et. al. 2000), the focus of this research was narrowed to make the task more feasible. As shown in Figure 1-5, the emphasis was on the traditional purchasing, logistics and customer service functions. Also, because of the boundary-spanning nature of these functions, a focus on supplier and customer relationship management was also incorporated. However, this research focused on those aspects of managing customer relationships pertaining to customer service and logistics, and not necessarily on the broader marketing and sales aspects of customer relationship management. Global integration across these supply chain functions was also examined. During the interview process, participants were asked about the value of globally-integrated management of cross-functional supply chain processes. To ensure a complete perspective, participants were also asked to discuss each dimension from a strategy, planning and operations perspective, as differentiated in Figure 1-5.

The theoretical framework used to guide this research was the "Global Integration Value Hierarchy" shown in Figure 1-4. This research was exploratory in nature, employing qualitative interviewing techniques to access the cognitive structures of

managers to better understand the value of global integration among the multiple dimensions of supply chain activities and processes. Using means-end theory and hierarchical value maps (HVM's), an analysis of differences and similarities in cognitive structures of managers in different businesses was used to investigate the influence of environmental and organizational variables on the value of global integration. The research questions addressed in this research are highlighted below.

Research Questions

Key questions addressed in this research included:

- What are the key attributes (actions and tools), consequences (positive and negative) and value (contribution to organizational goals) of global integration of supply chain activities and processes?
- What are the dominant structural linkages or causal relationships between the actions and tools, and perceived consequences and value?
- How and why do hierarchical value maps differ across the different dimensions of supply chain activities and processes?
- How do environmental and organizational factors influence managers' hierarchical value maps?

A Priori Assumptions

While this research was aimed at developing theory in a substantive area, there were several existing theoretical frameworks and a priori assumptions that drove the

research questions and design. While the overall objective of the research was to develop theoretical frameworks in an area where little research had been done, it was important that any a priori assumptions be highlighted, and examined and defended as a part of the data analysis process. The assumptions underlying this research design are highlighted below.

1. Global integration of supply chain activities and processes are a critical management issue for global or transnational companies in achieving their strategic objectives.
2. The value of global integration of supply chain activities and processes differs across the multiple dimensions of supply chain activities and processes highlighted in Figure 1-2.
3. The specific supply chain activities and processes for which global integration is more important are influenced by differences in value and cost drivers related to environmental and organizational variables and, thus, differ across industries.
4. The cognitive structures of managers in a given company reflect important cause and effect relationships for their firm, and these cause and effect relationships are reflected in means-end relationships extracted from the interviews and depicted visually in hierarchical value maps (HVM's).

SUMMARY

In this chapter, several bodies of literature relevant to this research were reviewed. Drawing from the international business and strategy literature, environmental and economic drivers for increasing globalization were identified, and the evolution and importance of the MNC in an increasingly global environment were discussed. Global strategy literature was then reviewed to identify the different approaches to global management adopted by the MNC, and the specific drivers and strategic importance to the MNC of global integration. Inferences were then drawn from the strategy and supply chain management literature to examine the implications of global integration to the management of supply chain activities and processes in the MNC. Research specific to the global integration of supply chain activities and processes was then reviewed, and the need for additional research in this area highlighted. The multiple dimensions of supply chain activities and processes considered were highlighted, and are shown in Figure 1-2.

Using the Yip (1992) global strategy framework as a foundation (Figure 1-1), the relationship between global integration and value was examined. Research in the arena of customer value was discussed to provide the theoretical and methodological foundation for exploring the value of global integration of supply chain activities and processes. Means-end theory, with its roots in personal construct theory, was discussed, and means-end analysis in the form of the value hierarchy was applied to the phenomenon of global integration. The "Global Integration Value Hierarchy" was developed and presented as the theoretical framework for this research (Figure 1-4). Finally, the research questions pursued in this exploratory research were highlighted and

a priori assumptions underlying this research approach were identified. In Chapter 3, a more complete description of research methodology, including sampling plan, research protocol, interview guide, analysis techniques, and steps to ensure validity and reliability, is provided.

CHAPTER 3: RESEARCH METHODOLOGY

INTRODUCTION

Chapter 1 described the background for - and underlying logic of - this research, highlighting the importance of the research questions and the theoretical frameworks used to guide this research. This research, aimed at developing substantive theory about global integration of supply chain activities and processes, is qualitative and exploratory in nature. While formal theory was used to develop the overall framework guiding this research, little has been done to develop substantive theory in this area, i.e., to understand and explain the value of global integration of supply chain activities and processes to the MNC adopting a global or transnational business model. Therefore, an exploratory approach aimed at developing a deeper understanding of global integration, and of relevant constructs and relationships, was appropriate for this research. Specific research questions addressed in this research were:

1. What are the key attributes (actions and tools), consequences (positive and negative) and value (contribution to organizational goals) of global integration of supply chain activities and processes?
2. What are the dominant structural linkages or causal relationships between the actions and tools, and perceived consequences and value?
3. How and why do hierarchical value maps differ across the different dimensions of supply chain activities and processes?
4. How do environmental and organizational factors influence managers' hierarchical value maps?

Chapter 2 provided a more in-depth review of the literature relevant to this research. Drivers for global integration and the importance of focusing attention on understanding global integration of supply chain activities and processes within the global company were discussed. Conceptual foundations in global strategy and their supply chain implications for the various business models adopted by the MNC were also discussed, and literature describing current research in this area was reviewed.

Significant gaps in the extant literature regarding the value of global integration of the multiple dimensions of supply chain activities and processes to be managed by the MNC adopting a global business model were identified. The “Global Integration Value Hierarchy” was developed as the theoretical framework to guide this research (Figure 1-4). This framework suggests there is a hierarchical relationship between the attributes (actions taken or tools required), consequences (expected costs or benefits), and value (desired end states, goals or purposes) of global integration. Further, this framework suggests that context (environmental or organizational variables that act as cost or value drivers) influences the patterns or relationships embedded in the value hierarchy. This research examined the application of means-end theory to the substantive area of global supply chain integration in the global company. The research methodology utilized borrows from prior customer value research using means-end theory, grand tour interviewing techniques and hierarchical value map analysis, as well as from other relevant qualitative approaches such as grounded theory and case study methodologies.

The purpose of Chapter 3 is to provide a detailed description of the methodology used in this research, along with the antecedent justification for the choice of

methodology and the research design elements. An overview of the research methodology and approach is also provided in the Research Protocol (Appendix A-1). Because of the lack of prior research in this area, this research was necessarily exploratory in nature, with the objective of developing substantive theory using formal theoretical frameworks to guide the research.

QUALITATIVE RESEARCH

“Scientific research is systematic, controlled, empirical, and critical investigation of natural phenomena guided by theory and hypotheses about the presumed relations among such phenomena” (Kerlinger 1992 p.10), with the purpose of explaining and understanding relationships to be able to predict or anticipate outcomes or events. While there has been historical debate about whether qualitative research was in fact “scientific research,” a number of scholars have contributed to developing “systematic, controlled, empirical and critical” methodologies for ensuring scientific soundness in qualitative, exploratory research.

Taylor (1994) describes qualitative research as “any systematic investigation that attempts to understand the meanings that things have for individuals from their own perspectives.” Such research is based on the assumption that human behavior consists of meaningful responses to external stimuli, with the world seen as dynamic and changing, and people’s responses based on constant interpretation and reinterpretation of that changing environment. Meaning is derived from the interactions of the individual with others, as well as through their own self-reflection – thus meaning can be both individual

and shared. Meaning is also contextual, in other words, meaning is influenced by the environment within which individuals interact. Thus, a goal of qualitative research is to understand the world from the perspective of the participants being studied.

As highlighted in Chapter 2, this research examined the value of global integration of supply chain activities and processes by accessing the cognitive structures of knowledgeable and experienced managers in global companies. Because of the complexity and abstractness of variables and issues related to the subject matter, the assumption was that the experience and knowledge of the managers is reflected in their mental models or cognitive structures about cause and effect relationships. It was expected that these cognitive structures are a reasonable representation of reality. Based on the information sharing and ongoing communications among managers, it was assumed that certain dominant patterns of constructs and relationships are shared by managers within a company. It was further expected that such patterns are representative of reality for that company, and that such patterns could be identified and better understood through this research. Thus the goal of this research was to understand the world from the perspective of the participants studied, and a qualitative, exploratory approach was the most appropriate way to accomplish that objective.

Qualitative research is useful to develop an understanding about a phenomenon about which little is yet known (Strauss and Corbin 1990). McCracken (1988) argues that qualitative methods are useful for understanding the complex nature of a particular phenomenon of interest, while quantitative tools offer a complementary method to understand how widely the findings from qualitative research can be applied. According

to Glaser and Strauss (1967), even if there is previous speculative theory, the process of discovery achieved through qualitative research gives us a theory that “fits” in a substantive area. Glaser and Strauss (1967 p. 32) suggest such theory development “can be achieved by a comparative analysis between or among groups within the same substantive area.”

This research differed from grounded theory in that grounded theory does not assume any theory a priori, but builds or generates the theory entirely based on the data. In this research, theoretical frameworks frequently used in customer value research were used as the basic frameworks of analysis and several a priori assumptions were used to guide the research. However, there are parallels with grounded theory methodology in that this research also emphasized discovery and theory development in a substantive area using qualitative data. Thus, tools and techniques were adapted from qualitative research methodologies, as appropriate, to ensure sound scientific research.

Glaser and Strauss (1967) sought to systematize the collection, coding and analysis of qualitative data for the generation of theory. There are 3 major components of qualitative research: the data, the analytic or interpretive procedures, and the written and verbal reports. Interviews and observations are the most common sources of data. Because this research aimed at understanding manager’s cognitive structures, in-depth interviews were utilized. Rubin and Rubin (1995) note that starting with theory can limit your vision of the phenomenon of interest, and that the qualitative researcher must be free to follow the data wherever it leads. Qualitative research requires a systematic effort to really hear and understand what research participants have to say. In applying formal

theory to a substantive area, the process of discovery toward developing substantive theory must balance the ability to direct the interview process to relevant areas with the flexibility to pursue new ideas as they surface during the interviews. Thus, as is common in customer value research based on means-end theory, interviewing techniques were semi-structured to achieve this balance. Techniques for analyzing and conceptualizing the data included coding, non-statistical sampling, writing and memos, and diagramming of conceptual relationships (HVM's). Each of these will be discussed in greater detail in the subsequent sections.

For exploratory research such as this, literature is used for theoretical sensitivity, to provide concepts and relationships that are checked against the data. In other words, knowledge of existing theories can provide ways of approaching and interpreting data, can be used to stimulate questions, and can be used to direct theoretical sampling (Strauss and Corbin 1990). While this research was driven by a theoretical framework developed from the literature, the focus of this research was on developing rather than testing theory. The "Global Integration Value Hierarchy" framework (Figure 1-4) was utilized as a way of approaching and interpreting data, and to stimulate questions and direct theoretical sampling. This research was not aimed at validating this framework, but rather at examining its application in the substantive area of global integration of supply chain activities and processes. As such, the framework was used to guide the research design and data analysis. The final result was the development of substantive theory and propositions about the value of global integration of supply chain activities and processes in the global company.

DATA COLLECTION

Sampling

As in grounded theory research, sampling was aimed at achieving theoretical saturation and representativeness rather than statistical generalizability (Glaser and Strauss 1967; Strauss and Corbin 1990). Theoretical sampling is cumulative, looking for variation and letting analysis guide additional data collection. A sampling plan is constructed, not to achieve generalizability, but rather to gain access to the categories and relationships associated with the phenomenon of interest (McCracken 1988). According to McCracken (1988), it is more important to work carefully with a few people than to work superficially with many. Taylor (1994) argues that for qualitative research using in-depth interviews, a sample size of 15 to 30 individuals is typical to understand the phenomenon of interest.

Maintaining a balance between consistency and discovery in theory development research is essential – i.e., systematically gathering relevant data while remaining open to new information (Strauss and Corbin 1990). This was done through careful selection of relevant companies and respondents, aimed at maximizing variation across participant companies. If areas relevant to the research – but not fully explored through the initial sample – were identified, additional companies were added to the process. From the initial set of companies interviewed, only one represented the global business model and provided access to managers across all regions and areas of interest. In the case of other companies in the initial sample, several represented the international and multinational models, while in others accessibility of managers in important areas was limited. Since

this initial sample did not provide enough variation in examining integration in the global company, two additional businesses adopting the global business model were added. In each of these cases, managers from across multiple regions and functions were made available to participate in the research. Those representing the international and multinational business models, or where a complete set of interviews was not possible, were not included in the final analysis for this research. Thus, from a total sample of 8 companies and 66 managers interviewed, a smaller set of 3 companies and 35 managers were included in the analysis process for this research.

The primary concern in sampling for exploratory research aimed at theory development is representativeness of concepts and linkages (Strauss and Corbin 1990). For each case examined, the presence or absence of linkages provides useful information, and the question of why an element or linkage is present or not can lead to important insights. The sampling for this research was not aimed at generalizability, but rather at specifying the characteristics and relationships relative to the value of global integration of supply chain activities and processes in the global company, and the environmental and organizational influences on that value. However, replications provide an opportunity for comparative analysis, and are used as a means for validating facts and establishing generality of a fact. By comparing situations where facts differ, properties of categories that increase generalizability can be identified (Glaser and Strauss 1967).

Because of the focus of this research on the global company as the unit of analysis, it was useful to draw from case study research methodology to examine the implications the multiple company research design. Case study methodology is

recognized as a useful tool for qualitative research aimed at explaining, or understanding in depth, a particular phenomenon (Ellram 1996). One of the more common applications of case study methodology is to develop theory that can be tested with further case studies or survey data (Bonoma 1985). The use of a multiple case design can extend the generalizability of results (Ellram 1996). By examining the value of global integration across multiple firms that operate within different industries, the influence of context can be incorporated in the analysis and findings, and results are likely to be more broadly representative of the larger population of global companies. Ellram (1996) argues “multiple cases represent replications that allow for development of a rich, theoretical framework.” Thus, multiple case design should be used to predict similar results, or to contrast results for predictable, explainable reasons. Therefore, multiple case design was utilized for this research, with an emphasis on maximizing variation among the participating firms to increase representativeness of results and extend the generalizability of the findings. It is important to note that generalizability is limited, however, and that subsequent research aimed at testing theory developed from this research will provide more useful analysis of generalizability.

In identifying companies to participate in this research, care was taken to maximize variation within the bounds of feasibility of the research. MNC's from different industries and managers from different functions and geographic regions were included in the research. The objective was to engage 2 - 5 businesses from the following target industries: electronics, telecommunications, chemicals, automotive, pharmaceutical, heavy equipment, and rubber and plastics. These industries were

selected because of the global nature of each industry, the presence of large MNC's within the industries (UNCTAD 1994), and the identification of personal contacts within potential participant companies. Desired geographic representation included managers based in Asia, Asia-Pacific, Europe and North America. The sample used for the final analysis consisted of three unique businesses from two companies. Industries represented are telecommunications, synthetic fibers (sometimes characterized as plastics) and chemicals.

Within each company, appropriate participants with responsibility for, or adequate knowledge of, the phenomenon of interest were selected. The criteria for determining individual interviewees within each company were provided to the initial contact in each participating company (Appendix A-3). Representatives from the following areas in major regional headquarters of each company were included in the interviewing process.

- Sourcing / Purchasing
- Sales and Operational Planning (Sales forecasting, production planning, capacity planning)
- Logistics
- Customer Service
- Information Systems (specific to supply chain systems)

It was also important to include strategy, planning and operations decision-makers in the interviews. After gaining a company's agreement to participate, the key contact coordinating the interviews was asked to identify managers to be interviewed. This was done after dialog about the purpose of the research. Appropriate participants were

determined jointly between the company contact and the researcher, taking into account the company's organizational structure.

When interviewing is used for qualitative research, a sample size of 15 to 30 individuals is typical to understand the phenomenon of interest (Taylor 1994). It was anticipated that for each company, a minimum of 8 - 10 managers would be interviewed (managers from each of 3 or 4 functional areas from each regional headquarters). In reality, this number varied depending on company size and organizational structure. The final data set utilized for this research included a total of 35 participants from 3 distinct businesses (SBU's) in two companies. These three (3) SBU's represented three different industries and participants were representative across functions and regions as specified in the research design.

It was also necessary to gain access to background information about each company. This information was primarily gathered during the interviews, but documentation providing such background information was also requested as a supplement. Background information requested is highlighted below.

- (1) the nature of the company's business and products,
- (2) global location of offices and plants,
- (3) company size by global region,
- (4) organizational structure,
- (5) information capabilities,
- (6) current state of global integration, and
- (7) degree to which products, supply chain flows, customers and suppliers are global

Soliciting Participants

Potential participants were identified and contacted using a personal networking approach. Since the sampling for this research was purposive, selection was done to ensure appropriate representativeness, while using the personal network approach to contact target companies. The initial contact was done through a combination of a solicitation letter (Appendix A-3) and a follow-up phone call to answer questions and determine whether there would be any interest in participating. Benefits to participating companies were included in the initial contact letter (Appendix A-3), as shown in the excerpt below:

“How the company will benefit?”

By participating in this research, you can make an important contribution to our understanding the trade-offs in the decision about global versus regional or local management of the supply chain, as well as the influence of industry and organizational factors on the decision. You will be provided with the overall results from the study, as well as information specific to your company which can be of value to you in your globalization efforts. The information specific to your company will:

- (1) enable you to benchmark the perceptions of your managers versus those of all of the companies who participate, and
- (2) provide useful insights about managerial perceptions within your company – both across organizations and across geographic regions.

Since differences in perceptions of value among managers can be a barrier to the cooperation and collaboration required for global integration, these insights may be very valuable to you in implementing your global strategies.”

The Interview Process

Rubin and Rubin (1995 p. 43) suggest that qualitative interviewing design needs to be “flexible, iterative and continuous, rather than prepared in advance and locked in stone.” On the one hand, research design is aimed at ensuring systematic collection of data in a credible and thoughtful way, to keep the research focused and on target. On the other hand, as data are collected and analyzed, the questions may be refined or changed, and the need for additional participants identified. Design is flexible to allow a deeper understanding of new ideas and themes that emerge during the interviews. Thus, interviewing must be flexible to adapt to what the researcher is learning and what a particular interviewee is most knowledgeable about.

Open-ended interview questions allow the researcher to hear what participants think before narrowing down the options for questioning. Thus, the sequence is to gather a broad set of information, then focus particular questions based on the analysis of early interviews. Theoretical saturation is reached when additional interviews are not generating any new information or additional concepts or themes (Glaser 1967).

The in-depth, qualitative interview is a method that allows the researcher to gain insight into the “mental world” of the interviewee (McCracken 1988). Because the objective of such interviews is to understand the participants’ representation of reality, i.e., their cognitive structures, typically only a few general questions are prepared (Taylor 1994). A semi-structured approach to interviewing was developed for this research to ensure the appropriate balance between focus and completeness in understanding specific areas of interest on the one hand, and flexibility to identify and pursue new ideas that

came up during the interview process on the other hand. The general questions used in the interview process were specified in an Interview Guide (Appendix A-2). The researcher used this interview guide to keep the interview process on track, and ensure all questions relevant to this research were asked of each participant.

One-on-one, in-depth interviews were conducted in the offices of the participating firms. In the exceptional case where an interview could not be scheduled face-to-face, a telephone interview was conducted. Of the 35 interviews, 26 were conducted face-to-face, and 9 were conducted by phone. In every case, phone interviews were conducted after a number of interviews within the company had been completed, giving the researcher some degree of familiarity with the culture and processes in that particular company. Additionally, these participants were asked by a key person in their organization to participate, and were provided with a description of the research and the frameworks used to guide the discussion prior to the interview. The *a priori* knowledge of the company on the part of the researcher, the sponsorship of the company, and the background materials provided prior to the interview facilitated the telephone interview process such that the need to conduct the interview by phone was not detrimental to the data collection process. All interviews were personally conducted by the researcher, and audio-taped for subsequent transcription, with one exception. In one case, due to a failure of the audio equipment, the researcher made field notes during the interview, and those notes were analyzed in lieu of a verbatim transcription of the interview.

The interviews were a combination of open-ended questioning and directed probes to discover linkages and to gain a deeper understanding of areas relevant to the

research. The interview guide (Appendix A-2) was used to ensure the interviews remained focused on the research questions, yet the researcher remained flexible to pursue important insights that arose during the course of the interviews. A more detailed discussion of the development of the interview guide is provided in the following section.

The Interview Guide

Several things were considered in the design of the interview guide. Since the purpose of qualitative interviewing is to hear the participant's perspective and thinking, questions were designed to be general and non-directive. Initial questions were aimed at understanding the characteristics of the firm's business environment and organization. Next, open-ended questions were used to get the participant to discuss his or her perspective on global integration and "floating prompts" were used to explore more deeply those areas of interest mentioned by the participant (Rubin and Rubin 1995). Directed probes were also used as a means to get the participant to provide more explanation, clarification, evaluation, and linkages about topics of interest to the research (Glesne and Peshkin 1992). The researcher made every effort to use these prompts in an unobtrusive way so that the discussion was not guided by researcher bias. Planned prompts were used to explore important topics that did not readily come to the mind of the participant. Planned prompts were only introduced after the discussion of material introduced by the participant had been exhausted (Rubin and Rubin 1995).

The type of interviewing used for this research was simultaneously: (1) structured – specific questions were asked, (2) open – there was a need to follow unexpected leads

during the interview process, and (3) depth-probing – points of interest were pursued further using directed probes or floating prompts (Glesne and Peshkin 1992). Using the “Global Integration Value Hierarchy” framework (Figure 1-4) as a guide, specific questions were designed to ensure that relevant topics of interest in this research were covered during the course of the interview.

The opening remarks by the researcher during the interview process were designed to make the participants comfortable with the process, and to assure them that the discussion would be treated confidentially. The researcher reinforced the notion that the purpose of the interview was to better understand the participant’s perspective, that there were no right or wrong answers, and that the interviewer’s role was to listen openly and learn. It was also emphasized that the researcher needed to ensure the areas of interest be covered in a short amount of time, so it might be necessary to explore in one direction, then to redirect the discussion to other areas of interest. This emphasis up front was designed to make it more comfortable for the participant when redirects were necessary in the interview process, preventing the participant from feeling as if the interviewer was not interested in what he or she had to say.

Two of the most common interviewing techniques used in customer value or means-end studies are laddering and grand tour techniques. Laddering techniques are the more structured approach, directly asking for connections between attributes, consequences and desired end states from the interviewees. The first step in a laddering interview is the elicitation of attributes associated with a particular product that are significant to the interviewee. This elicitation step can be done using a number of

different techniques, but the purpose is to elicit the most significant attributes that the consumer associates with the product (Gutman 1982; Woodruff and Gardial 1996). Once significant attributes are elicited, direct probing about the consequences and desired end-states associated with each individual attribute is done. This probing is done through repeating the question, "Why is that important to you?" until the respondent can no longer answer the question. This line of questioning forces the respondent to move up the value hierarchy in degree of abstractness, and linkages between the attributes and higher levels of abstractness in the value hierarchy are stated directly by the respondent.

This more structured approach has the advantage of providing direct access to the linkages between attributes, consequences and desired end-states in the mind of the consumer. However, in order to achieve the structure required for this interviewing technique, the focus must be very clear and must be sufficiently narrowed in the attribute elicitation phase of the interview to make it feasible. Given the emphasis on discovery in this research and the complexity of the topic area, it was important that the interviewing technique used allow the researcher to fully explore and better understand the mental model of each interviewee. In order to gain access to the richness and depth of data needed to gain this understanding and develop substantive theory about the global integration of supply chain activities and processes, a less structured approach to interviewing was required.

Because of these concerns about forcing too much structure into the interview process, the less structured approach of the "grand tour" technique was utilized for this research. The "grand tour" technique is one that has been used in customer value

research to explore how the consumer, in a particular usage situation, experiences a product or service. By asking a consumer to talk about his or her experience in detail, the researcher can gain important insights about the consumer's value hierarchy associated with use of the produce or service. With this approach, linkages between the attributes, consequences and desired end-states may be stated directly by the consumer or may be inferred by the researcher based on the rich, qualitative data gathered in the interview process (Woodruff and Gardial 1996).

In a customer value application, the opening question in a grand tour interview might ask the participant to think about a specific situation where he or she might use a particular product and describe, in as much detail as possible, what is going on in that situation. The objective is to get the participant to talk in depth about his or her typical experiences. As the participant talks, the interviewer will use "floating probes," asking for additional detail or clarification in areas of interest. Directed probes may also be used, by isolating specific areas discussed by the participant and asking laddering questions to access the participant's perceptions of direct linkages between attributes, consequences and goals or desired end states.

Because of the complexity of the phenomenon of global integration of supply chain activities and processes, and the need to more fully understand the cognitive structures of managers in depth, an adaptation of the "grand tour" approach was used. A very open-ended question was utilized to get the participants to talk about their view of global integration, what it means to them for the various dimensions of supply chain activities and processes, and what the requirements for achieving global integration in

those dimensions are for their company. Floating and directed probes were utilized to explore more fully specific topics or linkages of interest. The interview guide illustrates specific questions and flow of the interview process (Appendix A-2). An initial set of questions was developed and was subsequently revised based a series of pilot interviews conducted before the research data collection process was begun.

Pilot interviews were a crucial step in the development of the questionnaire and the interviewing techniques. It was important to draw from the actual population to be studied, and to ask the respondents in the pilot interviews to critically reflect on the usability of the questions (Glesne and Peshkin 1992). While qualitative techniques do provide the opportunity to learn and revise the approach throughout the process, it is important that data collection with the actual participants be as effective as possible. To address this issue, pilot interviews were conducted with five (5) executives, who were selected to represent each of the distinct areas of study. Executives in positions of responsibility for purchasing, logistics or integrated supply chain processes with multinational companies were interviewed, and then were asked to critique the effectiveness of the questions in light of the purposes of the study. The data gathered during the pilot interviews, along with the critiques by the executives interviewed, were evaluated and the interview guide was upgraded to make the process more effective during the actual data collection phase of the research. Also important was the experience gained by the researcher, which was invaluable in improving interview technique.

DATA ANALYSIS

The initial data analysis step in this research was to determine the categories, relationships and assumptions that form the mental models or personal constructs of the participants about global integration of supply chain activities and processes. The “Global Integration Value Hierarchy” framework shown in Figure 1-4 was the conceptual framework that guided the analysis. In order to identify the categories and linkages in the qualitative data, three distinct coding steps were utilized. First, ideas and thoughts representing the three levels of the value hierarchy (attributes, consequences and goals or values) were identified and labeled. Second, important categories within each of those levels were identified and labeled. Finally, linkages between specific categories were identified and value chains developed where a number of categories were linked together by the participant. Each step in the process is discussed in greater detail below.

Content Analysis and Coding

A first step toward theory development in qualitative research is the identification of concepts and the linkages between them that are imbedded in the data. The grouping of similar data and the assignment of conceptual labels to each group are the first steps in the data analysis process (Strauss and Corbin 1990). These concepts can then be related to each other. Conceptualizing the data requires interpretation on the part of the researcher as to what the actual words or phrases used by the interviewee represent. The process of grouping concepts that pertain to the same phenomena is called categorizing. Essentially, this categorization process is a form of content analysis.

Some form of content analysis is necessary when looking for inferences from qualitative interviews, and the participant's own language and form of expression is crucial to the inquiry (Kassarjian 1977). The inclusion or exclusion of content and analysis categories is done systematically, with analysis designed to identify and access data relevant to the particular problem or phenomenon being studied. The categories selected for analysis provide the conceptual foundations for the research. The first step in content analysis in this research was the identification of ideas or thoughts expressed by the participant at each level in the value hierarchy. Ideas or thoughts relevant to global integration were initially categorized as attributes (actions taken or tools required), consequences (costs or benefits), and goals or values. This initial categorization was done independently by two coders, and categories were compared to assess inter-judge reliability. A more detailed discussion of the coding process and statistics on inter-judge reliability are discussed in Chapter 4.

Open Coding

Open coding is a coding step aimed at identifying the categories of importance imbedded in the interview data (Strauss and Corbin 1990; Ellram 1996). Open coding is a technique that allows the researcher to identify categories, dimensions and properties in the qualitative data. This step in coding can be useful to make comparisons or to summarize segments of the data in ways that facilitate further analysis (Ellram 1996). Having identified categories of interest, specific questions can be asked about the category as reflected in the data. For example, the presence or absence of certain

attributes, consequences or values may be summarized by company or by function to identify differences. Based on this summarization, important relationships may be more easily identifiable. The presence or absence of certain categories may then lead to an understanding of the contextual or organizational factors influencing the patterns. The second stage of coding in this research utilized an open coding approach. Within each of the levels of the value hierarchy, e.g., attributes, consequences, and goals or values, categories of importance were identified and labeled. A comparison of the dominant categories embedded within the hierarchical value map (HVM) of a particular SBU or representing a particular set of activities or processes provides important insights regarding the influence of environmental or organizational variables present in one case and absent in another.

Identifying Linkages

Once important categories within each level of the value hierarchy are identified, the next step in the analysis process is to identify the linkages between those categories. Categories are often linked sequentially by the participant, and are represented in the form of individual value chains at this point in the analysis. As an example, suppose a participant indicates that data standardization is important for global integration, because it allows access to information globally, which helps managers make better decisions, which leads to greater profitability. Based on the comment, an individual value chain with multiple sequential linkages would be created as follows:

Data Standardization ⇒ Information ⇒ Better decisions ⇒ Profitability

By linking each category and creating individual value chains, summary hierarchical value maps can be created which are reflective of actual frequencies of linkages embedded in the data. Thus the analysis utilizes a combination of qualitative inference and some very simple quantitative tools such as frequency counts to identify the dominant patterns of categories and relationships embedded in the qualitative data (Woodruff and Gardial 1996). Means-end theory and laddering methodologies include well-defined, quantitative approaches to diagramming the structural linkages between attributes, consequences and values in the form of the hierarchical value map (HVM). Codes or categories are summarized and frequency counts, means or percentages are calculated to compare responses across individuals or groups. Frequency counts are also be used as an indicator of the importance of a particular category or linkage.

A summary implication matrix can be developed to capture all of the linkages that appear in the set or subset of interviews. An implication matrix is typically a square matrix (much like a correlation matrix), where both the horizontal and vertical axes contain the full set of summary codes or categories (Woodruff and Gardial 1996). The numbers in each cell represent the number of times pairs of codes were linked in the individual interviews. Based on this summary implication matrix, a hierarchical value map that summarizes the most frequently mentioned linkages across all interviews can be constructed. Due to the complexity of this research, the summary implication matrices were constructed for each participating company to reflect only dominant linkages. These summary implication matrices are shown in Appendix A-6. Insights about the influence of environmental and organizational variables were gained by examining the

differences between implication matrices and HVM's across companies and across the various dimensions of supply chain activities and processes.

Ensuring Objectivity in the Coding Process

It is important to ensure researcher objectivity in the data analysis process. An important step toward this objective is an independent check of the analysis done by the researcher. These independent checks are accomplished through selective use of independent coders and peer debriefings. Categories identified in the data are reviewed with individuals knowledgeable about the subject matter to ensure agreement that the categories selected are appropriate. Ensuring appropriate choice of categories is a critical step in ensuring the validity of the research, i.e., the findings are a reasonable reflection of the phenomenon studied. This second step in the coding process was done by the researcher as well as by an independent coder, and inter-judge reliability was assessed. Inter-judge reliability is an important indicator of validity in the analysis phase of the research. Issues of credibility and validity, and the steps taken to ensure both, are discussed in more detail in subsequent sections.

Documentation of the Research Process

An important element of scientific soundness in qualitative research is to ensure traceability. By making the research process transparent, readers can assess the completeness and appropriateness of research design and the research process. Traceability is accomplished through the systematic documentation of the research

process, and the underlying logic behind the findings and conclusions. Details on the coding and analysis process discussed in Chapter 4 allow the reader to assess the overall validity and reliability of the research.

Research Protocol

Another useful tool to ensure sound research design is the development of a research protocol. The research protocol outlines the key research issues, the design of the research, the proposed methodology and the interview guide (Ellram 1996). The development and utilization of the research protocol ensures completeness and consistency in the research process. A research protocol, which provides an overview of the entire process and research design for this research, was developed prior to the data collection phase and can be seen in Appendix A-1.

VALIDITY, RELIABILITY AND CREDIBILITY

Judgments about the soundness of any research fall into three categories: (1) validity, reliability and credibility of the data, (2) adequacy of the research process, and (3) empirical grounding of the research findings (Strauss and Corbin 1990). These authors argue that “good science” in qualitative research aimed at theory development requires a redefinition of the criteria typically applied to quantitative studies. Wallendorf and Belk (1989) highlight five questions that must be assessed to evaluate any research:

- (1) How can we know whether to have confidence in the findings?

- (2) How do we know the degree to which the findings apply in other contexts?
- (3) How do we know the findings would be repeated if the study were replicated?
- (4) How do we ensure objectivity of the research? In other words, how do we know the degree to which the findings emerge from the context and the respondents, and not solely from the researcher?
- (5) Is there subject bias in the results? In other words, how do we know whether the findings are based on false information from the informants?

Each of these questions will be discussed in turn, and the steps taken to address them in this research process will be highlighted.

How can we know whether to have confidence in the findings?

This question is reflected in the criteria of internal and external validity for quantitative, theory testing research. For this research, the criteria used to answer this question were related to credibility (Lincoln and Guba 1985). Were the findings an adequate and believable representation of the phenomenon? This assessment was based on an evaluation of the data collection, analysis and interpretation methods. One approach to achieving credibility is triangulation across sources and method. For this research, multiple sources across multiple businesses were interviewed to enhance the credibility of the findings and participating businesses were selected from different industries to ensure that findings are applicable on a broad basis. In the interview process, participants were asked which dimension or which supply chain activities and processes they felt would be most important to be globally integrated. Responses

provided a check against the interpretations of relative importance developed through the HVM and quantitative characteristics of the implication matrix. Quantitative research methods will be utilized in subsequent research to test the theoretical frameworks generated out of this research and to extend the generalizability of the findings.

To ensure credibility of findings, it is also important that researcher bias be avoided. Steps taken to ensure researcher objectivity included inter-judge reliability checks on the coding of categories, as well as peer debriefings to test researcher interpretations against those of knowledgeable colleagues for reasonableness and logic. Another way of testing for credibility is to present interpretations to participants to see if they agree with the researcher's conclusions (Taylor 1994). Findings from this research were also presented to key contacts in participating companies for assessments of face validity.

Ellram (1996) argues that an important component of establishing reliability or credibility in case study research is establishing a chain of evidence which allows readers or reviewers to follow the case study data and analysis for logic, flow, clarity and content. One of the keys to ensuring credibility in case study research is to make the research procedures and process explicit so that readers can judge the soundness and appropriateness of the methodology (Ellram 1996). Providing a clear articulation of each step in the research process and making the data and analysis results accessible are both elements of establishing such a chain of evidence that were utilized in this research process.

How do we know the degree to which the findings apply in other contexts?

The question of applicability in other contexts relates to questions of external validity and generalizability. While an important criterion in quantitative research is generalizability, the purpose of theory development is specification, i.e., specifying interactions and relationships relevant to the phenomenon of interest (Strauss and Corbin 1990). For theory development, a more appropriate assessment might be that of representativeness. The sample of companies interviewed was carefully selected to reflect different industries and product types to ensure representativeness. Care was also taken to ensure broad representation of participants from both a role and geographical perspective. While increased representativeness does extend the generalizability of the findings, caution must be taken about assuming generalizability of results. Future research aimed at testing the theory developed in this research will further address the question of generalizability of the findings.

How do we know the findings would be repeated if the study were replicated?

In quantitative research methodologies, the question of whether findings would be repeated if a study were replicated is one of reliability. For qualitative research aimed at theory development, the more appropriate criterion is reproducibility (Strauss and Corbin 1990). When applied to qualitative research, the criterion of reproducibility can be defined as when a second investigator, applying the same theoretical perspective and the same rules for data collection and analysis, under similar conditions, will develop the same theoretical explanation for the phenomenon. Differences in interpretation can be

worked out through reexamining the data and identifying conditions or elements that underly these different perspectives (Strauss and Corbin 1990). Inter-judge reliability to assess reproducibility of content analysis and peer debriefings to assess reproducibility of interpretations were steps taken to ensure reproducibility. Tests for inter-judge reliability were accomplished by utilizing an independent coder to duplicate the process of assigning concepts imbedded in the data to categories identified by the researcher. Results were compared between the researcher and the independent coder, and differences were discussed and resolved. Interpretations by the researcher were also discussed with knowledgeable peers to assess reproducibility of findings.

In case study research, the research protocol and the development of a case study database are also seen as keys to reliability or reproducibility. The research protocol (Appendix A-1) and the interview guide (Appendix A-2) provide some degree of structure to the process and can be assessed by independent reviewers for appropriateness and completeness (Ellram 1996). The research protocol and interview guide also provided a framework to ensure that data collection was guided by the research questions, as well as by emerging ideas from the interviews. A case study database, which contained the research protocol and interview guide, as well as field notes and summary results for each case, was maintained to ensure traceability of the research process (Ellram 1996).

How do we ensure objectivity of the research?

Objectivity relates to the degree to which findings emerge from the context and the respondents, and not solely from the researcher. Inter-judge reliability and peer debriefings are both techniques that help ensure objectivity. While it is incumbent on the researcher to remain open to the concepts emerging in the data, independent assessments that can be checked against researcher interpretations provide an important indicator of objectivity in this research. As discussed earlier, independent coders were utilized to evaluate inter-judge reliability in the coding process. In-depth discussion of findings with knowledgeable colleagues served as a means to assess reproducibility of interpretation. Additionally, the quantitative aspects of the analysis process provide a validation that the categories and causal relationships identified as important in the analysis were, in fact, those most frequently mentioned by the participants. Summary data and a more in-depth discussion regarding quantitative analysis of categories and linkages are provided in Chapter 4.

Is there subject bias in the results?

Subject bias relates to whether findings are based on false information from the informants. The critical element in avoiding bias in responses from the informants is the structure of the questioning during the interviewing process. Open-ended questions with limited and careful probing were designed to ensure that responses reflected the thoughts of the participant, absent the influence of the researcher. Concerns about subject bias often arise because of sensitive personal questions. Personal sensitivity was not a

concern in this research, but there may have been some concern on the part of participants about confidentiality. For this reason, each interview began with assurances that all responses would be treated as confidential, and that anyone with access to information from the interviews would be required to sign a confidentiality agreement.

LIMITATIONS OF THIS RESEARCH

While there are important contributions from this research, there are also potential limitations. A major contribution from the research is the development of a theoretical framework regarding the potential value of global integration of supply chain activities that can provide useful insights to managers in the global company. Given the complexity of choices facing today's manager, and the need to allocate scarce resources to those activities that contribute the greatest value to the company, such a framework can be a very valuable tool. The second contribution is the identification of important areas for future research. The global company as an important entity in the global business environment has been neglected as an object of research in the supply chain related disciplines of purchasing, logistics, customer service and supply chain management. Similarly, the implications of global integration in a supply chain context have received little attention. This research provides insights about important areas for future research related to global integration of supply chain activities and processes in the global company, which are discussed in detail in Chapter 5.

There is, however, an important limitation in this research, arising from the fact that the area of study is extremely complex and the research questions have a relatively

broad focus. The complexity and breadth of the subject do not make research in this area less important, only more difficult. While the research sample was designed for representativeness, sample size by necessity was relatively small. Thus, care should be taken in generalizing results from this research. It is important to reiterate that this study was exploratory in nature, and aimed at developing theory. Theoretical frameworks and propositions developed from this research provide the foundation for future research aimed at theory testing. A more in-depth discussion of contributions and limitations of this research can be found in Chapter 5.

SUMMARY OF RESEARCH METHODOLOGY

This chapter provides an overview of the research methodology used to study the value of global integration of supply chain activities and processes in the global company. Specific research questions addressed in this study were:

1. What are the key attributes (actions and tools), consequences (positive and negative) and value (contribution to organizational goals) of global integration of supply chain activities and processes?
2. What are the dominant structural linkages or causal relationships between the actions and tools, and perceived consequences and value?
3. How and why do hierarchical value maps differ across the different dimensions of supply chain activities and processes?
4. How do environmental and organizational factors influence managers' hierarchical value maps?

A summary of the research process and design elements is provided in the Research Protocol (Appendix A-1). Specific interview questions used in the interview process are shown in the Interview Guide (Appendix A-2).

In this chapter, the characteristics of qualitative research, and the appropriateness of using a qualitative, exploratory approach in this research, were discussed. The importance of various elements of research design was highlighted, and specifics of design for this research were described. Specific interviewing and data analysis techniques utilized were identified, and the approach to developing the Interview Guide (Appendix A-2) to ensure effective data collection was also discussed.

Criteria used to ensure sound scientific research were also discussed, and specific steps taken in this research to ensure soundness were identified. Finally, the limitations of this research were highlighted. In Chapter 4, the analysis process, research findings and conclusions are discussed and conceptual frameworks presented. In Chapter 5, implications of the research findings and areas for future research are presented.

CHAPTER 4: DATA ANALYSIS AND FINDINGS

INTRODUCTION

While Chapter 3 discussed the research process and provided a brief overview of the process used for analysis, Chapter 4 reviews the analysis process in detail and includes a discussion of the findings from the research. The chapter begins with a demographic profile of the research participants and discusses the representativeness of the research sample. Next, the process by which the data were collected, coded and analyzed is discussed. Finally, the findings and conclusions are discussed and theoretical frameworks resulting from the research are presented.

THEORETICAL SATURATION AND REPRESENTATIVENESS

Sample Demographics

As discussed in Chapter 3, sampling for this research was aimed at theoretical saturation and representativeness, rather than statistical generalizability. Companies in industries typically dominated by large MNC's were targeted as participants. In order to ensure greater generalizability, multiple industries within this group were targeted. An initial set of six companies was solicited and participants identified. This initial set included companies from the telecommunications, chemicals, rubber (tire), and electronics industries, as well as one large trading company.

From this initial set of six companies, 39 interviews were conducted in Asia, Europe and North America. After these initial interviews were completed, the data were reviewed to identify whether an additional set of interviews would be required to adequately sample the phenomenon of interest. Only one company in the initial set was representative of the global business model, which was the object of this research. For this one company adopting the global business model, the set of participants included representatives from each of the areas of interest, i.e., purchasing, logistics and cross-functional supply chain processes, as well as from each of the major regions where the company operates. However, in no other cases did the companies represent the business model of interest and provide access to the appropriate set of participants. In four of the six companies, the business model was more representative of the international company, and the concepts associated with their view of global integration were not appropriate to address the research questions. In the fifth company, participant access was somewhat limited - in terms of number of participants, as well as representativeness across regions and supply chain functions. For these reasons, five of the six companies included in the initial sample were not included in the final analysis.

As a result of the shortcomings of the initial set of interview participants, two additional independent businesses units representing two different industries were solicited to participate. While both of these business units were a part of the same parent company, the independence with which they operate and the differences in the industries in which they participate provided adequate justification for treating them as two distinct cases for the final analysis. Thus, the final sample set used for analysis included two

companies, with three distinct business units from the telecommunications, chemicals and synthetic fibers industries. For each company, participants from across supply chain functions, at multiple levels of management and from multiple regions around the world were interviewed. The total sample size was 35.

The demographic profiles of the sample set by business and region are shown in Tables 4-1 and 4-2. The fact that the largest percentages of interviews were managers in the US and Europe (43% and 40% respectively) is reflective of the organizations themselves. Each of the companies is US based, and the major regions with large organizations are the US and Europe. In all cases, the major growth has been seen in Asia and all have organizations there, but the organizations have not yet been developed as extensively as in the US and Europe. In only one case did the business suggest a participant located in the South American region as appropriate to this research.

THE DATA ANALYSIS PROCESS

Introduction

A summary level overview of the analysis process can be seen in Table 4-3. The process consisted of four major sets of activities. First, important themes imbedded in the interview data were identified. Second, important relationships between those themes were identified. Next, dominant patterns in those relationships were identified through the creation and analysis of hierarchical value maps (HVM's). Finally, differences and similarities in those patterns across the three business units were identified, and factors

Table 4-1. Sample Demographics by Business and Region

Business	US	Europe	Asia	South America	Totals	%
Communications Technologies	4	9	2	0	15	43%
Global Chemicals	6	2	3	1	12	34%
Leading Edge Fibers	5	3	0		8	23%
Total	15	14	5	1	35	
%	43%	40%	14%	3%		

Table 4-2. Sample Demographics by Business and Managerial Function

Business	Purchasing	Logistics / Customer Service	Supply Chain	Business Managers	Other	Totals	%
Communications Technologies	3	3	5	0	4	15	43%
Global Chemicals	1	1	4	6		12	34%
Leading Edge Fibers	2	1	5			8	23%
Total	6	5	14	6	4	35	
%	17%	14%	40%	17%	11%		

Table 4-3. Summary Overview of the Analysis Process

	Step in the Analysis Process	Approach
Identification of Important Themes	1. Identify attributes, consequences, goals and values and passages providing background information related to the business environment and organizational influences	Independent coding with reconciliation
	2. Identify important concepts or themes from the initial set of attributes, consequences and goals	Researcher judgment
	3. Independent check on coding for important concepts or themes	Independent coding with reconciliation
	4. Identify dominant concepts or themes within each business unit	Based on count of coded passages and percentage of participants mentioning the category
Identification of Important Relationships	1. Identify important relationships among the dominant concepts or themes	Individual ladders created containing dominant themes from interview text
	2. Count number of linkages, both direct and indirect, between specific pairs of concepts or themes	Using Excel macro to create summary of linkages and linkage type
	3. Identify dominant linked pairs and create Summary Implication Matrices for each business unit	Based on counts of linkages and number of participants mentioning linked pair
Identification of Dominant Patterns	1. Identify generic categories of concepts or themes	Researcher and second supply chain expert agreement
	2. Develop individual hierarchical value maps (HVM's) for each business unit and generic category	Based on relationships between dominant linked pairs identified in Step 7 and generic categories identified in Step 8.
	3. Identify differences and similarities in patterns of HVM's across business units	Researcher judgment
Findings and Conclusions	1. Identify differences in variables in the business environment or organization related to patterns in the HVM's	Researcher judgment
	2. Discuss findings and conclusions with knowledgeable colleagues	Researcher and colleagues with supply chain expertise and familiarity with the research
	3. Develop conceptual frameworks related to the research questions	Researcher

unique to each business environment or organization contributing to the differences were investigated. Conclusions drawn from this investigation led to the creation of conceptual frameworks related to the value of global integration of supply chain activities and processes for global businesses. The process used for each set of activities, and the evidence of credibility and objectivity in the process, are discussed in the sections below. Conclusions and conceptual frameworks developed from the research are also presented in this chapter.

Data Preparation

As discussed in Chapter 3, each of the interviews was audio-taped and transcribed so that a verbatim text version of the interview was available for the analysis process. Initial transcription was done by a professional service with no familiarity with the subject matter. While this would not typically be a concern, because of the diversity of speech patterns and accents represented by the multinational group of participants, the transcription process was particularly challenging. In order to ensure a reasonable level of accuracy in the text, each text interview was checked against the audio version and edited as needed by the researcher. The edited text version of the interviews was used to identify important concepts and themes in the data.

Identification of Important Concepts or Themes

A three-step process was used to identify important concepts or themes imbedded in the data. First, passages containing attributes, consequences, goals and values associated with global integration of supply chain activities and processes were

identified. Next, important concepts or themes imbedded within these passages were identified. Finally, the most dominant themes within each particular business unit were identified. These dominant themes were used in subsequent steps of the analysis process to identify the most important relationships for each company.

Identifying Attributes, Consequences, Goals and Values

The initial step was to identify important passages in the text that contained concepts or themes important to the research. Two independent coders identified passages containing attributes, consequences, goals, and values associated with global integration of supply chain activities and processes. The researcher provided the coders with written documentation that included a description of the coding process, the work flow to be followed, and a description of each of the code categories. Sample passages related to each of the categories were identified by the researcher and included with the description of the category to ensure greater understanding and clarity of the task on the part of the coders. This documentation of the coding process can be seen in Appendix A-4.

Several measures were taken to ensure that this initial coding step was credible and met the objective. First, the researcher discussed the coding task with the two coders simultaneously. The researcher presented an overview of the research, discussing the objectives of the research and the research questions in depth, and responding to specific questions by the coders. Next, the two coders and the researcher coded an interview, then discussed the coding for calibration and upgrade to the coding process. The two coders

then worked independently to code the remaining interviews, comparing results and reconciling differences after each two or three interviews were completed. As the coders worked through the complete set of interviews, the researcher participated in coding and reconciliation at various intervals to ensure alignment on the process. As the coders reconciled differences in the coding, the researcher was consulted in cases where they were unable to reconcile their differences.

After each coder identified relevant passages and assigned labels, they compared coded passages and identified any differences. Based on discussion between the two, they reconciled differences and consulted the researcher only when they could not reach agreement. Coding was done at each of four levels in the value hierarchy - attributes, consequences, goals and values. For each category, some passages were coded as negative and some as positive. The following quote from one of the interviews is an example of the "negative" category.

"If you don't have consistent processes, you don't have metrics that link up consistently you know that are done the same way you don't know if your output, the output that you're getting is going to result in what you're looking."

In this passage, the "lack of consistent processes" and "lack of linked metrics" are examples of negative attributes, and the "inability to get good performance feedback" is an example of a negative consequence.

For this first phase of the coding process, with the intent being to identify important passages for further and more refined coding, the coding structure had a fairly high degree of granularity. The task of the coders was to identify important passages to be further analyzed, as well as to identify the level of the value hierarchy of the particular

passage. The degree of openness in this coding step (i.e., no specific passages identified *a priori*), coupled with the relatively high degree of granularity made this a particularly complex task in terms of acceptable inter-judge reliability.

Coder reconciliation statistics for this step in the analysis process are reported in Table 4-4. Because initial interviews were used to calibrate the coding process and as an educational tool for the coders, only 29 of the 35 total interviews were included in the coder statistics. Overall rate of agreement for initial coding of these 29 interviews was 75.3%, with 99.9% agreement after discussion between the two coders. Agreement rates of 80% or better are considered reasonable when the coding step is aimed at ensuring the clarity of definition of unique concepts or themes (Woodruff and Gardial 1996; Bagozzi and Dabholkar 1994). Since this step in the process was aimed at identifying important passages more than ensuring integrity of specific concepts or themes, a 75.3% agreement rate is quite adequate. This step provided confidence that the identification of passages containing themes or concepts important to the research was done objectively.

Identifying Unique Themes

Once important passages were identified, the researcher reviewed the passages and categorized them into unique concepts or themes. This was an iterative process, where concepts or themes were identified and subsequently compared for similarities, then similar or related themes were combined into a single theme. For example, in the initial phase of this coding step, ideas related to market share, revenue growth, and

Table 4-4. Inter-judge Reliability in Initial Coding of Attributes, Consequences, Goals and Values

Business	Initial Identification of Attributes			Initial Identification of Consequences			Initial Identification of Goals and Values			Total at All Level of Hierarchy			% Overall Initial Agreement
	Agreed	Coder Reconciled	Researcher Reconciled	Agreed	Coder Reconciled	Researcher Reconciled	Agreed	Coder Reconciled	Researcher Reconciled	Agreed	Coder Reconciled	Researcher Reconciled	
Communications Technologies	308	147	0	182	131	0	38	38	0	528	316	0	62.6%
Global Chemicals	611	169	0	412	145	3	139	41	0	1162	355	3	76.4%
Leading Edge Fibers	702	159	0	427	125	0	192	28	0	1321	312		80.9%
Total All Companies	1621	475	0	1021	401	3	369	107	0	3011	983	3	75.3%
% Initially Agreed	77.3%			71.6%			77.5%			75.3%			

market penetration were identified as three distinct themes. These three themes were later combined and became a single theme called "market success."

These unique concepts or themes, with definitions, were then provided to one of the coders for an independent check. Passages identified in the initial coding were reviewed and themes assigned by the independent coder. The researcher and independent coder then compared results, and differences were reconciled. This process was completed for one company before beginning the process for the next. In this way, problem codes were identified and either combined with another code or clarified prior to moving on to the next company. Inter-judge reliability statistics for this second phase in the coding process are shown in Table 4-5. For the first business coded, overall agreement prior to reconciliation was 71.9%. After combining similar themes and clarifying definitions of problem codes, inter-judge reliability for the second business improved to 82.2% and for the third to 96.6%. Overall inter-judge reliability for the complete set of interviews was 82.8%.

In this stage of the research process, it was important to identify all unique ideas or themes, and not to limit the number or to aggregate themes at too high a level since it was not yet clear which themes would be uniquely important. Combinations could readily be done at a later stage of the process if deemed appropriate. A total of 122 individual themes were identified in this step in the coding process. The next task was to identify the most relevant themes for the research questions being asked.

Table 4-5. Inter-judge Reliability in Coding of Unique Themes

Business	Unique Themes at the Attribute Level			Unique Themes at the Consequence Level			Unique Themes at the Goal or Value Level			Total at All Levels of Hierarchy			% Overall Initial Agreement
	Agreed	Coder Reconciled	Researcher Reconciled	Agreed	Coder Reconciled	Researcher Reconciled	Agreed	Coder Reconciled	Researcher Reconciled	Agreed	Coder Reconciled	Researcher Reconciled	
Communications Technologies	656	286	0	426	149	0	127	38	0	1209	473	0	71.9%
Global Chemicals	712	149	4	620	160	1	230	30	0	1562	339	0	82.2%
Leading Edge Fibers	635	19	0	487	23	0	235	6	0	1357	48	0	96.6%
Total All Companies	2003	454	4	1533	332	1	592	74	0	4128	860	0	82.8%
% Initially Agreed	81.4%			82.2%			88.9%			82.8%			

Identifying Most Important Themes

An underlying premise of this research approach is that the most important or dominant themes for a particular business are those discussed by multiple participants and with the greatest frequency. While the number of times an idea or theme was mentioned was taken into consideration, the number of participants discussing the idea or theme was a more significant factor in identifying the important themes to be included in later analyses. In some cases a theme was discussed repeatedly by one or two participants, but did not seem to be perceived as an important issue across the set of participants, thus was not considered representative of the business as a whole.

Using this logic to identify the more important themes, 53 themes were eliminated and 69 were retained for use in the next analysis steps. A complete set of these dominant themes for each of the three businesses, along with the number and percentage of participants mentioning the theme and the number of times the theme was mentioned, can be seen in Appendix A-5.

As a general rule, only themes or ideas mentioned by more than 40% of the participants in a particular business were considered in subsequent analyses. There were a few exceptions to this rule. In the case of Global Communications, discussion of goal and value categories was not as prevalent as with the other businesses. In order to avoid losing important insights about the relationships between lower level themes and the goal and value themes, a cutoff level of 25% of participants discussing the theme was applied to the goal category for this business. The two codes retained as a result of lowering this

cutoff level were "Market Success," mentioned by one third of the participants, and "Customer Relationships," mentioned by 26% of the participants.

It was also important that a decision to eliminate codes specifically related to the supply chain be examined very carefully. For example, if a theme particularly relevant to the purchasing function was mentioned by a small number of participants but mentioned a number of times by the participants in purchasing roles, it was retained for further analysis. As an example, the theme "assurance of supply" was mentioned by one third of the participants in the Communications Technologies business. However, it was mentioned a total of 15 times, for an average of three times per person discussing it. Since this theme is particularly relevant, and is fairly specific to the purchasing role, it was considered one of the important themes to be retained. In no case was a theme retained where it was discussed by less than one third of the participants.

It is also interesting to note that several themes identified as important to one particular business were not evident or particularly important to another. For example, the theme of "Tax Minimization" (found at the consequence level of the value hierarchy) was not identified at all for the Communications Technologies business. This topic made an appearance as a relatively unimportant category in the Global Chemicals business, but was mentioned by more than 50% of the participants in the Leading Edge Fibers business.

Identification of Important Relationships

The next phase of the research process was designed to identify important relationships among the themes considered to be important for each business. In this

phase, the text containing each of the important themes previously identified was reviewed and individual ladders reflecting linkages stated directly or inferred by the participant were created. Below is an example of this process.

Two individual ladders were created from the following text based on direct linkages made by the participant.

".... it needs to be integrated from a planning standpoint so that I can manage in a way that minimizes my inventories, is cost-effective, andwill meet all the customers needs."

The two ladders created from this text were:

Global Demand Planning $\Rightarrow$ Managing Inventory $\Rightarrow$ Lower Cost

Global Demand Planning $\Rightarrow$ Managing Inventory $\Rightarrow$ Serving Customers

In this example, global demand planning is directly linked to managing inventory and indirectly linked to lower cost and to serving customers.

Once all of the individual ladders were completed, a count of direct and indirect linkages between each unique pair was done for each business. A count of the number of participants discussing each unique linkage was also done. The linked pairs mentioned by the most participants, as well as those mentioned most frequently, were then identified for use in constructing the hierarchical value maps.

Summary data for the linked pair analysis described above is shown in Table 4-6. Raw data counts of linked pairs extracted directly from the individual ladders were 2,072 for Communications Technologies, 2,530 for Global Chemicals, and 1,601 for Leading Edge Fibers. An examination of these linkages to identify unique pairs show that for the three businesses, the number of unique pairs was 852, 957 and 802, respectively.

Table 4-6. Summary Data - Identification of Important Linkages Between Themes

Business	Raw Data Total Number of Linked Pairs	Number of Unique Pairs	Number of Unique Linked Pairs Considered for HVM	Cutoff Level # of Participants	Cutoff Level # of Mentions
Communications Technologies	2,072	852	116	20%	3
Global Chemicals	2,530	957	205	25%	3
Leading Edge Fibers	1,601	802	156	25%	3

As with the identification of dominant themes, the assumption was made that those linkages repeated across a number of participants or a number of times were representative of the more important linkages for the business. In this phase of the research, the objective was to select a more manageable set of the more important linkages for use in constructing the HVM's. Cutoff levels were driven first by the number of participants mentioning the linkage, and secondly by the number of times the pair was linked either directly or indirectly. In the cases of Global Chemicals and Leading Edge Fibers, a cutoff level of 25% for the number of participants mentioning the linkage was utilized. This cutoff yielded 205 and 156 linked pairs for the two businesses, respectively. In the case of Communications Technologies, where responses tended to be less consistent across participants, the cutoff level was set at 20% and yielded 116 linked pairs. All linked pairs retained for further analysis were discussed by at least 20% of the participants interviewed and a minimum of 3 times. This final set of linked pairs was then considered in the construction of the hierarchical value map (HVM) for each

business, although only those mentioned the most frequently or those considered to be particularly relevant to research questions were included in the HVM's.

A summary implication matrix, showing all the linkages retained for consideration in the construction of the HVM's, was developed for each business. The purpose of a summary implication matrix is to provide a data summary showing the number of linkages between each unique pair of themes. The horizontal and vertical axes of the matrix contain all of the themes identified as important, and the numbers in the cells represent how many times that particular pair was linked, either directly or indirectly, in the individual ladders. The summary implication matrices can be seen in Appendix A-6.

Identification of Dominant Patterns

In the process of identifying important themes and relationships described above, no attempt was made to segregate out or limit the types of themes considered. An examination of the complete set of themes identified in all stages of the coding process showed that, while a number of variables were related specifically to supply chain activities and processes, a number of others were more generic variables related to organizational, information, or generic business process management issues. For example, themes such as "managing global suppliers" or "serving customers" are clearly related to the supply chain questions raised. However, other themes such as "teamwork," "decision-making," or "information" were more applicable in any aspect of business management.

Since this research was particularly concerned with supply chain related themes, the ability to segregate those out and look at them separately was important. At the same time, understanding the underlying organizational, information and business processes important in the management of supply chain activities and processes was also an important part of this research. While it was desirable to be able to segregate and examine closely themes related specifically to supply chain activities and processes, it was also important that more generic variables not be discarded. Rather, generic themes frequently linked to supply chain related themes were also included in the final analysis.

In order to highlight supply chain related themes, while also considering their relationships with other, more generic themes, a categorization scheme was developed to flag out each particular theme by type. The categorizations were developed by the researcher, then revised based on dialogue with a knowledgeable colleague with supply chain expertise. These categorizations, along with definitions, can be seen in Table 4-7. Five distinct types of themes were identified. These were (1) supply chain related themes, (2) goal related themes, (3) generic business process managing themes, (4) organizational themes, and (5) information related themes. Several sub-categories were also identified within the supply chain and goal related themes.

Themes or concepts specific to the "buy, make, deliver" process of the firm were categorized as supply chain themes. Within this category, each theme was also assigned to one of three sub-categories, depending on whether the theme was focused toward suppliers or customers, or was an activity or process internal to the firm. This supply chain category captured the themes particularly relevant to the research objectives. By

Table 4-7. Generic Theme Categories and Definitions

GENERIC CATEGORIES			DEFINITION
1		Supply Chain Themes	All themes specific to internal "buy, make, deliver" process. Supply chain activities and processes should all be captured here.
	1a	Supplier Focused	Supply chain activities or processes focused on the supplier.
	1b	Internally Focused	Supply chain activities or processes that take place internal to the firm.
	1c	Customer Focused	Supply chain activities or processes that are focused on the customer.
2		Goal or Outcome Themes	Intermediate and strategic level goals and objectives of the company.
	2a	Strategic Goals	Overarching strategic goals of the company or business.
	2b	Execution Goals	Intermediate level performance outcomes or execution goals of the business or company.
3		Business Process Management or Decision Themes	Managing or action oriented activities - these tend to be "how to's" to accomplish goals and objectives.
4		Organizational Themes	Themes related to people, organizational structure, organizational dynamics, culture, values
5		Information Related Themes	Themes related to information, information technology, knowledge or understanding

segregating them and looking at them as a unique set, patterns related to the three areas of interest in this research could be more readily seen. Themes categorized as supply chain related are shown in Table 4-8. Also shown in Table 4-8 is the level of the value hierarchy assigned in the first phase of coding. In other words, if the passage that was coded as "information" was initially coded as an attribute, it is designated in Table 4-8 as an attribute.

Because of the interest in how the global integration of supply chain activities and processes contributes to company goals and objectives, the goal category is also particularly relevant to this research. Themes in this category fell into two unique sub-categories - strategic goals, e.g., competitive advantage and profitability - and execution goals, e.g., resource utilization and lower cost. In the analysis process, relationships between the supply chain and goal or outcome variables were also of particular interest. Goal related themes are shown in Table 4-9.

Three additional categories of themes were identified that are much more generic: (1) organizational themes, (2) information related themes, and (3) generic business process themes. Themes in these categories are likely to be applicable to any business process. Organizational themes, shown in Table 4-10, included alignment, teamwork, organizational structure and discipline. Information related themes included themes such as information technology, data and data linkages, and understanding of the business and markets on a global scale, all of which were closely inter-related. The information related themes were mentioned frequently and were closely related to many of the supply chain themes. The information related themes are shown in Table 4-11. Finally, the

Table 4-8. Supply Chain Related Themes

Type of Supply Chain Category	#	Theme	Level in the Value Hierarchy
CUSTOMER RELATED	1	Avoid Customer Leverage	Consequence
	2	Customer Commitments	Consequence
	3	Global Account Management	Consequence
	4	Pricing	Attribute
	5	Serving Customers	Consequence
	6	Target Markets	Consequence
FIRM LEVEL	1	Global Demand Forecast	Consequence
	2	Flexibility to Ship Inter-regionally	Attribute
	3	Global Logistics	Attribute
	4	Global Demand Planning	Consequence
	5	Global Production	Attribute
	6	Balance Supply / Demand	Consequence
	7	Managing Inventory	Attribute
	8	Managing Material Flow	Consequence
	9	Production Stability	Attribute
	10	Supply Chain Visibility	Consequence
SUPPLIER RELATED	1	Assurance of Supply	Consequence
	2	Global Purchasing	Attribute
	3	Leverage	Attribute
	4	Managing Global Suppliers	Consequence
	5	Supplier Relations	Consequence
	6	Supplier Selection/Rationalization	Consequence
	7	Easy to do Business	Consequence
	8	Supplier Performance	Consequence

Table 4-9. Goal Related Themes

Type of Goal	#	Theme	Level in the Value Hierarchy
EXECUTION GOALS	1	Efficiency	Consequence
	2	Execution Capability	Consequence
	3	Minimize Investment	Consequence
	4	Lower Cost	Consequence
	5	Optimization	Consequence
	6	Product Mix Enrichment	Goal
	7	Quality Improvement	Consequence
	8	Capacity Utilization	Consequence
	9	Tax Minimization	Consequence
STRATEGIC GOALS	1	Business Success	Goal
	2	Competitive Advantage	Goal
	3	Customer Relations	Goal
	4	Customer Satisfaction	Goal
	5	Market Success	Goal
	6	Operational Excellence	Goal
	7	Profitability	Goal

Table 4-10. Organizational Themes

Generic Category	#	Theme	Level in the Value Hierarchy
ORGANIZATION RELATED	1	Alignment	Attribute
	2	Discipline	Attribute
	3	Focal Point	Attribute
	4	Leadership	Attribute
	5	Mindset	Attribute
	6	Organizational Structure	Attribute
	7	People	Attribute
	8	Representativeness	Attribute
	9	Skills & Capabilities	Attribute
	10	Teamwork	Attribute

Table 4-11. Information Related Themes

Generic Category	#	Theme	Level in the Value Hierarchy
INFORMATION RELATED	1	Business/Market Knowledge	Attribute
	2	Data	Attribute
	3	Information	Attribute
	4	Information Technology	Attribute
	5	Information Linkages	Attribute
	6	Metrics	Attribute

generic business process management category included themes such as decision making, standardization, and managing change. The themes in this category are shown in Table 4-12. Descriptions of the individual themes within each category are provided in Appendix A-7.

In constructing HVM's for each business, patterns of relationships were examined at the summary level for each of these categories, as well as at the level of unique themes. The set of HVM's was used to identify similarities and differences in patterns and relationships relating to global integration of supply chain activities and processes. Thus, particular attention was given to the supply chain and goal related variables. The summary HVM showing the patterns of relationships between the general categories of themes was also helpful in identifying the areas perceived as most important by the businesses. The set of HVM's used in the analysis and discussed in the following sections includes (1) the summary-level HVM showing linkages between generic categories, (2) the HVM's focusing on each supply-chain related category, and (3) the HVM's focusing on goal-related themes. Themes in the organizational, information or business process management categories were included in these HVM's if they were strongly linked to themes in each respective category. Complete HVM's related to organization, information or generic business process management were also constructed and are provided as information in Appendix A-8.

Table 4-12. Business Process Management Themes

Generic Category	#	Theme	Level in the Value Hierarchy
GENERIC BUSINESS PROCESS MANAGING THEMES	1	Balance Regional / Global	Consequence
	2	Balance Short-term and Long-term Issues	Attribute
	3	Managing Change	Attribute
	4	Communications	Attribute
	5	Coordination	Attribute
	6	Decisions	Attribute
	7	Innovation	Attribute
	8	Integration	Attribute
	9	Managing Complexity	Consequence
	10	Managing Diversity	Attribute
	11	Performance Feedback	Attribute
	12	Global Processes	Attribute
	13	Rules & Standards	Attribute
	14	Shared Learnings	Attribute
	15	Simplification	Consequence
	16	Speed	Attribute
	17	Standardization	Attribute
	18	Vision	Attribute

ANALYSIS & FINDINGS

To address the specific research questions, the analysis process included an examination of the characteristics of each business, as well as an analysis of similarities and differences in the hierarchical value maps (HVM's) associated with the themes relevant to the research. As a first step, a business profile was developed for each of the businesses participating in the research. The business profile included characteristics of the industry, competitive environment, products, customers and suppliers. As a second step, HVM's were compared across the three businesses for each of the following categories: (1) generic categories of themes, (2) supplier-related themes (3) firm-level supply chain themes, (4) customer-level supply chain themes, and (5) goal-related themes. Analysis and findings for each of these steps are discussed in detail below.

Business Profiles

As highlighted earlier, the three participating businesses were selected from different industries in order to examine the influence of differences in the business environment on the question of global integration of supply chain activities and processes. The three industries represented by the participating businesses were telecommunications, chemicals and synthetic fibers. Characteristics of the business environment for each of these industries can be seen in Table 4-13, and are discussed in detail below.

Table 4-13. Participant Company Business Profiles

	Communications Technologies	Global Chemicals	Leading Edge Fibers
Business Environment & Characteristics	- High-tech consumer products - Major growth in less-developed Asian economies - High growth regions also more profitable - Highly regulated industry with country specific requirements - Dynamic, rapidly changing demand for new products	- Commodity products differentiated by packaging, blending and service - Serves global market, with 50% revenues in US, 25% in Europe, and the remainder in Asia and Latin America - High growth rates in developing economies in Asia and South America - Heavily influenced by environmental regulatory changes - Seasonal demand patterns	- High end branded product in industry dominated by commodity-like products - High growth business, with major growth in less-developed Asian economies - Downstream activities highly labor intensive, resulting in markets shifting globally to low-cost labor environments - Clear market leader with > 50% market share versus large, fragmented competitor base
Competitive Environment	- Large, global competitors - Competitors have taken share over previous three years - Competitors believed to be more effective at product design for simplification, speed to market and lower cost - Competitors moved more quickly to lock up constrained supplier capacity for critical electronic components	- Large, global competitors - Competitors offer less environmentally friendly, products at lower prices in less regulated, developing economies - Competitors driving cost down and improving logistics performance	- Competitors growing aggressively and taking market share - Many competitors produce in one location and ship globally - A large number of new entrants undercutting pricing structure - Competitors building new facilities in high growth regions, making speed of delivery a key to success in those regions - Competitors offer fewer product options, and compete on cost in specific niches - Competitors in other regions have flexible expansion options because of different economic models

Table 4-13. (Continued)

	Communications Technologies	Global Chemicals	Leading Edge Fibers
Customer Characteristics	- Mix of local and regional players, with some becoming more global. - Global players operate and manage regionally - Customers are primarily carriers or operators selling air time rather than communications devices - Requirements differ regionally based on differences in technology and regulatory requirements	- Customers in OEM market are large global players - Customers in after-market are regional or local - Typically, distributor organizations located in each country - Customers demand local service and quick response	- Customers becoming more global with consolidation - Downstream flows are global through major, global clothing manufacturers and retailers - Heavy focus on building relationships and creating pull-through with immediate customers
Supplier Characteristics	- Large global suppliers of key components are critical to business - Severe capacity constraints in supply base over previous year - Some component parts are sourced regionally because of cost of transport or lack of capable global suppliers	- Supplier base is consolidating. Expect that only 4 - 6 large and medium suppliers will survive and remainder will disappear - Many suppliers of key raw materials are global. - Raw materials are globally interchangeable and can be acquired globally	- Supplier base is relatively global in that raw materials are acquired and shipped globally. Some are produced in one location and shipped globally, while others are produced in multiple locations worldwide. - Historically, supply base has been heavily US based. Looking to source worldwide. - One major raw material is sourced internally from a sister division. - Standardization of raw materials across different suppliers is critical to ensure products are interchangeable across production facilities
Company Characteristics	- US corporate headquarters - Production facilities in US, Europe and Asia - Operate as 3 primary regions: EMEA, Asia, the Americas - R&D and new product development primarily in US - Regional general managers have regional P&L responsibility - VP with global responsibility for operations strategy and planning	- US corporate headquarters - Owned production facilities in US and Europe, and JV in Asia - Global business leadership with P&L responsibility - Global business team organization with cross-functional representation - Matrixed organization with reporting through a global business organization and a regional administrative organization - Individual country organizations responsible for legal and logistics support across all business units	- US corporate headquarters - Multiple production facilities in North America, South America, Europe and Asia Pacific - Global market segment organization, global sales organization with geographic leaders - Global business functions (e.g. global technical team, operating team) with geographic leads - Global business leadership located in multiple regions

Table 4-13. (Continued)

	Communications Technologies	Global Chemicals	Leading Edge Fibers
Product Characteristics	- Product application is global, but technology platforms differ regionally and nationally - Average product life cycle is 18 months	- Most products readily interchangeable - Some products require qualification by customers, limiting interchangeability - Products global in application - One set of products offered globally - Hazardous chemicals shipped in bulk in specialized containers - New environmentally friendly products more expensive	- Specialty fiber blended with other fibers in downstream applications - Products differentiated by application - Broad product line versus competition - Two-tiered product offering (branded and generic) - Driving toward making product interchangeable globally - Production facilities interchangeable for most products, but some have specialized hardware requirements
Cost Drivers	Material driven, with material components being the largest cost factor	Traditionally production driven, but with need to minimize investment in new production facilities, global distribution and logistics has become a key driver	- High duty structure has a heavy influence on location and optimum utilization of production facilities - Capital intensive production facilities
Value Drivers	Ability to innovate and speed to market with new products	- Environmental responsibility - Operational excellence - Reliable and responsive delivery - Cost effectiveness	- Branded image - Downstream relationships - Breadth of product offering - Service
Critical Issues	- Ability to ensure adequate supply of component parts to meet demand - Need to shift from technology focus to market focus - Complexity of new product introduction and materials planning - Need to become a global company rather than an international company - Need for a globally integrated planning process	- Uncertainty associated with environmental and regulatory changes - Investment risk associated with legislative uncertainty - Managing transition of phased out products and retired assets across markets - Product pricing with transition products in developing countries - Need to incorporate local laws, regulations, and issues into the global planning process	- Competitive pressures to introduce new products and drive better performance - Need to stay ahead of competition with products and service to avoid becoming a commodity business - Need to understand and take advantage of currency and duty issues in location decisions. - Need competitive financial management to combat aggressive competitive expansion

Communication Technologies

Communication Technologies is a producer of high-technology, consumer telecommunications products. Rapid technology innovation in this industry means that there is a constant demand for new and innovative products. The major growth in this business has been in less-developed Asian economies where wireless technologies are in high demand because of the shortage of traditional telecommunications infrastructure. Typically, these high-growth markets are also more profitable than the more saturated markets in highly developed economies.

Communications Technologies has several very large, global competitors who have taken market share over the previous few years. These competitors are believed to be more effective at designing products with standardized technology platforms that facilitate speed to market and lower cost. Competitors have also been more effective in previous years at predicting global demand and locking up supplier capacity for those critical components that have been in short supply in recent history.

The telecommunications industry is one that is highly regulated, generally leading to very country-specific requirements for products and services. Thus, customers tend to be local or regional players, with only a few beginning to consolidate globally. Even where global consolidation has taken place, management of customer firms tends to remain regionally focused. The customers of Communications Technologies are primarily carriers or operators, with their primary product being air time rather than communications devices.

There are several large, global suppliers for key electronics components for this business. In recent years, severe capacity constraints for the manufacture of these components have been a problem in this industry, and in particular for Communications Technologies. Other component parts, such as plastic casings, are produced and purchased locally or regionally. Because of high shipping costs and the lack of capable global suppliers for these parts, local and regional suppliers are a logical choice.

Communications Technologies is a US based company with production facilities in Europe, the US, and Asia. They operate as three distinct regions, with regional general managers having P&L responsibility for the region. R&D and new product development is primarily based in corporate headquarters, with some small amount of development activity in Asia. They have recently placed operational strategy and planning responsibility under a single global VP.

Products manufactured and sold by Communications Technologies are global products in that consumers use them worldwide. The application is global, but the technology platforms differ regionally and nationally. Thus, the demand for a specific product produced by this company is not particularly global. However, component parts from suppliers are common across products in all regions. As mentioned earlier, product innovation is important for this business, and the average product life cycle is ~ 18 months. This business tends to be material driven, since material components are the largest cost factor and supply constraints have been a significant issue in recent years. Manufacturing is fairly flexible in terms of being able to make changes in production at a particular facility, as well as flexible to produce products designed to meet the needs of

different regions. Thus, they have the capability to use excess capacity in one region to meet the excess demands in another region. However, this business typically uses this flexibility by shifting production over a long-time horizon, or on an ad hoc basis, and more routinely plans and manages short-term capacity issues at a regional level.

One of the critical issues facing this business is the need to develop new products and get them to market quickly. Given the short product life cycles, the complexity of managing the new product introductions and material planning is great. A second critical issue is ensuring adequate supply of component parts to meet global demand.

Participants suggested three improvement opportunities for Communications Technologies to better deal with these critical issues: (1) develop a globally integrated planning process, (2) focus on becoming a global rather than an international company, and (3) shift from a technology focus to a market focus.

Global Chemicals

Global Chemicals is a US-based manufacturer of a commodity-like product differentiated primarily by packaging and services. This business serves a global market, with ~ 50% of its revenues in the US, ~25% in Europe, and the remainder in Asia and Latin America. This business also sees much of its growth in less developed countries in Asia and South America. Demand patterns are seasonal, thus demand is likely to be up in one part of the world when it is down in another.

This business has been heavily impacted by changes in environmental regulations over the past decade. As a result of legislative changes, new production processes have

been developed and investment in new facilities has been required. There remains a great deal of uncertainty on a global basis about what future legislative changes will bring, thus there is a need to very carefully manage the investment risk associated with building new facilities. As a result, Global Chemical has moved from being a regionally-based business with production capacity located in each region, to a global business with a few production facilities in strategic locations to meet global demand.

Competitors in this industry tend to be large, global players who are working to drive costs down and improve their logistics performance. Global Chemicals is focused on driving operational excellence to minimize cost and use differentiated service as their competitive edge. Their challenge is to do this with minimum investment in new production facilities while serving a global market. Thus global distribution and logistics are critical to this business.

Global Chemicals' customer base is a mix of large, global customers and local or regional customers. Some of their products are sold into OEM markets, where the customers are large, global players. Others are sold into after-markets, where regional or local players are prevalent. Typically, sales are through distributor organizations in each country. Given the competitive environment, customers typically demand local service and quick response.

The supplier base is consolidating and becoming more global. Participants indicated that more than likely only 4 - 6 large and medium suppliers would survive, and the remainder would disappear. Raw materials for the products manufactured by Global Chemicals are globally interchangeable, and can be acquired globally.

Global Chemicals has several production facilities in the US and Europe, and has formed a joint venture for production in Asia. The leadership of this business is global, with global P&L responsibility. The business is managed with a global business team organization with cross-functional representation. The organization is matrixed, with managers reporting through a global business organization for business direction, and through a regional administrative organization. Individual country organizations are responsible for legal and logistics support across multiple business units.

Most of the products sold by Global Chemicals are readily interchangeable globally, though a few are less readily interchanged because of qualification requirements by customers. This business has one set of products that are offered globally. These products are hazardous chemicals, which are shipped in bulk in specialized containers. Thus, repackaging may be required when products are shipped from one region to another. The new, environmentally friendly replacement products manufactured by Global Chemicals are more expensive than their predecessors. In some cases, competitors continue to offer the predecessor products at lower prices in developing countries with less stringent environmental regulations. This presents a challenge for Global Chemicals to be competitive in such markets.

The critical issues facing this business are the uncertainty associated with future environmental regulatory changes, and the investment risk associated with that legislative uncertainty. Somewhat related issues faced by the business include (1) the ability to manage the transition of phased out products and retired assets across markets, as legislative change evolves across countries and regions, (2) managing product pricing

with transition products in developing countries, and (3) the ongoing need to incorporate local laws, regulations and issues into the global demand planning process.

Leading Edge Fibers

Leading Edge Fibers manufactures and markets a high-end branded product in an industry dominated by commodity-like products. Their business has seen strong growth over several decades, with the major growth once again seen in the less-developed Asian economies. Downstream activities in the Leading Edge supply chain are labor intensive, resulting in markets shifting globally to low-cost labor environments. This is also a business that faces high duty structures, which has a strong influence on optimal location and utilization of global production facilities.

Leading Edge is a clear market leader, maintaining greater than 50% market share in a fragmented competitive environment. However, competitors are growing aggressively and taking market share as Leading Edge has been unable to bring new production capacity on line fast enough to keep pace with the growth in global demand. There are a number of new entrants in this industry who are undercutting the pricing structure. As competitors build facilities in high growth regions, speed of delivery and responsiveness to local customers become increasingly significant issues for Leading Edge to remain competitive. Competitors tend to produce in one or a few locations and ship globally. Thus they offer fewer product options and compete on cost in specific niches. An additional challenge facing Leading Edge is the flexibility in expansion

options afforded competitors in other regions with different economic models, e.g., less stringent ROI requirements, lower interest rates, and supportive regulatory environments.

Customers in this industry are becoming more global with consolidation, but the true global nature of this industry is reflected in the degree to which downstream flows are global through large global clothing manufacturers and retailers. Leading Edge maintains a strong focus on building relationships with downstream customers to create pull-through demand with their immediate customer base.

The supplier base for this business is relatively global in that raw materials are acquired and shipped globally. Some are produced in one location and shipped globally, while others are produced and shipped from multiple locations worldwide. Historically, the supply base for this business has been heavily US based, but they are increasingly looking for new and better sources of raw materials on a global basis. One of the major raw materials for this business is acquired internally from a sister division in the parent corporation. One of the major challenges in the purchasing arena for this business is the need to standardize raw materials across global suppliers, so they in turn can produce globally interchangeable products and leverage purchases across suppliers.

Leading Edge has multiple production facilities located in North America, South America, Europe and Asia Pacific. The business is managed through a global market segment organization, with global sales and functional teams and individuals on the team have lead responsibilities geographically. While corporate headquarters is in the US, this business has global leadership dispersed among multiple regions. Products are specialty fibers that are blended with other fibers in downstream applications. Products differ by

application, but production facilities are generally interchangeable globally for a particular product going into a particular application. However, some products have special hardware requirements, and can only be produced in a particular production facility.

In part, Leading Edge differentiates itself by making a broad range of products available to customers on a global basis. To accomplish this, production facilities are managed as a global asset to respond to global demand. They also have a two-tiered product offering consisting of both a high-end branded product and a generic product to compete with low-end commodity products.

Critical issues facing this business are driven by the competitive landscape. The ability to introduce new products, drive better performance and provide high service levels to customers is key to avoiding the commoditization of this business. There is also a need to better understand and manage currency fluctuations and duty issues in location and production decisions. Finally, there is a need for competitive financial management to combat aggressive competitive expansion in other regions, where competitors operating under a different economic model have greater flexibility to expand capacity in high-growth regions.

Analysis of Hierarchical Value Maps

One of the underlying assumptions of this research was that differences exist across business units in the value of global integration, and that those differences are reflective of influences in the business environment or within the organization. The

research design aimed at uncovering those differences through the analysis of hierarchical value maps (HVM's) constructed for each participating business unit. These hierarchical value maps reflect the cognitive structures of managers regarding the value of global integration of supply chain activities and processes.

As highlighted earlier, the HVM's were constructed based on the most dominant themes identified in the coding process, and the linkages between themes discussed most frequently by participants. For each participating business, a set of eight HVM's was constructed that focused on a different set of themes. The first HVM provided a summary level view of the patterns of linkages between the general categories of themes, e.g., between all organizational themes and all information-related themes. Three sets of HVM's focused on the supply chain related themes, i.e., supplier related themes, firm level supply chain themes, and customer related themes. The fifth HVM focused on the goal related themes, the sixth on organizational themes, the seventh on information related themes, and finally, the eighth on the general business process management themes. As noted earlier, the only those HVM's focused on summarizing relationships among categories or on supply chain and goal related themes are included in the analysis and discussed in this chapter. The other three sets of HVM's focused on organizational, information-related and business process management themes are shown as information in Appendix A-8.

The construction of eight distinct HVM's for each business unit served two purposes. First, because of the complexity of the research and the number of themes identified as important to global integration, including all themes in a single HVM for

each business was not feasible. Secondly, having individual HVM's focused on particular categories of themes facilitated the analysis process, allowing the researcher to more easily examine particular relationships of interest. Since the purpose of constructing HVM's was to use them as an analytical tool, this approach was appropriate to the research. It is also important to note that, within each individual HVM, important relationships between themes within the category of interest and themes in other categories were also shown. While this created some overlap between HVM's for a particular business unit, it provided a mechanism to look at all the linkages and relationships seen as important within the business.

With the exception of the summary level HVM's, each HVM contained only themes and linkages that met the cutoffs applied in previous steps in the research analysis. Only those themes and linkages mentioned across a representative number of participants and mentioned a number of times were included in this step of the process. Themes and linkages most dominant within each HVM were highlighted with bold framing and typeface. So while all relationships in a given HVM reflect some degree of importance for the business, dominant patterns showing the most important relationships were readily identified. To understand differences in and drivers of the value of global integration, HVM's were compared across the three business units, and similarities and differences identified.

Relationships Among Theme Categories

Summary level HVM's showing the relationships between categories of variables can be seen in Figures 4-1, 4-2 and 4-3. The hierarchical structures depicted in these HVM's are very similar across the three business units. Themes categorized as organizational, information and business process management themes are typically at the attribute level of the hierarchy, while supply chain themes related to suppliers and customers or internal to the firm are typically at the consequence level of the hierarchy. Execution goals are also found at the consequence level of the hierarchy, and strategic goals are those characterized as end-state goals in the value hierarchy. The structure of the HVM's for each business is very consistent with the categorization of themes in the initial coding process (shown in Tables 4-8 through 4-12). The hierarchical nature of the relationships among categories, coupled with the consistency between the assignment of attribute, consequence and goal categories and the hierarchical structure of the relationships in the HVM, lends validity to the applicability of means-end theory and the value hierarchy in this context.

While the overall patterns of relationships are similar across the three businesses, patterns of dominance differ. In this particular set of HVM's, the number of linkages within and between categories is shown. For example, as shown in the summary level HVM for Communications Technologies, organizational themes were linked directly to other organizational themes 24 times, and were linked to information-related themes 36 times. On each of the HVM's, those categories within and between which there were

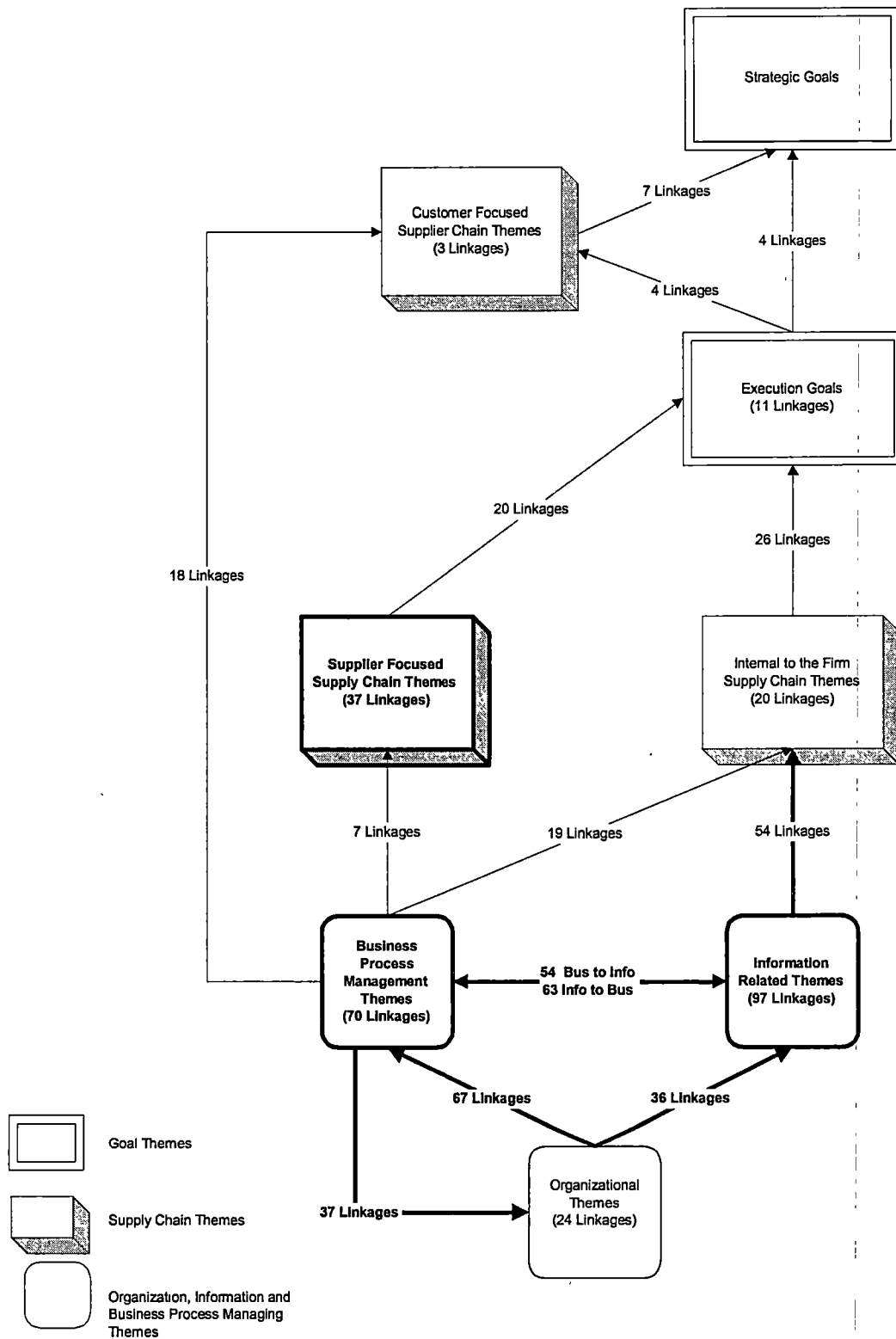


Figure 4-1. Communications Technologies: Category-Level Hierarchical Value Map

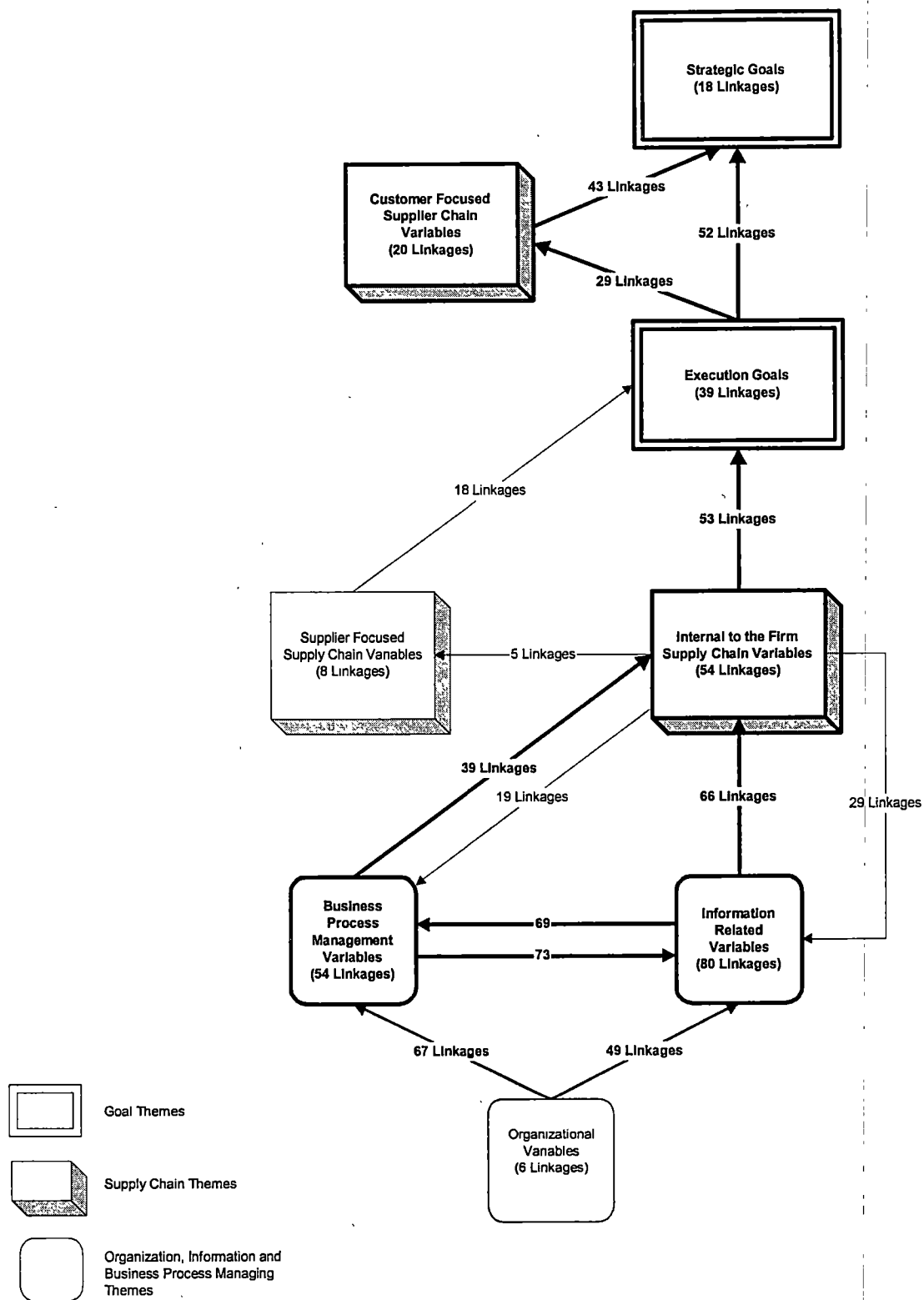


Figure 4-2. Global Chemicals: Category-Level Hierarchical Value Map

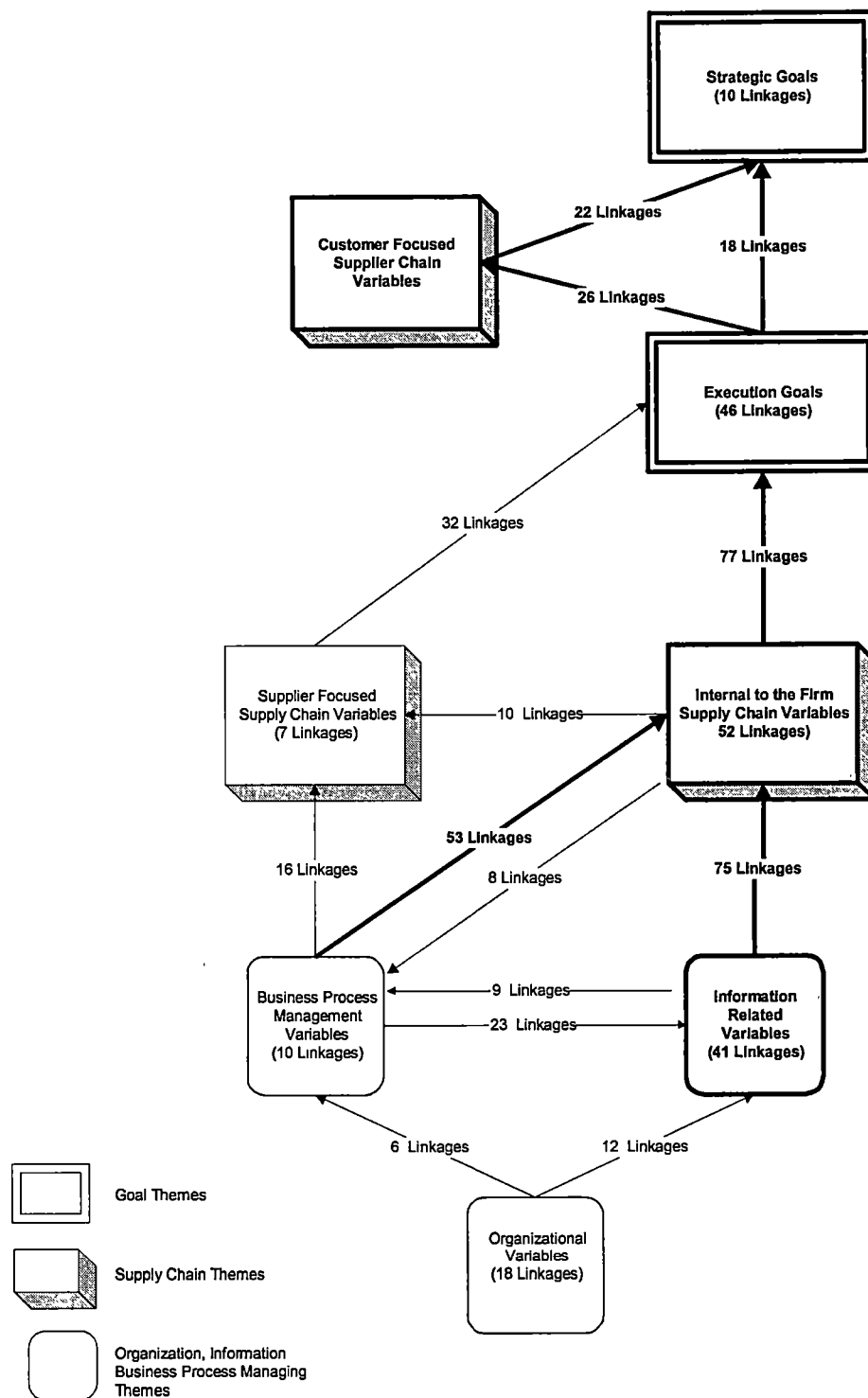


Figure 4-3. Leading Edge Fibers: Category-Level Hierarchical Value Map

more frequent linkages are shown with bold framing and text. A comparison of the number and concentration of linkages, or the dominant patterns of linkages, shows some interesting differences.

In the case of Communications Technologies, the largest concentration of linkages was at the attribute level or in the organizational, information and business process management related categories of themes. The most dominant patterns of linkages related to the supply chain category were found within the supplier-focused themes (37 linkages) and between information related themes and those supply chain related themes internal to the firm (54 linkages). While there were linkages from the supplier and firm focused themes to higher-level execution goals and customer-focused themes, these numbers were relatively small. The patterns seen in the other two business cases were quite different.

In both the Global Chemicals and Leading Edge Fibers summary level HVM's, there was a greater frequency of linkages from the attribute level through the consequence and goal levels of the hierarchy. Interestingly, the exception to this in both cases was in the supplier-related category, where there were relatively few linkages within the category or between this category and others. Whereas the supplier related category was the most dominant in the supply chain related categories for Communications Technologies, it was the least dominant for both of the other businesses. This suggests global integration is most important for Communications Technologies in the supplier-related dimension of supply chain activities and processes, and least

important for Global Chemicals and Leading Edge Fibers in the supplier-related dimension of supply chain activities and processes.

In the case of Global Chemicals, with the exception of supplier-related themes, there were strong linkages between all of the supply chain categories and throughout the hierarchy. It appears that supply chain related themes, other than in the supplier arena, were seen as integrated, and strongly linked to the business achieving its strategic objectives. Another category where there was little emphasis was within the organizational category. While organizational themes were frequently linked to other business process management themes and information related themes, there were few linkages within the category.

As was the case with Global Chemicals, the Leading Edge Fibers summary level HVM showed strong linkages between supply chain related themes and the business's goals (again, with the exception of supplier related themes). Different than both other businesses, Leading Edge puts little emphasis on organizational themes, and relatively limited emphasis on business process managing themes. Based on the dominant linkages through the hierarchy, it appears that Leading Edge also sees firm level supply chain related activities as closely linked to its ability to achieve its execution and customer related objectives, and ultimately its strategic goals. There was, however, a bit less emphasis on customer related themes for Leading Edge than was seen in the case of Global Chemicals.

Supply Chain HVM's

Supplier Related Themes

The HVM's illustrating the relationships important in the supplier related category are shown in Figures 4-4, 4-5, and 4-6. In the case of Communications Technologies, the emphasis on supplier related themes suggested by the summary level HVM can be readily seen in the HVM focused on this category (Figure 4-4). As compared to Global Chemicals and Leading Edge Fibers, their supplier-related HVM was much more complex, and included several themes that emerged as a more important theme only for this business. It is worth noting that these themes may have been heard in the other businesses, but did not meet the frequency cutoff levels to be considered representative of the business.

Some of the relationships seen in the HVM were common across businesses. One of the more dominant sets of relationships across the three businesses was between managing global suppliers and leveraging volume to reduce cost. These relationships were discussed frequently in all three businesses, and are reflected in the following comments typical of those heard.

Communications Technologies Manager:

"If we could get over the fact that we had to triple or quadruple source everything, I think we could leverage the demand and get probably better pricing, maybe global pricing."

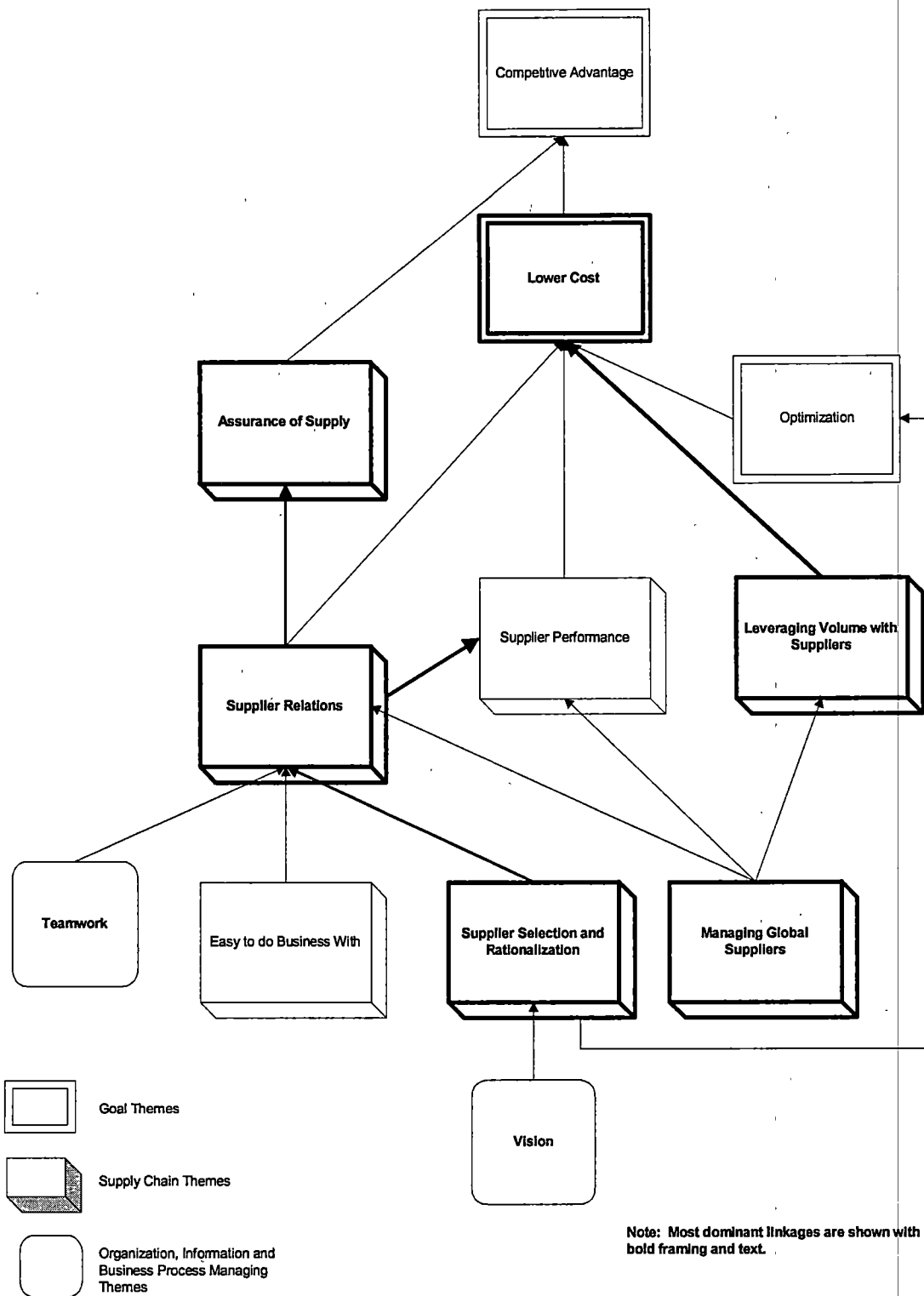


Figure 4-4. Communications Technologies: Supplier Related Hierarchical Value Map

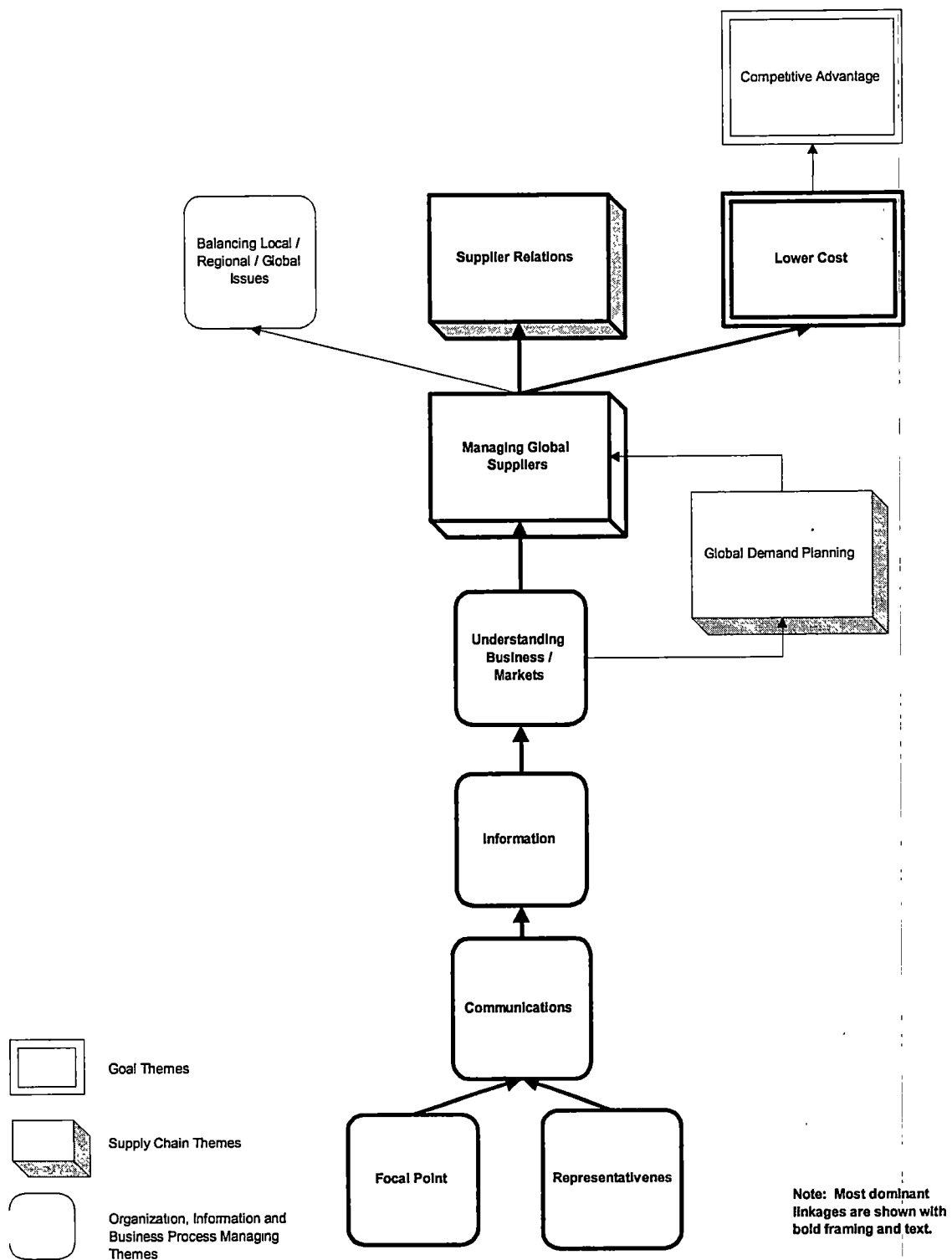


Figure 4-5. Global Chemicals: Supplier Related Hierarchical Value Map

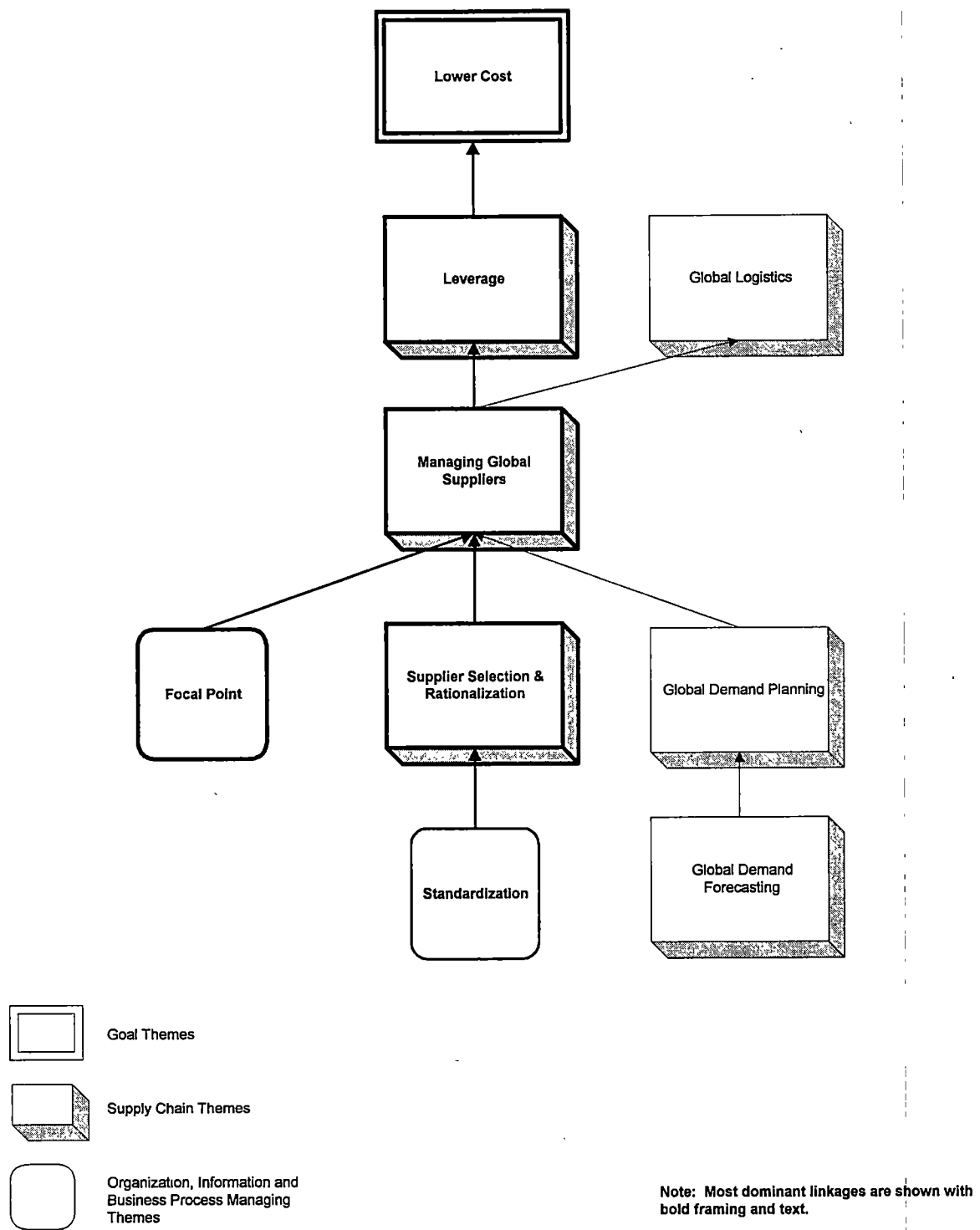


Figure 4-6. Leading Edge Fibers: Supplier Related Hierarchical Value Map

Global Chemicals Manager:

"I think to some extent some of the global purchasing is pretty critical, although if it's supplied locally I think if you could get the global commitment to the agreements, and you could leverage your purchasing power globally...."

A second set of linkages important to Communications Technologies had to do with the rationalization of the supplier base and selection of global suppliers with whom the company can build strong relationships that help ensure supply. This was particularly important for this business, given the shortage of capacity for key component parts in previous years. In discussing this issue, several managers described the importance of relationships with key suppliers, as highlighted in the following quotes.

Production Planning Manager:

"... the ability in terms of the supply chain to procure and guarantee raw materials -that alone in my many years at 'Communications Technologies' has been the key issue I've seen, and I think that the way to overcome that is really to have a global partnership with the key suppliers who then feel part of the 'Communications Technologies' environment, and also commit..... "

"Now somehow we need to build a partnership with them to make it almost impossible to walk away, that they stay with us..... For me it's really within the supplier relationships - I think that's where we would see our biggest benefit from globalization - in terms of having global partners, in terms of supplying components and raw materials."

Global Sourcing Strategy Manager:

"So it's important to reduce the supply base so that we maximize the leverage and develop the kind of relationships, you know, win-win relationships that you've got to have. We have to be most favored customer, or let's say approach the most favored customer status, and volume, how much business we do with them is a big component of that..... It should, we should have a lot more mind share at that company and a lot more ability to guarantee our supply at the expense of our competitors."

This excerpt from the interview with the Global Sourcing Strategy Manager highlighted the importance of developing strong supplier partnerships for the ability to guarantee supply to gain competitive advantage in this particular industry. One of the themes that emerged as important to Communications Technologies in the supplier arena that was not seen in the other businesses was "ease of doing business with suppliers." Being easy to do business with was seen as one mechanism for being a preferred customer and ensuring the kind of supplier relationships important to assure supply, as demonstrated in the following comment by another manager.

Information Technology Manager:

"It means that you can have single points of supply chain planning, single point schedule sharing so they get globally a view of what's actually happening at a given point and time rather than having fifteen different forecasts coming in from fifteen different plants.....which leads to ... you scare the supplier and they kind of, if they start becoming confused they start delivering less to yourselves, so they might.... if it's easier to be done with the competitor of ours, they might decide to deliver it to a competitor because it's easier to deal with that [sic]."

As can be seen in the supplier-focused HVM for Communications Technologies, two key attributes required for global integration in the supplier arena were "vision" and "teamwork." In this business, the need for ensuring a clear sense of strategy and direction on a global basis, and ensuring the various regions are aligned and working together toward that common strategy and direction was mentioned frequently.

The supplier-related HVM for Global Chemicals is shown in Figure 4-5. For this business, as for the other two, the relationship between managing global suppliers to lower cost was dominant. Additionally, the importance of managing suppliers in a way

that builds strong relationships was also seen as important. While leveraging volume was mentioned by some of the participants as the mechanism to reduce cost, it was not dominant across participants, and other mechanisms for reducing costs were also seen as important. Thus, the HVM shows a direct linkage between the managing global suppliers and lower cost themes. Examples of other mechanisms to reduce cost through the global approach to managing suppliers include (1) the ability to provide better forecasts and ensure a minimum range of variability, (2) the ability to negotiate more effectively by having better pricing information across geographic regions, and (3) the ability to protect supply and pricing through long-term contracts. These approaches were reflected in the linkages from understanding the business and markets and global demand planning to managing global suppliers. Examples of these mechanisms for managing global suppliers more effectively to reduce cost can be seen in the following quotes.

Purchasing Manager:

"I've had suppliers because I've given them better forecasts, then put limits on it, say if you're going to buy X number of pounds, and if you can come within plus or minus 10% a month of that or 20% a month, they'll give you a 5% discount on the price. It's real money. It adds up to a million dollars or three million dollars a year, it can."

"When we buy raw materials, we would like to have, you know, five, eight, ten years of a supply contract so that we are sure that the supply doesn't get interrupted and the cost is low."

Supply Chain Manager:

It is important to "have...the knowledge of the price level in the various regions. You know, about the relation between Global Chemicals and our suppliers on a global basis, and it will give us the opportunity to better prepare your negotiation. I guess that as a result of that, we can make a better deal [sic].

Supplier relationships were also seen as important in this business, as described by the procurement manager in the following comment.

"Everybody at certain times has needs that they cannot fulfill and if you have the right kind of relationships, people bend over backwards to help you."

In this business, the primary attribute for managing global suppliers had to do with information and with having a good understanding of your business internally, as well as of the dynamics of the business environment and downstream markets. The importance of having this kind of knowledge and understanding was linked to supplier management indirectly through the global demand planning process, but was also a strong direct link. Having the right kind of information and business and market knowledge on a global basis was seen as a key attribute for effective management of global suppliers.

Two important organizational themes linked to having the right kind of information were "focal point" and "representativeness." A "focal point" refers to some mechanism, typically in the form of a person or a team, which enables the collection, aggregation and dissemination of global information. Through such a focal point, a complete set of relevant global information can be available to people who need it in a timely way. Representativeness refers to the need to have representation from all regions of the world involved in the process of collecting and aggregating information. Only by having representatives from the various regions can the business ensure that the right information is considered in trying to understand the business and markets on a global basis. As shown on the Global Chemical HVM, communications was also seen as critical to having the right information available to the right people to more effectively manage suppliers on a global basis. Finally, for this business, effective management of global

suppliers also related directly to the ability to balance global, regional and local issues. This reflected the need to manage globally to gain the benefits of leverage, but execute regionally and locally to have the responsiveness required at the regional and local level.

In the case of Leading Edge Fibers, the HVM focused on supplier related themes is fairly straightforward, showing a clear hierarchical set of relationships from selection and rationalization of suppliers globally, to managing global suppliers in order to leverage volume and reduce cost (Figure 4-6). Having a focal point as a key interface between the various regions and global suppliers was again seen by this business as a key to effective management of global suppliers. Standardization was also seen as a key to effective global supplier management, as illustrated in the following comments.

Purchasing Manager

"In the long run, if we send different - in this case different messages of acceptability or nonacceptability (to the supplier)..... would lead back to us to cost. I can't have the vendor having to incur extra cost and then expect him to give us the lowest possible cost when we're asking - everybody's asking for a different standard. First of all what the heck do you want."

Sourcing Director:

"Our definition of global and the reason that we went to global specifications was so that we could source anywhere in the world at any time. So one of my responsibilities is to make sure that we look everywhere in the world.

Finally, as was also seen in the Global Chemicals business, being able to forecast demand and plan globally were seen as important attributes in being able to effectively manage suppliers globally.

In considering the set of HVM's in the supplier arena, two things stood out. First, the importance of global integration in the supplier arena was focused on having the ability to appropriately manage relationships with global suppliers, with a major emphasis on leveraging volume on a global basis to reduce overall cost of supply. The second observation was that the complexity of the HVM for Communications Technologies in the supplier arena was greater than for the other two businesses. Additionally, there were themes and relationships seen as important to the competitive advantage of the business related to establishing strong supplier relationships to assure adequate supply of component parts that were not seen in the other two businesses. These differences suggest the activities and processes related to purchasing and supplier relations were seen as a more important area for global integration for Communications Technologies than for the other two businesses.

Firm Level Supply Chain Themes

A comparison of the three HVM's focused on firm-level supply chain themes, seen in Figures 4-7, 4-8, and 4-9, showed a very different picture than the earlier comparison of supplier related themes. What is most readily apparent are differences in the complexity of these HVM's, with the degree of complexity being opposite what was observed in the supplier arena. In the firm-level supply chain category, the HVM for Communication Technologies was far less complex than those for Global Chemicals or Leading Edge Fibers, with Leading Edge showing the most complex set of linkages. It is also interesting to note that linkages to execution goals or strategic goals were limited to only three for Communications Technologies, while for both Global Chemicals and

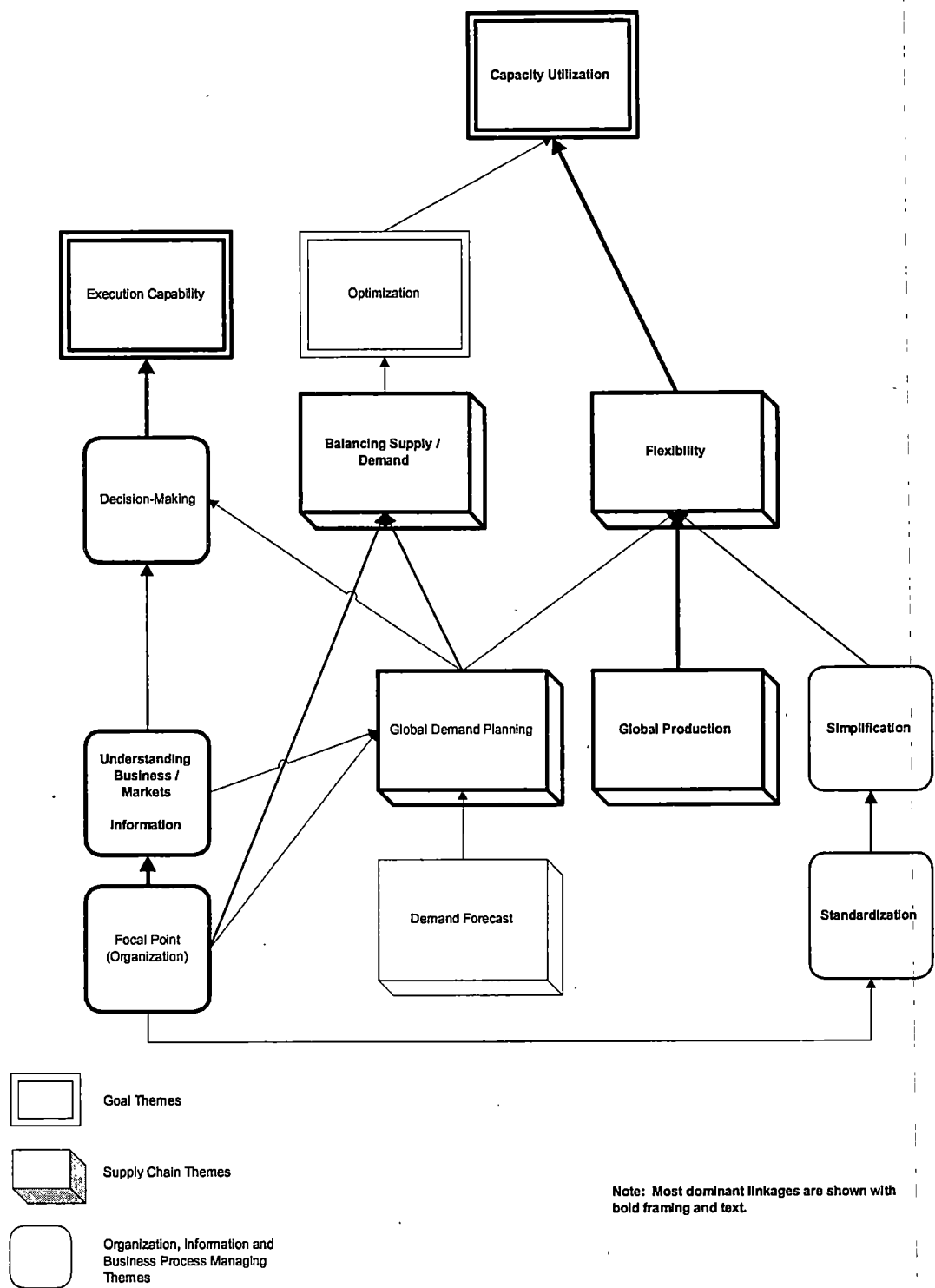


Figure 4-7. Communications Technologies: Firm Level Themes Hierarchical Value Map

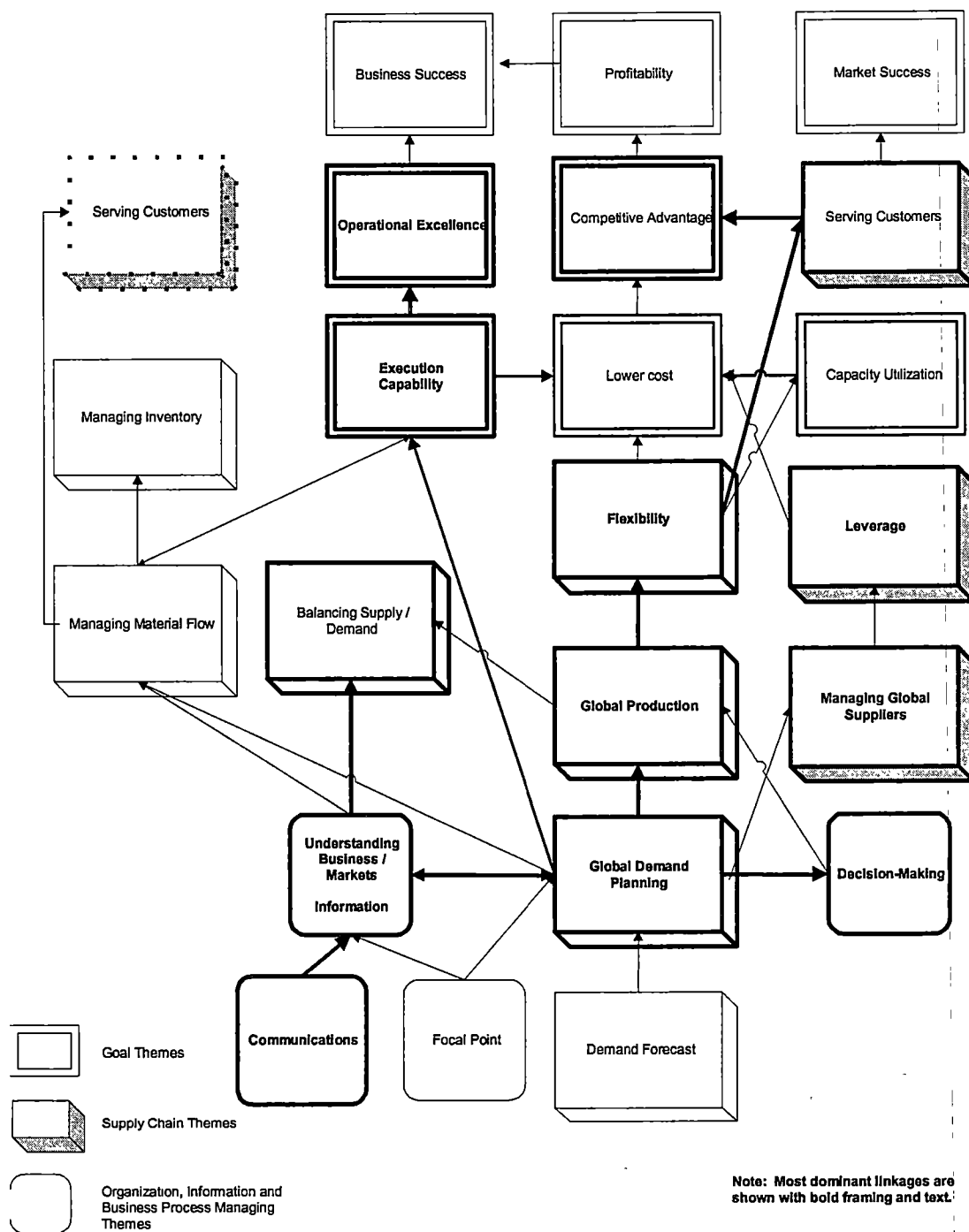


Figure 4-8. Global Chemicals: Firm Level Themes Hierarchical Value Map

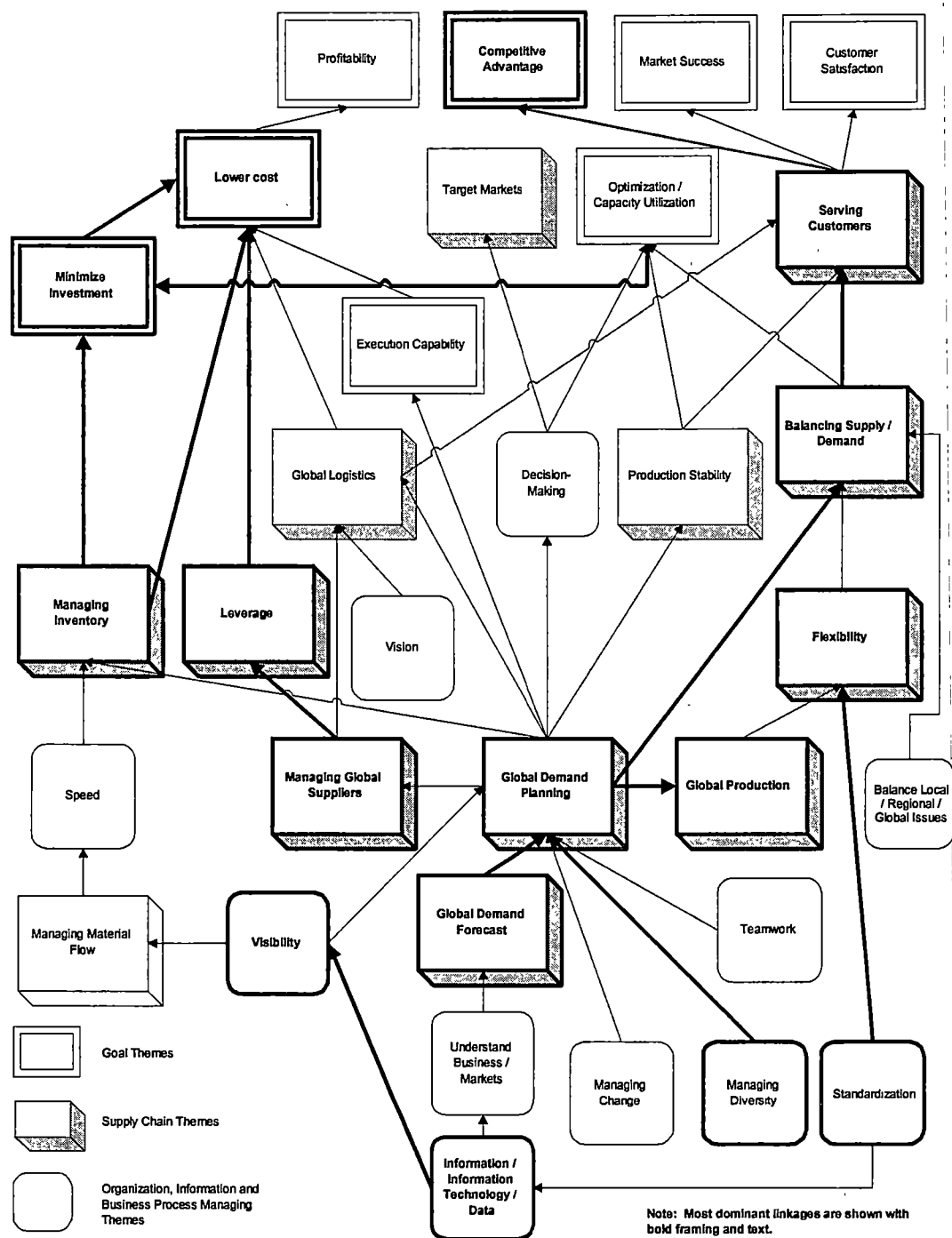


Figure 4-9. Leading Edge Fibers: Firm Level Themes Hierarchical Value Map

Leading Edge Fibers, firm-level supply chain themes were linked to a total of eight execution or strategic goals. Additionally, both Global Chemicals and Leading Edge Fibers showed strong linkages between firm-level supply chain themes and their ability to serve customers. This summary level comparison suggests that global integration of these firm-level supply chain activities and processes was seen as much more central to the company's ability to meet its overall objectives than was the case with Communications Technologies.

For Communications Technologies, one of the more dominant sets of relationships was between information-related themes (having information and understanding the business and market environment) and appropriately balancing supply and demand on a global scale. The ability to optimize results based on balancing supply and demand was highlighted in the following comment.

Supply Chain Manager:

"....for us, it would be good if we had the capabilities of being able to balance all of our capacity and demand and supply across all of our various regions so we could maximize what we choose to build and which customer we want supply, etc., etc., So, what we would like to have would be the capability of being able to see what our global demand is for, let's say, a particular component so that we could then make intelligent choices around - based upon what the demand is, who do we want to sell those to."

This quote highlights the fact that, for Communications Technologies, global integration of firm-level activities was also focused on the effective management of purchased component parts.

The second set of relationships seen as particularly important to Communications Technologies related to having global production capacity that gives flexibility to source

products from other regions, allowing better capacity utilization. Communications Technologies managers discussed these relationships fairly frequently, but the focus was different than that seen in Global Chemicals and Leading Edge Fibers. They were typically discussed as an important option over a long-range or mid-range planning horizon, rather than as an integral part of the day-to-day management of the business. For example, one supply chain manager discussing the value of global integration described global production as a long-term capacity planning issue.

"It comes down to you know getting suppliers aligned, getting new operations set up and basically saying I don't think we should leave it up to a region to go and start an operation in a country, that's more like a global role."

Other managers focused on more intermediate or short term issues of global production with the following comments:

"Where does it make financial sense six or eight months from now to produce products....so that we can ultimately as an overall company be more profitable."

Logistics Manager:

"Primarily what you want to do that is so that if you, for some reason, can't fulfill orders in one region that you at least have the ability to go to another region to try to make use of that capacity or whatever."

In the first of these two comments, the focus was on making decisions about how to best use global production facilities over a fairly long time horizon, i.e., having the flexibility to source a particular product from one region to another as a fairly long-term solution. In the second, the focus was clearly on having the ability to use extra capacity from one region to another on an ad hoc basis. What was not evident was a view that global production facilities are or should be managed in a globally integrated way for ongoing

balancing of global supply and demand in a short time horizon. In fact, a linkage that was noticeably missing for this business was between global demand planning and global production. This particular link was a dominant one in the other two businesses.

Some of the mechanisms seen as important to achieving the flexibility associated with utilizing production capacity globally were standardization and simplification. Managers highlighted the need to standardize information systems, manufacturing processes, part numbers and terminology, bill of materials, and metrics in order to simplify the task of producing in one region and shipping to another. Finally, having the ability to make better decisions faster was linked to execution capability, e.g., having the ability to do what needs to be done and do it effectively. This set of relationships was illustrated in the following comments.

Supply Chain Project Leader:

"What I would really like to think that our planning would be robust enough we'd had the right information in the right places that once we decided what we're going to do, we could pretty much adhere to that."

"So, as opposed to shipping them all to Europe because they need them, and then Europe ships then to China because China didn't have any, we could make a lot of those decisions right at the time that we needed to make the decision and we could do a better job of getting the right material to the right place."

Demand Planner:

"To make sure that when it comes down to execution we are not asking questions, we are executing..... It makes it pretty difficult to execute to whatever decision is made at the last minute."

Having a good understanding of the business and market dynamics and a sound global demand planning process were seen as keys to better and faster decision-making, in turn giving the organization better capability to effectively execute to the business strategies.

The Global Chemicals HVM (Figure 4-8) related to firm-level supply chain themes was decidedly more complex than Communications Technologies, but there were also a number of definite similarities. The same relationship between having a good understanding of the business and markets and being able to effectively balance supply and demand was seen as dominant in this business. Global demand planning was linked directly to improved decision making, as was the case with Communications Technology. Global demand planning was also seen as directly linked to execution capability (an indirect linkage for Communications Technologies).

One notable difference in the Global Chemical HVM versus the other two was the role of the global demand planning process as a mechanism for understanding the business and global markets. Having global information and understanding of the business and markets was seen as a key for global demand planning, and the global demand planning process was in turn seen as an important process for collecting, analyzing and disseminating important information about the business and global markets. A second notable difference versus the Communications Technologies HVM was the direct link between global demand planning and global production. In the Global Chemicals business, global demand planning was seen as key to utilizing production capacity effectively on a global basis. In large part, this was driven by the fact that, as a result of changing environmental regulations, this business has invested in new

production processes in selective locations globally and is dependent on a few production facilities to meet global demand. These relationships were illustrated in the following discussion.

Business Manager:

"Based on the fact that we cannot afford any more for return on investment, but also kind of risk reasons, investment risk reasons, which are related to unknown legislative developments that are going on around our products You don't want to have everything everywhere. You just cannot afford it. You cannot take that risk. As a result, we have a very globalized sourcing situation. We want to have critical mass from a production facility standpoint, so you make it at one big plant and try to serve the world, your global business with it..... So, it's a very inter-dependent, global kind of sourcing situation. So, you have to have a global strategy on, you know, how you source your raw materials and how you make your products and how you globally distribute those in order to be successful in this business. You cannot, you know, afford to just be regional or local."

As a result, the need for integrated planning has grown. As one manager described it,

"Then, we had a big initiative in the business, and it was called business resource planning, where each of the regions worked to, and we worked out on a global basis, to become a Class A BRP organization, which means that you would be planning, have a better process in terms of planning your production, logistics, have some very clear processes in place to manage the new changing environment and the new situation."

The approach to managing firm-level supply chain activities and processes taken by this business is a cross-functional approach, with strong linkages from the global demand planning process to purchasing, production, material flow and inventory management activities. For example, there was a direct link between global demand planning and managing global suppliers to reduce cost, as was seen in the previous HVM. There was also a direct link from global demand planning to managing global production in a way that provides flexibility to utilize capacity effectively, and more importantly to serve

customers in a way that provides a competitive advantage for the business. These relationships were summed up quite nicely in the following comment from one business manager.

"Well I think one you have to be managing the business globally, you have to be looking at the business globally and looking at you know customers and markets, and you know trends and do your planning at a global level. And then from there you have to decide you know what do I need to serve the markets and how can I optimize you know with the assets I've got, through good disciplined processes that are truly global."

One set of relationships unique to this particular business was the link between execution capability and operational excellence. Operational excellence emerged as an important goal for this business, and was seen as an important vehicle for the survival of the business, as evidenced by the link to the "business success" theme. The relationship between global demand planning and execution, operational excellence and business success was evident in the following comments from top managers.

Business Manager:

"So, our business is really - I think the nature of our business is really operational excellence and that means that we will be very good in buying, making, and delivering the product for the customer. I think before, a few years ago, the situation was that we had different manufacturing facilities around the globe and each region was not really very well integrated. You had some flow of products between regions, but mainly you had - (each) region was self-sufficient in terms of dealing with their supply because each region had the plant. We have many, many plants around the globe, and so there was not a lot of need or even desire to interact."

Business Director:

"We had to recognize that we were still basically a commodity business, which meant we had to focus on operational excellence, produce our products cheaply and well consistently, deliver on time, meet the customer expectations, and use

that to build a base of success and then grow from there. That's what we did. I mean, we started with that and we grew from there. We've gone out and we've been able to do things in the marketplace now that's added that extra element, which is the volume and then the pricing to go with all these other basically underlying operational excellence pieces."

Given the emphasis on producing and delivering products at low cost in this business, the link between flexibility and effective use of production capacity and lower cost was seen as important, as was the ability to execute well to minimize cost.

Finally, the HVM for Leading Edge Fibers was even more complex than that of Global Chemicals (see Figure 4-9). At first glance, what was most noticeable was the hub-and-spoke effect, and the centrality of the global demand planning function. As seen in the previous HVM, global demand planning was seen as instrumental in the ability to effectively manage global suppliers to leverage global purchases and reduce cost. One of the most dominant linkages was, as with Global Chemicals, from global demand planning to global production. Global demand planning was seen as an important mechanism to ensure production capacity is managed globally and, in turn, to ensure the flexibility to balance global supply and demand. However, in this case, the ability to balance supply and demand on a global basis was seen as closely linked to the ability to service customers globally and achieve competitive advantage. This set of relationships was not seen in the other two businesses. The importance of effectively balancing supply and demand in this business was driven by the fact that global demand is growing faster than the ability of the business to expand production capacity. As a result, they must make decisions about which customers and markets to serve with their constrained capacity. The importance of these relationships was illustrated by the following comments.

Supply Chain Manager:

"And so that whole piece of trying to think long range around how are you going to feed these guys, where's the right place, keeping that flow even, minimizing the disruption of the type of supply at the trade level is a large piece of the planning piece that we do. And then the balancing of having the right stuff available to service the marketplace today is another right piece."

"And we can make priority decisions around the different regional customers, and who should really get what, and the fact that the product is sitting in the U.S., and the U.S. has a demand. But if the guy in Asia is more important, we'll give the business to the guy in Asia."

Flexibility to produce products at any location to meet any global demand was seen as one of the keys to effectively balancing supply and demand. In this particular business, there was a strong linkage between standardization of products and processes and flexibility of sourcing globally, as described by a supply chain project leader.

"The benefit is in terms of flexibility of supply. And that's the one you want to get at. By working globally if I've got more demand here than I can supply there maybe I can steal some from there. That's the key benefit that we want to get is for our customers. Being able to utilize any capacity globally to meet any need globally. But that's hindered by the product interchangeability. That's the problem. But that's eventually where you want to be."

The problem of standardization or interchangeability for this business lies, not with the customers, but with the production processes. It is important that product produced in different locations behave the same in customers' mills, which means Leading Edge Fibers has the flexibility to source any customer's demand for a particular product from any location.

For this business, the firm-level logistics activities, such as managing the logistics function, managing material flows and managing inventories, were seen as directly linked to the global demand planning process. Effective management of global logistics was

seen as a result of effective planning and management of logistics suppliers. The linkage between global demand planning and the management of material flows was seen as directly impacting the speed with which product can move globally, thus reducing the amount of inventory required and the working capital and cost associated with inventory. Another particularly relevant theme that emerged in this business that was not as prevalent in the others was associated with the need for supply chain visibility. Given the shifting global nature of downstream activities in this supply chain, this focus on integrated and global demand planning supply chain visibility directly linked to logistics-related activities seemed logical.

Another theme that was particularly noteworthy for this business was the focus on managing the diversity in the global business environment. This industry is one in which duty structure and taxes tend to be a significant issue. For many countries, the textile industry is a highly protected industry, and since much of the activity has migrated to low-cost labor environments, many of the immediate customer locations are in developing countries with high barriers to trade. Thus, the ability to manage the diversity in the global environment is particularly significant for this business, and a key to effective global demand planning.

Finally, globally integrated demand planning was seen as a vehicle to maintain production stability, or to reduce the number of changeovers required on production equipment. By having flexibility to interchange product from one geographic region to another, facilities can be scheduled to run a minimum number of products, while the total breadth of products to serve global demand can be produced at multiple locations. This

was seen as a mechanism to optimize the production capacity, but it was also seen as a mechanism to improve yields and maximize supply to meet the demands of customers.

In summary, this set of HVM's focused on firm-level supply chain themes pointed to a number of similarities between companies, but also highlighted some distinct differences. In all three businesses, having access to information that provides a good understanding of the business and markets on a global basis was seen as key to an effective global demand planning process. Global demand planning was, in turn, seen as important to the ability to effectively balance global supply and demand. Also, in all three businesses the ability to utilize production capacity globally was seen as a key to flexibility and effective resource utilization. Only in the cases of Global Chemicals and Leading Edge Fibers was this flexibility seen as important to the ongoing balancing of supply and demand within a short time horizon to effectively serve customers on a global basis.

What was noticeably different in the case of Global Chemicals and Leading Edge Fibers versus Communications Technologies was the degree to which cross-functional activities were seen as inter-connected and connected to the ability to plan for and effectively balance supply and demand on a global basis. As noted earlier, the degree of complexity of the HVM's for these two businesses suggests the global integration of the firm-level, cross-functional supply chain activities and process are particularly important to these businesses. The less complex and inter-linked HVM of Communications Technologies suggests this is not an extremely critical area in their global integration initiatives.

Customer Related Supply Chain Themes

The three HVM's focused on customer-related themes are shown in Figures 4-10, 4-11, and 4-12. In the case of Communications Technologies (Figure 4-10), the primary focus of the customer-related themes was serving customers, which was seen as directly linked to customer satisfaction and competitive advantage. There were three themes at the attribute and consequence level that linked to the "serving customers" theme for this business. One was related to having a global view of demand and optimizing production plans to maximize product availability. The supply constraints experienced in recent history have impacted the company's ability to service customers, thus there has been a great deal of focus on how to optimize the use of those scarce component parts. The other two themes that emerged as important in serving customers were (1) having a good understanding of the business and markets on a global basis, and (2) appropriately balancing local, regional and global issues. Both of these themes were related to the need to be responsive to local customers needs. In the first case, the focus was on understanding market dynamics and the business environment and using that knowledge to better serve customers. In the quote below, the focus on understanding social and cultural differences and integrating that knowledge into the planning process was evident.

New Product Development Manager:

"In Asia we do things this way, so as well as skills, you're better if you can understand what happens in a country sense and with the type of people and socially what happens there, again, will mean to say that if you're sympathetic to that you might be able to plan more effectively."

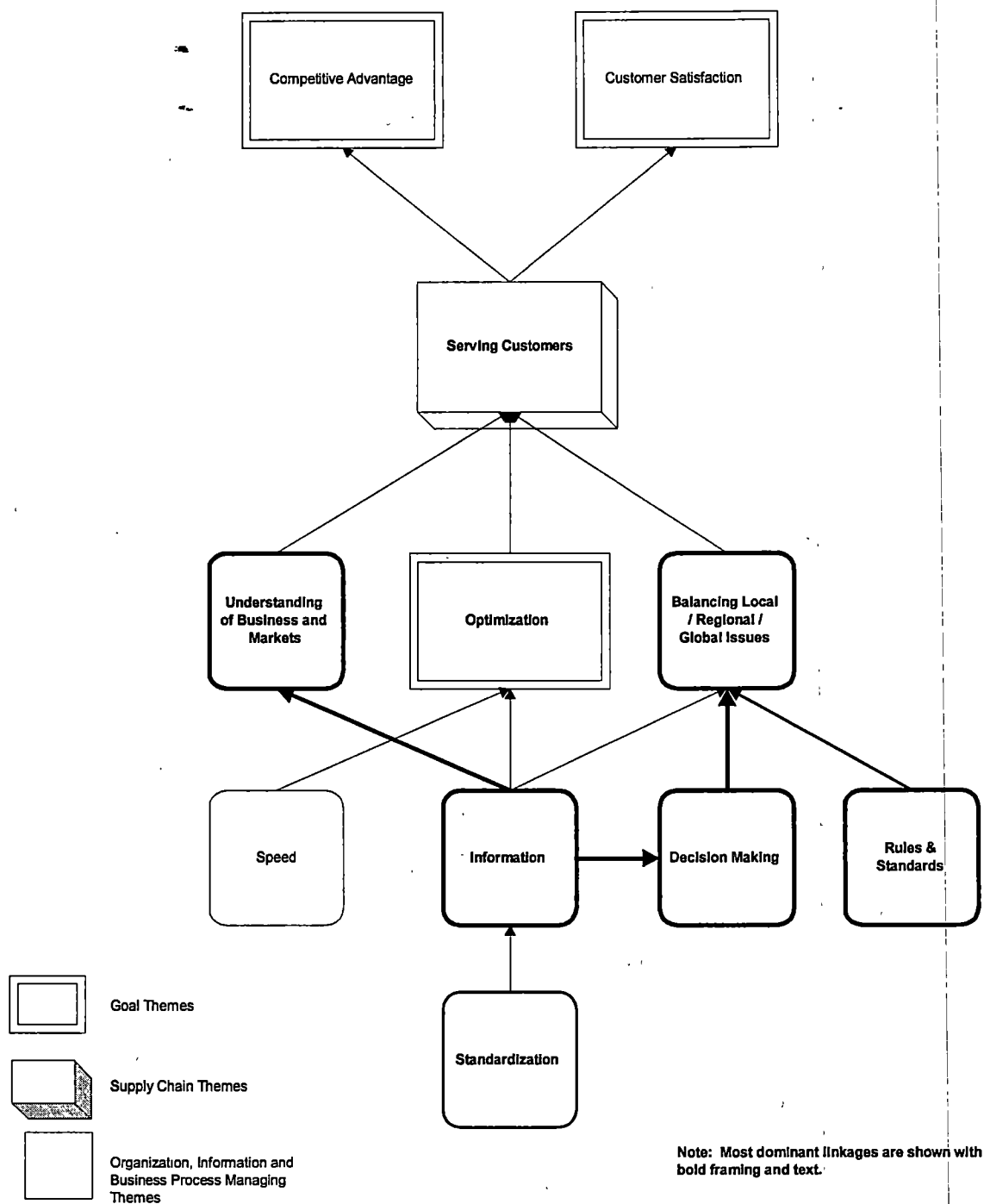


Figure 4-10. Communications Technologies: Customer Related Hierarchical Value Map

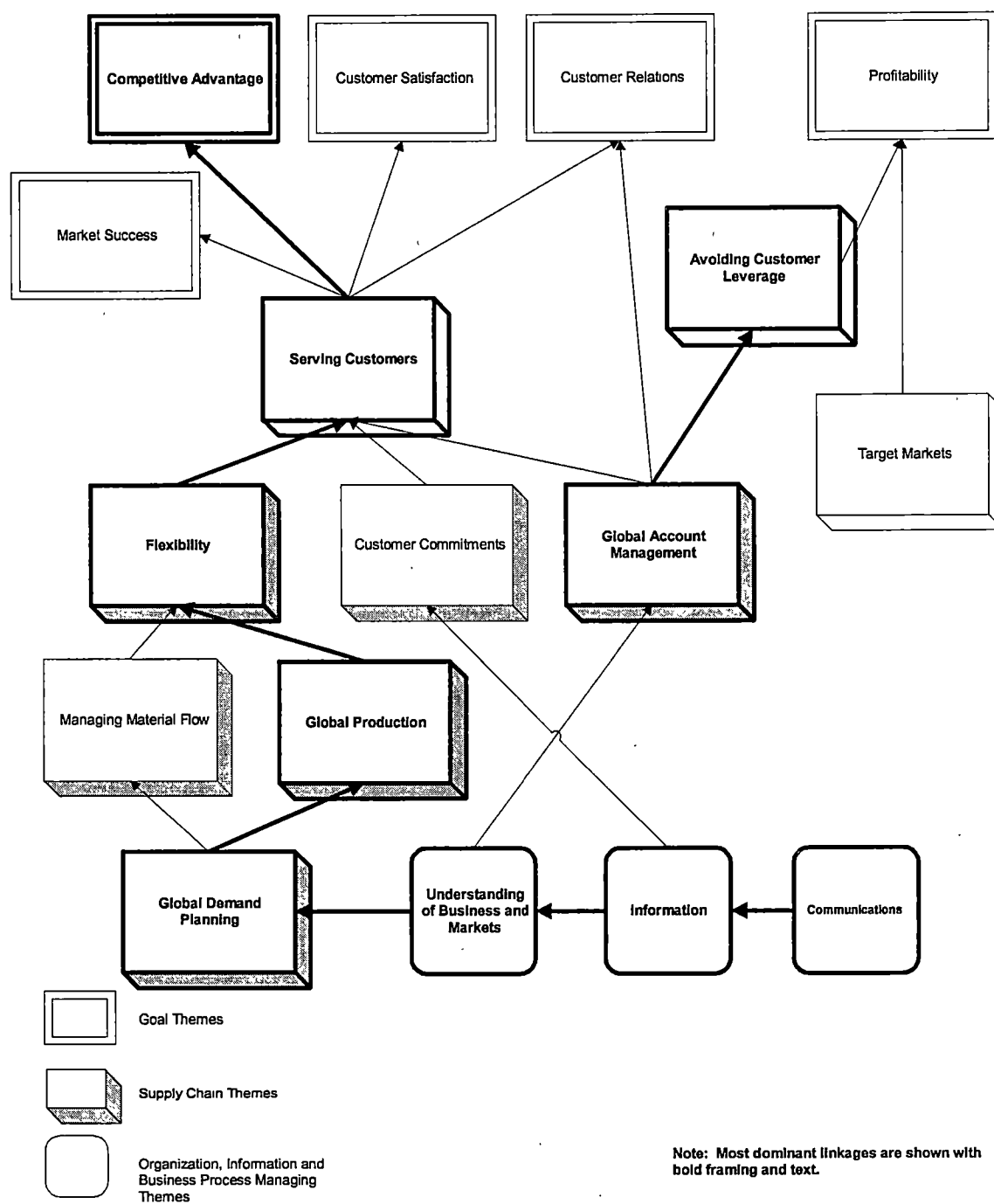


Figure 4-11. Global Chemicals: Customer Related Hierarchical Value Map

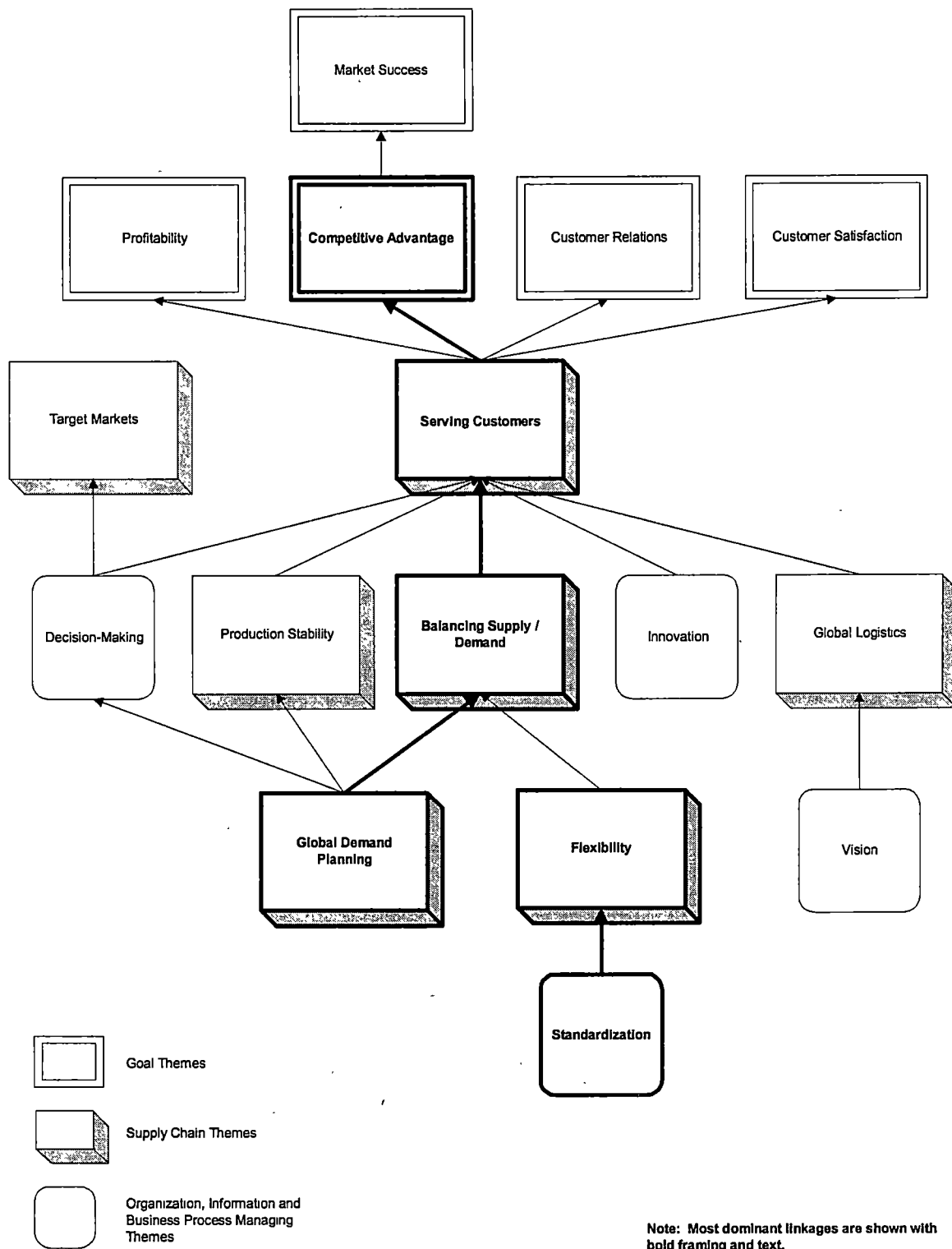


Figure 4-12. Leading Edge Fibers: Customer Related Hierarchical Value Map

The "balancing local, regional and global issues" theme had to do with managing the conflict between global management and what is best for the region or at the local level. In the example below, the issue relates to the inability to compete at the regional level if global decision-making is required.

Demand Planner:

"Well it (operations) needs to be I mean it needs to be regional because our customers are here. And if we are not able to make decisions to support our local customers then we are not we cannot compete."

In this business, regional autonomy or freedom to operate to meet the needs of local customers was seen as important. However, the constrained capacity of supply of critical component parts is a global issue that impacts all of the regions. Thus, the conflict between managing the allocation of those parts to satisfy global demand and the belief that global decisions may not be best for regional or local markets was a common theme. To deal with this conflict, access to good information on a global basis was seen as key to making better decisions faster such that the regions are not negatively impacted by the need to manage globally. An additional mechanism for resolving this conflict is the establishment of rules and standards to govern regional behavior in areas important to the global business. The need for rules and standards was referred to by several managers as the need for the "Ten Commandments" of the Communications Technologies business, referred to as "tenets of faith" in the following quote from one of the managers interviewed.

"But, at a regional level....after we've set down these tenets of faith okay we don't really care how you implement to maximize and optimize the efficiency within your region - because I don't understand China to the extent the China guy does nor do I understand America to the extent that the American does."

What is most noticeable in examining the customer-related HVM for Communications Technologies is the lack of any relationships to other supply chain activities and processes. Clearly, the degree to which this business sees the global integration of cross-functional supply chain activities and processes as important to its ability to service its customers is minimal.

The Global Chemicals HVM focused on customer related themes shows a different picture (Figure 4-11). The HVM itself is much more complex than that of Communications Technologies, and shows much more connectivity to internal supply chain activities and processes. There are two sets of linkages that are particularly dominant in this business. The first is the global demand planning $\Rightarrow$ global production $\Rightarrow$ flexibility $\Rightarrow$ serving customers $\Rightarrow$ competitive advantage path. The link from global demand planning to global production and, in turn, to flexibility was discussed in the previous section. With the investment risk resulting from legislative uncertainty, this business has not invested in production capacity in all of the markets they serve.

Therefore, there is limited production capacity in limited geographical locations to meet global demand. The product is, for the most part, an interchangeable product produced anywhere to satisfy demand anywhere. Because of the capacity and geographic limitations, the ability to effectively plan, produce, and ship globally was seen as key to effectively serving customers, which in turn was seen as a key to achieving competitive advantage. Other goals related to this ability to serve customers globally are improved

customer relations, greater customer satisfaction and market success (e.g., increased revenues or greater market share). One other theme that was unique to this business was that of making and keeping customer commitments. Because service was viewed as a key to competitive advantage, and operational excellence as an important objective, this business recognized the ability to be able to respond to customer requests and honor commitments as an important mechanism for effectively serving customers.

The second dominant set of relationships seen in the Global Chemicals business was the link between global account management and the "avoiding customer leverage" theme. While having the ability to negotiate global contracts and leverage volumes with their suppliers to reduce cost was seen as important, having the same dynamic when the roles are reversed was not viewed so positively. Customers of this business include large, global OEM's, some of which are known for their strategy of leveraging their suppliers. As a result, this business felt it was particularly important to have a good understanding of their business on a global basis, and of market dynamics, to be in a better position to manage the relationship and negotiate effectively with their large global customers, thus avoiding being "leveraged." As one manager commented, "knowledge is power" and with global knowledge, the business can better negotiate global agreements, avoiding being leveraged by their customers and contributing to the bottom-line profitability of the business. This issue was described by one manager as follows:

"Once the customers are treated on a regional or global basis, they have a significantly increased strength to negotiate. Because they leverage their total quantity. [sic] So from our perspective, our strength lies when we treat them locally, and our strength is reduced when we treat them globally."

One additional theme that emerged in this business was global integration as a mechanism for identifying and pursuing target markets based on potential for growth and profitability. Routine discussions of competitive activity, market trends, global demand and customer plans help the business keep abreast of and quickly respond to opportunities. This perspective was illustrated quite well in the following discussion of the value of the global sales and operational planning (S&OP) process.

" It gives some hints on where, for example, competition is targeting - which of the segments, which, you know, forces you to think about pricing strategy in those segments. It also hints toward maybe some product shortages or tightnesses that some people have because they have plant problems or just because they're running out of capacity. So, then you can start thinking about, you know, taking some share in certain segments, maybe. So, it's business strategy kind of thinking that you relate to those kind of trends. Sometimes short-term; sometimes longer-term. Are you kind of, you know, going away from a certain segment because you find that a lot of people really want this and by the looks of it, it's not all that interesting. You know, for example, we had a way too high share with global OEM's, which are typically the low price guys and we decided to have, you know, to let some of that go, by just quoting a much higher price. That all relates to product mix enrichment strategies, if you will, that you have. So, some of that you can do short-term - based on, you know, what you hear in the S&OP call, what's going on around the world, the behavior of competition. So, that's one important piece. The other one really relates to staying alert around things that might be coming, and you have to kind of prepare yourself, make some contingency plans if something happens. You know, a certain trend ina particular application.... Do we want to play along and if so, what does that mean for the product-supply situation. Maybe we want some extra inventory of this just in order to be able, you know, to get there. So, it's, you know, it's hard to describe exactly what you do with it. There's certainly, you know, judgment calls and strategic thinking, technical things that you want to do in the different segments, and all that. So, in that respect, I find the global S&OP folks very helpful. But if they would just talk about, you know, the sourcing thing. You know, that would be a very mechanized, mechanical kind of thing. So, that other dimension for me is extremely important. That's certainly why those global S&OP folks are there."

The customer-related HVM for the Leading Edge Fibers business, shown in Figure 4-12, was a bit more straightforward than that of Global Chemicals. For Leading

Edge, the focus was primarily on having the flexibility and a global demand planning process to balance supply and demand to effectively serve customers for competitive advantage. One manager described the advantage of planning demand globally to more effectively serve customers very succinctly in the following comment.

"Because otherwise people are just jumping through hoops or fighting fires all the time. You're missing sales because you don't have the product and you can't meet the customer demand and he's going somewhere else because he can't wait six weeks until he gets you know from the U.S. or wherever it's coming from."

This business also described the importance of a global demand planning process to identify target markets and respond to growth and profitability opportunities. With the market for their products growing faster than their ability to expand production capacity, they have been in an oversold situation for an extended period of time. Thus, the decision-making process about who to target with limited product was important as an ongoing part of managing their supply chain activities and processes. Two other themes seen as important to serving customers in this business were the management of the global logistics process and product innovation.

The end-state goal themes identified as important to this business were identical to those identified by Global Chemicals. Serving customers was seen as an important mechanism for improving customer relations and satisfaction, profitability, and competitive advantage, which in turn leads to market success.

There was nothing surprising in the individual linkages seen in the three HVM's. More important than the individual linkages are the differences in patterns exhibited by the various businesses. In the case of the customer-related supply chain HVM's, it was once again apparent that the degree to which the businesses see the globally integrated

management of their supply chain activities and processes as linked to important company objectives is very different. In the case of Communications Technologies, there is a clear focus on serving customers by maintaining a regional or local perspective, even though the constrained supply of scarce materials requires a degree of global management. In the cases of Global Chemicals and Leading Edge Fibers, the ability to serve customers and achieve important end state goals was clearly seen as linked to globally integrated management of cross-functional supply chain activities and processes.

Goal-Related Themes

The HVM specific to the goal-related themes was, in large part, a repeat of relationships seen in HVM's relating to supply chain themes (Figures 4-13, 4-14, and 4-15). These goal-related HVM's are included as a summary of the most frequently mentioned linkages between attribute and consequence level themes and goal-related themes, and is intended to give a more complete view of the goals that emerged as particularly important to each business unit.

In the case of Communications Technologies (Figure 4-13), the most dominant goal level themes were capacity utilization, lower cost and execution capability. A number of managers discussed the need to be flexible to produce in one region and ship to another when needed, which allowed them to optimize their utilization of capacity. As discussed earlier, the primary focus seemed to be on sharing capacity over a fairly lengthy time horizon rather than using capacity for dynamic balancing of supply and demand in the short-term. As discussed earlier, there was a very strong link between

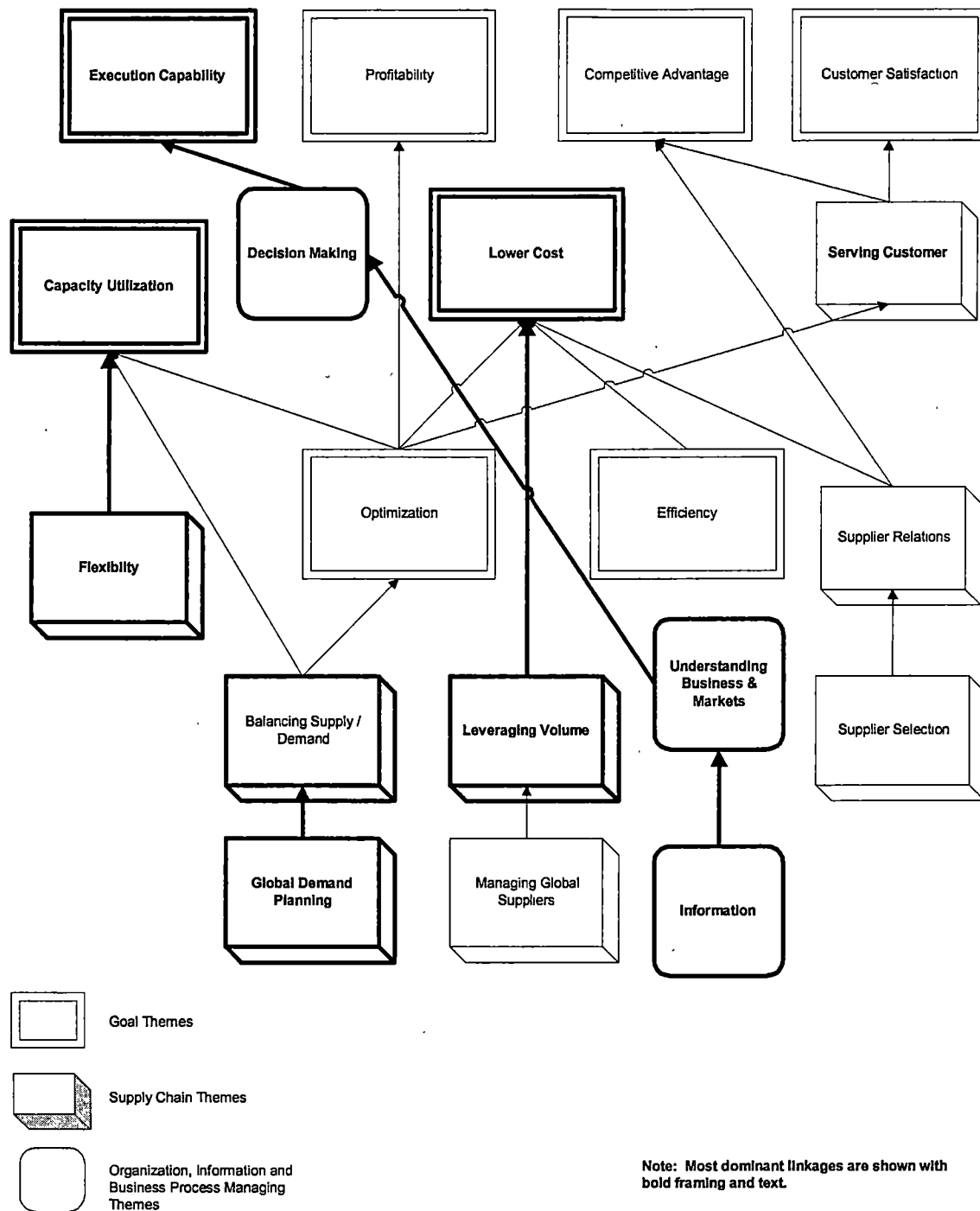
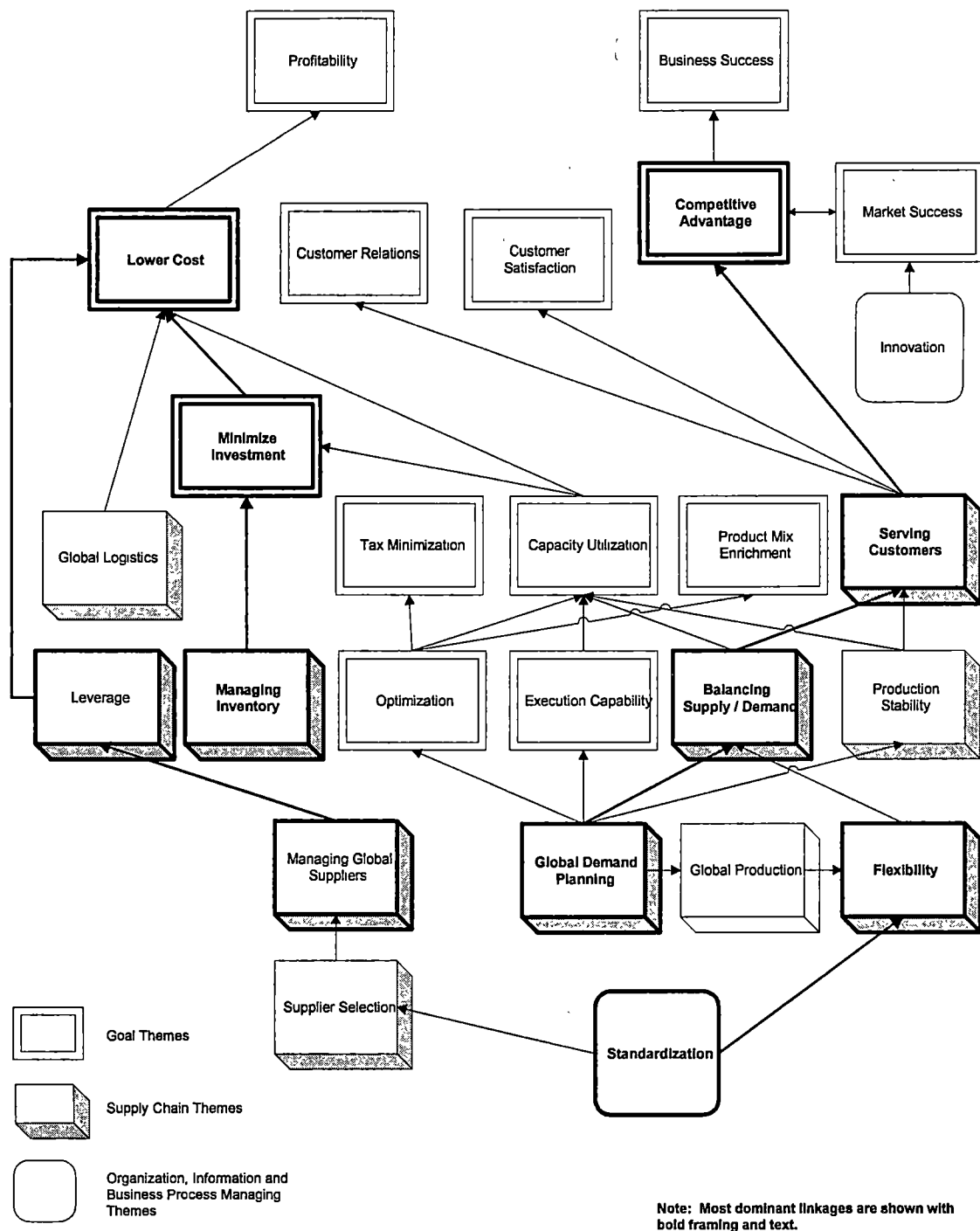


Figure 4-13. Communications Technologies: Goal Related Hierarchical Value Map



Note: Most dominant linkages are shown with bold framing and text.

Figure 4-15. Leading Edge Fibers: Goal Related Hierarchical Value Map

leveraging purchasing volume with global suppliers to reduce cost. Supplier selection and rationalization and managing supplier relationships were also seen as keys to competitive advantage. This goal-related HVM once again highlights the focus and degree of integration of supply chain activities and processes. The primary focus of global integration for Communications Technologies was on managing the purchasing and supplier related activities and processes, and planning globally to effectively match constrained supply to global demand. In the case of Communications Technologies, this firm-level set of activities and processes was in large part aimed at the supplier-related issues. Because of the global shortage of critical component parts, a globally integrated approach to balancing supply and demand has become critical for this company.

The goal related HVM for Global Chemicals (Figure 4-14) suggests this business is particularly goal oriented, and that the organization is aligned on the importance of particular goals. As highlighted in the earlier discussion, the ability to plan and execute well on a global basis and be operationally excellent was seen as important to the business's success. Global demand planning for and management of the production asset was seen as a key to having the flexibility to serve customers, and in turn to satisfy customers and effectively manage customer relations. Also highlighted earlier, the ability to manage global suppliers to leverage volumes and reduce cost was also seen as a means for this business to achieve competitive advantage. The global demand planning process was also seen as important to effective capacity utilization, which allows the business to optimize production plans and reduce cost. Finally, globally integrated demand planning was seen as a mechanism for enrichment of the product mix, i.e., to

make choices about which demand to satisfy to achieve the most profitable supply / demand mix. The following comment illustrates the importance of the integrated planning process to having the right information to make these kinds of decisions.

"If you have a product that's a commodity, okay, and commodities growth cycle is up and down with pricing, for example, depending on the supply/demand situation. You could move much faster, increase prices, or improve your product mix because of the information you have in your hands, and the delay that you cut in how you get the information. On the other hand, if you are in up-cycle - on the other hand, if you are in a down-cycle, you can really drive your competitors to get the pieces of the market place you really don't want and not lose so much on those pieces."

The goal-related HVM for Leading Edge Fibers (Figure 4-15) also reflected the relationships discussed previously. Examples include (1) the management of global suppliers as a mechanism to leverage volumes and reduce cost and (2) the importance of global demand planning to effectively balance supply and demand to service customers and achieve competitive advantage. Three goal-level themes not seen previously were product mix enrichment, tax minimization and minimization of investment. As seen with Global Chemicals, this business relies on the global demand planning process to identify opportunities to target a more profitable market with limited production capacity. Interestingly, though tax minimization is frequently mentioned in the strategy literature as one of the benefits of global integration, it was only seen as an important issue for this business. This is not surprising, since this industry is one that incurs high tariff and non-tariff barriers, such that the stakes for this business of realigning supply and demand patterns to minimize the tax impact are likely to be significant. Finally, this business put emphasis on the importance of globally integrated management to reduce working capital tied up in inventory, and thus to reduce cost.

In summary, an examination of the three goal-related HVM's pointed to both similarities and differences among the three businesses. The globally integrated management of suppliers to leverage volume and reduce cost was seen as important to all three companies. Likewise, the flexibility to use production capacity more effectively was seen as important. In the case of Communications Technologies, there was a greater emphasis on purchasing and supplier management as being important to their achieving important goals. In the cases of Global Chemicals and Leading Edge Fibers, there was much greater emphasis on global demand planning, global production and flexibility to source globally to serve customers. For these two businesses, global management of cross-functional supply chain activities and processes seemed to be more important in meeting a broad set of strategic and execution-level objectives.

RESEARCH CONCLUSIONS

The underlying premise of this research design was that the hierarchical value maps constructed for each individual business were reflective of the important patterns and relationships for that business associated with the globally integrated management of supply chain activities and processes. The assertion was that similarities across companies reflect generally applicable attributes, consequences and value associated with global integration, while differences reflect the influence of differing characteristics or dynamics in the business environment or within the organization itself. The similarities and differences seen in the relevant HVM's for the three businesses were discussed at length in the previous section. The research objective, however, was to draw more

generalized conclusions based on the relationships observed in this analysis of similarities and differences, and to develop conceptual frameworks providing insights about the value of global integration of supply chain activities and processes.

Objectives of Global Integration of Supply Chain Activities and Processes

The conclusions from this research reflect two major objectives for global integration. The first was the balancing of supply and demand, or in the case of these three companies, the ongoing realignment or reallocation of scarce sources of supply to meet global demand selectively to optimize business results. The second was the effective management of relationships with influential global supply chain partners, both suppliers and customers, to enhance the quality of the relationships and negotiation process. Each of these two objectives is discussed in detail below, and conceptual frameworks providing the insights about the drivers and outcomes of each of these are presented.

Balancing Global Supply and Demand

The first overall objective of global integration seen among these three companies was the balancing of global supply and demand. For Communications Technologies, the emphasis was on allocating scarce supply of component parts to the regions based on a global view of demand, the relative importance of specific regional customers and the differences in profitability and growth potential of the various regions. Their objective

was to allocate scarce components, which are common across regions, to optimize the regional mix to get the best results for the business.

For Global Chemicals and Leading Edge Fibers, the focus was on appropriately using limited production capacity to meet global demand. For different reasons, both businesses are challenged to meet global demand with constraints on their ability to produce within each region to meet the needs of that region. In both cases, the scarce, interchangeable source of supply is production capacity. The process of balancing supply and demand is aimed at aligning or allocating production capacity to selectively satisfy demand from strategically important customers, in regions with higher profitability and growth potential, or where opportunities to take share from competitors present themselves.

At a more general level, the focus in all three businesses is on having a process in place to effectively realign scarce sources of supply to meet global demand, as shown in the framework presented in Figure 4-16. Consistent with the a priori assumptions and frameworks guiding this research, environmental and organizational influences appear to act as value and cost drivers for the global integration decision. First, only if the source of supply is interchangeable across geographic regions does the need or capability to realign that source of supply to meet shifting global demand come into play. Thus, the value of global integration is greater in the case where there is an interchangeable source of supply that is scarce versus global demand.

In cases where demand patterns are shifting globally, e.g., growth rates and profitability are greater in one region than another or major downstream customers are

Balancing Supply and Demand Globally

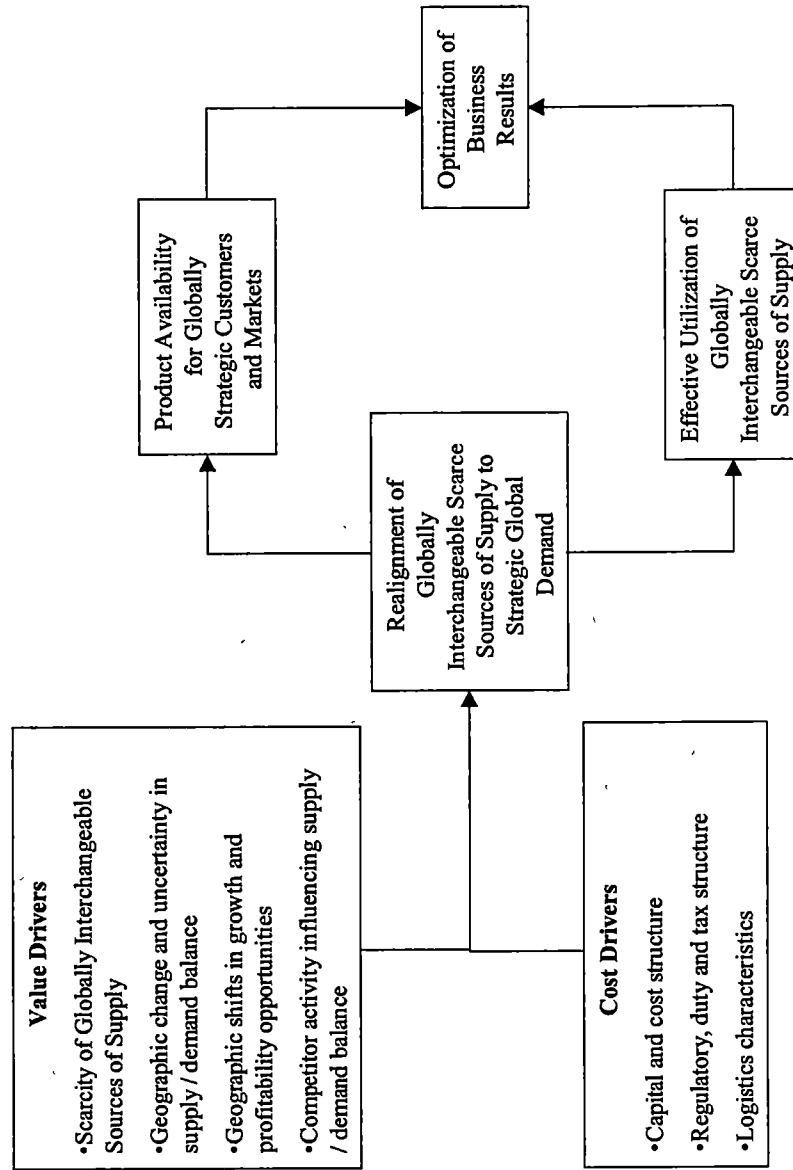


Figure 4-16. Globally-Integrated Management of Cross-Functional Supply Chain Activities and Processes

relocating globally, the ability to shift supply from one region to another allows the business to pursue strategic opportunities and optimize business results. In other cases, these opportunities may arise from competitor activity, such as plant shutdowns, or product quality problems. Having the flexibility to shift supply to meet opportunistic demand may allow the firm to take business from competitors in situations of tight supply and to gain market share.

Other characteristics of demand that influence the value of being able to effectively realign supply on a global basis were related to the global dynamics of ongoing demand. For example, for Global Chemicals' products, demand is influenced by weather patterns. Thus, when demand is up in one hemisphere, it is down in another. For another business, the economic environment heavily influences demand, thus demand patterns are likely to shift geographically with economic ups and downs. As normal demand patterns shift geographically, having the ability to recognize those shifts quickly and realign supply to meet changing demand is important.

Other considerations that influence the optimum alignment of supply are related to cost. In the case of Global Chemicals and Leading Edge Fibers, where the challenge is to realign supply to effectively use production capacity to meet global demand, the capital and cost structure of production facilities, as well as the regulatory and tax environment, influence the decision-making process. For example, as the demand balance shifts, opportunities to realign supply to maximize the use of low cost facilities, or to produce high value products in low tax environments may arise. Finally, logistics characteristics influence the degree to which realigning supply to meet global demand is

advantageous. Only if realignment decisions can be executed in a timely and cost effective manner do they become beneficial to the business. Thus, understanding and managing the process to be able to effectively realign scarce sources of interchangeable supply to meet shifting global demand patterns becomes a complex task for organizations.

Managing the Process

As managers described the activities and processes required to effectively realign scarce supply to meet global demand, they fell into three major categories, as highlighted in Figure 4-17. The first was the identification of issues and strategic opportunities in realigning supply to global demand selectively. The second was evaluating alternatives and setting strategic priorities. The third was effective execution, i.e., redistributing scarce supply to targeted demand within the demand time window, to achieve the strategic objectives.

The identification of strategic opportunities is an important element in the process of realigning interchangeable sources of supply strategically on a global scale. Global demand planning is a key process, and requires a credible forecast of global demand, coupled with a good understanding of the capabilities and constraints of the business to match global demand. A mismatch in the balance of supply and demand, whether based on quantities or geography, points to issues to be resolved in the planning process. Identifying the strategic opportunities requires a good understanding of the degree to which sources of supply are interchangeable to meet current demand, and the cost and

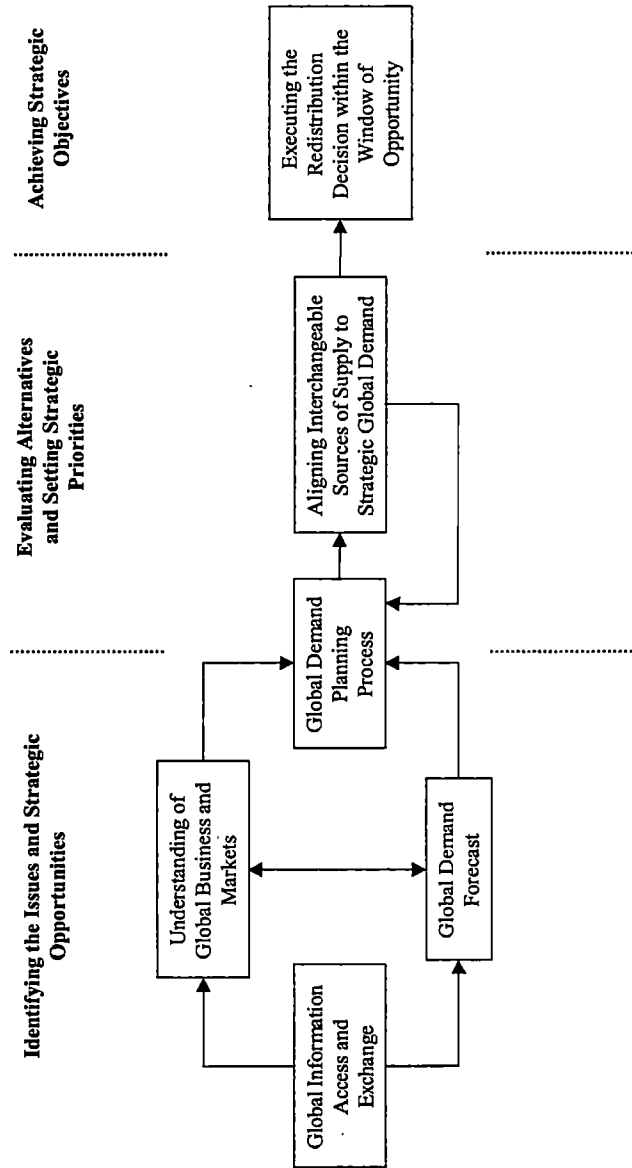


Figure 4-17. Managing Process for Realigning Scarce Interchangeable Sources of Supply to Strategic Global Demand

value drivers influencing the options. Finally, an understanding of market trends and dynamics is critical to understanding which demand offers the greatest potential for growth and profitability.

Having identified strategic opportunities, the next step is to evaluate alternatives and set strategic priorities. Decisions are made as to how to best align the scarce, interchangeable sources of supply to take advantage of the most strategic opportunities or the opportunities for the greatest profitability in the global supply / demand equation. These decisions are dependent on not only how each option affects the business results, but also on the requirements for effectively executing the decision, and the ability of the organization to meet those requirements.

Finally, globally integrated management of supply chain activities and processes to realign scarce resources to meet global demand selectively can only be an effective strategy if the redistribution of that supply can be done cost effectively and in the time window required to meet customer demand. For Communications Technologies, with a focus on reallocating or realigning purchased component parts to meet global demand, this redistribution process takes place at the interface with global suppliers. While some degree of cross-functional integration is required to understand the opportunities, little is required to execute against the reallocation decision. In the cases of Global Chemicals and Leading Edge Fibers, the focus is on the realignment of production capacity as the source of scarce supply. While the process of understanding market dynamics, identifying strategic opportunities, and making the reallocation decision is similar, the requirements to execute, or effectively redistribute supply, are quite different. In the case

of these two businesses, the integration of the "make, buy, deliver" process or the cross-functional supply chain activities and processes is key to effectively realigning or reallocating the scarce source of supply to take advantage of strategic opportunities.

Approach to Global Integration

While, at a very general level, the objectives and processes of global integration discussed in the previous sections are common to all three businesses, the patterns of relationships observed in the hierarchical value maps differ substantially. A comparison across the set of HVM's points to differences in two dimensions - the focus of global integration and degree of cross-functional integration.

For Communications Technologies, the focus of global integration is very much in the supplier-related arena. An examination of the business profile provides important insights as to why global integration in this arena is important for this business. Because of the scarcity of critical component parts, relationships with global suppliers are particularly important to this business in order to secure preferential treatment and assure access to supply. At the same time, the need to effectively realign this scarce source of supply to meet global demand points to the need to manage purchasing related activities on a global basis.

In the cases of Global Chemicals and Leading Edge Fibers, the focus of global integration is on the ongoing realignment of the constrained production capacity to be able to selectively meet global demand. In all three cases, the location of the scarce

interchangeable source of supply has a direct impact on the focus of global integration efforts.

As highlighted earlier, the process for effectively redistributing scarce supply also differs substantially among these three businesses. For Communications Technologies, the process requires a global approach to understanding the supply / demand balance, making allocation decisions for scarce component parts, and managing the supplier interface to redistribute those parts to the appropriate region. Production planning and distribution of finished products to regional customers is managed at a regional and local level. For Global Chemicals and Leading Edge Fibers, the realignment process requires understanding the supply / demand balance, making allocation decisions about production capacity, production scheduling, and distribution of finished product to global customers. To execute the allocation decision requires a high degree of cross-functional integration. Thus, the location of the scarce resource and the focus of global integration directly influence the process required to effectively redistribute supply to meet global demand, and, in turn, the degree of cross-functional integration required to manage the process.

These two dimensions - focus of integration and degree of integration - directly influence the choice of actions, tools, and processes required to effectively realign and redistribute scarce sources of supply to selectively meet global demand for optimal business results. These relationships are illustrated in the framework presented in Figure 4-18.

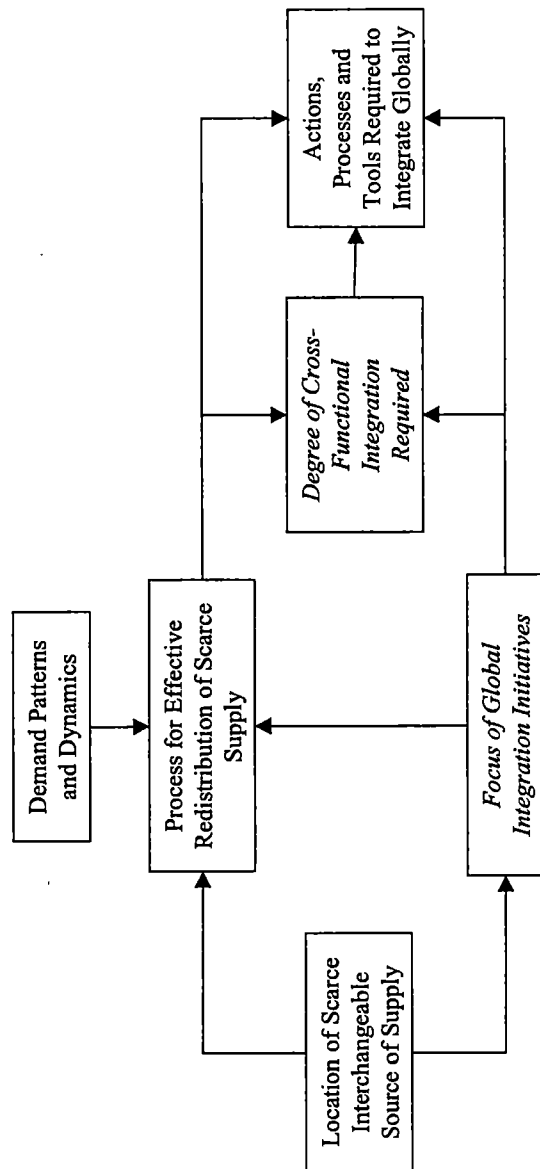


Figure 4-18. Approach to Global Integration

The patterns and dynamics of demand also directly influence the requirement for effective realignment and distribution of scarce supply. The fact that Communications Technologies' finished product is typically produced within the region for customers that are regional or local minimizes the amount of interface and movement of product across regions required to effectively serve those customers. For Global Chemicals and Leading Edge Fibers, the combination of a focus on the global utilization of the production asset and the global nature of downstream customers and markets requires a much more cross-functional approach. For these businesses, a high degree of interface between different functions in different regions is required for effective execution of the reallocation decision. Thus, as shown in Figure 4-18, the focus of integration and demand patterns and dynamics influences the process required for effective redistribution of scarce supply to meet global demand. The degree of cross-functional integration required is a direct reflection of the process requirements for effectively executing the reallocation decision.

Some of the actions, processes and tools required for global integration are common across all business, no matter what the focus. The most consistent theme heard from all three businesses was the need to have access to data and information on a global basis, to be able to understand their businesses and market dynamics globally in order to effectively balance supply and demand and manage the global demand planning process. As pointed out in Figure 4-17, these activities and processes are critical to identifying the issues and opportunities globally, and are a critical step no matter what the focus of global integration.

However, the location of the scarce resource and the focus of global integration will likely influence the requirement for evaluating alternatives and setting strategic priorities. In addition to the information-related requirements, Communications Technologies emphasized the importance of organizational and generic business processes to achieve global integration, particularly the importance of having a clear vision, teamwork, and rules and standards to balance the need for global integration with the need for local responsiveness. Because of the differences across regions in both products and customers, the need to maintain the freedom to operate autonomously within the region was seen as particularly important in this business.

The importance of having a focal point in the collection and dissemination of information, and in the decision-making process, was common across businesses, as was the recognition that having representativeness in that process is also critical. While many of the actions, tools or processes required to achieve global integration objectives were common across businesses, there were also some distinct differences.

As the decision-making process becomes more functionally intertwined and geographically complex, the variables to be considered in evaluating options and the complexity of the trade-offs to be made increase dramatically. Thus, the information requirement, the global demand planning process and the process for realigning supply become more complex. For the Global Chemicals businesses, one of the most frequently mentioned attributes for managing these processes is discipline - discipline in how the global planning processes are structured and managed, and discipline in execution against

a single global plan. This requirement was evident in a number of comments from managers in this business, several of which are included here.

"... one (is) leadership participation. I mean you know I can't say that I'm committed to it and then oh well S&OP is not for me it's for everybody else. I mean you have to use the process just like everybody else. You have to participate in the process just like everybody else. So I mean you know that was what we committed to and that was our, if you want to call it that, kind of survival strategy around how we create a business that's making decent kind of money you've got to get good and very disciplined at what you do.

".... but I think these (sales and operational planning) calls are - they're well managed, they're well structured, and people know that, you know, the things you bring up are serious."

"There's always a give and take, but if you use the one set of numbers as your base, it can just drive discipline and drive this idea of we're going to do what we can to maximize the business result so thatwhen good stuff happens, we can take advantage of it and when bad stuff happens, we can minimize the impact."

Thus, while there are many organizational, informational and business process themes or attributes in common across these three businesses, there are also some distinct differences in the requirement for achieving global integration objectives. For Global Chemicals and Leading Edge Fibers, there was a very central focus on the global demand planning process, referred to as the Global Sales and Operational Process (S&OP). For them, the supply chain planning process was seen as the primary vehicle for information exchange, the decision-making process, and the mechanism to ensure alignment. For Communications Technologies, the emphasis was much greater on the generic organizational and generic business processes as a vehicle for information exchange, decision-making, and alignment, and much less on supply chain processes. This

comparison suggests the focus of the global integration efforts and the degree of cross-functional integration required to achieve the objectives of global integration influences the decisions about the actions, processes, and tools required.

Managing Relationships with Influential Global Supply Chain Partners

The second objective of global integration is the effective management of the interfaces with important or influential supply chain partners. While the need to manage these relationships in a globally integrated way was seen as important at both the supplier and customer interfaces, the greater emphasis for these businesses was in the supplier arena. In part, this was because suppliers tended to be more global themselves than did customers. Perhaps a second reason this emphasis was seen is that the management of the supplier interface is typically more integral to the firm's supply chain activities and processes than is the management of the customer interface. Though it is certainly an important component of managing supply chain activities, management of the customer interface is more typically a responsibility of the marketing and sales organizations and processes. The relationships seen as important to the globally integrated management of both suppliers and customers are discussed below.

Globally-Integrated Management of Supplier-Related Activities and Processes

While two overall objectives emerged as drivers for globally integrated management of supplier-related supply chain activities and processes, they were not entirely unrelated, as illustrated in Figure 4-19. In other words, the process of

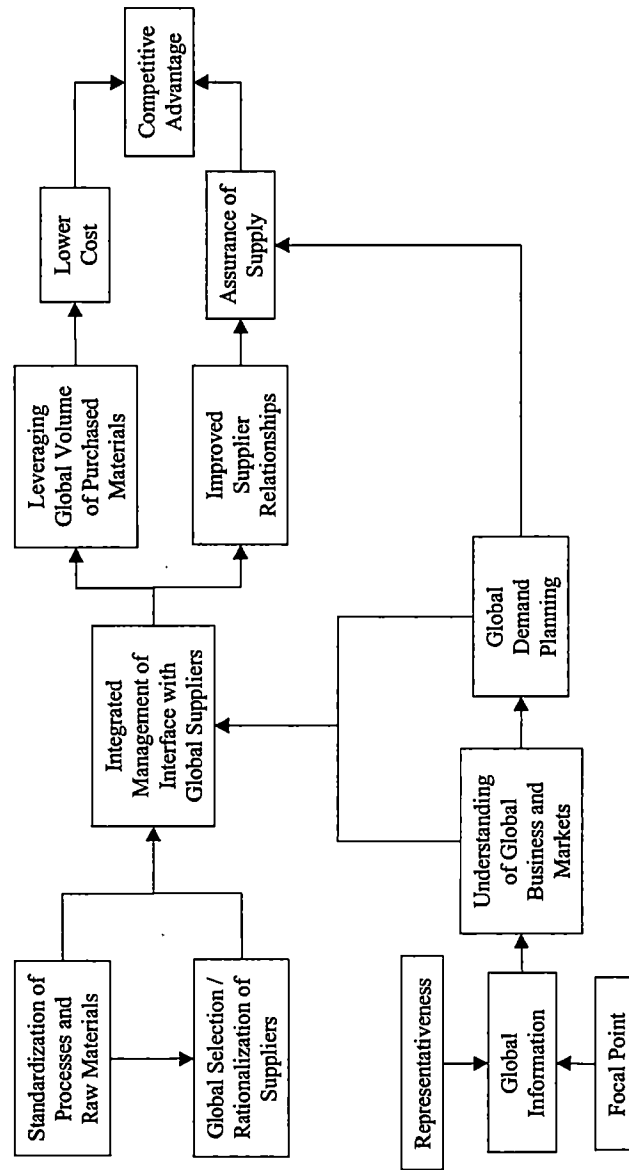


Figure 4-19. Globally Integrated Management of Supplier Related Activities and Processes

understanding global demand and making decisions about how to best balance supply and demand on a global basis is an important component of effectively managing relationships with suppliers in a globally integrated way.

In the case of Communications Technologies, the focus of their global integration activities was primarily on the supplier-related activities and processes, with a dual emphasis on managing relationships and reallocation of scarce, interchangeable supply components to meet global demand. For this business, global integration in the supplier management arena has become increasingly important because of the critical shortage of globally interchangeable component parts they have faced in recent history. As a result, relationships with key suppliers have become critical to ensure access to supply, and thus a significant source of competitive advantage for Communications Technologies. Having an integrated global demand forecast and plan was seen as critical to providing clear, consistent messages to the supplier and to being more "user-friendly." This was seen as an important element of improving relationships with suppliers, and in turn ensuring access to scarce supply.

Because demand and production tend to be very regionally focused for this business, the reallocation of scarce component parts is primarily managed through the supplier interface and the purchasing / materials management process. Based on total availability of supply and total global demand, allocation of parts is made to each region, where decisions about production and distribution within the region are made. Since Communications Technologies have historically not managed their demand planning or supplier relationships globally, they have had multiple relationships with suppliers at the

regional level, and have even competed with each other for constrained supply from suppliers. Because the supplier has dealt with multiple and sometimes conflicting signals coming from different regions, the overall relationship has at times been very difficult for suppliers to deal with. There is a belief among the Communications Technologies managers that a globally integrated approach to managing the relationships improves the quality of those relationships, and provides incentive for suppliers to put them first in assuring they have access to the supply they need. Of course, being able to communicate requirements based on a reasonably accurate view of aggregate global demand and a global plan for satisfying that demand is also critical to the supplier being able to meet that demand. Thus, by understanding and planning for demand globally, and managing relationships with global suppliers with a single global interface, the firm has greater assurance of adequate supply, which, in the case where supply is constrained, is critical to success.

A common theme for all three businesses was the importance of leveraging aggregate global volumes to get better pricing or higher priority with their key suppliers. Thus, the ability to understand aggregate demand and manage with a common interface was also seen as a key to effectively managing global suppliers to leverage total volume for reduced cost. These businesses consistently viewed their ability to leverage aggregate global demand as a source of competitive advantage.

The second element of effective global management of supplier relations is the role of information and global demand planning, as illustrated in Figure 4-19. An effective demand planning process requires the collection, aggregation and dissemination

of information about the business and about market trends and dynamics. Two organizational components emerged as critical to managing this process globally - one is establishing a focal point, and the second is representativeness. A focal point is a mechanism that brings data and information together, to be processed into meaningful information at a global level, and in turn distributed to the appropriate persons or places for action or decision-making. This focal point is typically in the form of a person or a team who is responsible to carry out these activities at a global level. Representativeness refers to the necessity of having the participation of and input from representatives from across the globe in this process. These representatives are charged with bringing relevant information about each region or country into the process in order to ensure a good understanding of global markets, and in turn a sound global demand planning process.

Other activities seen as important to effective management of global suppliers were the standardization of processes and raw materials and the global selection or rationalization of suppliers, also shown in Figure 4-19. Standardization of processes has to do with developing consistent ways of communicating with suppliers, consistent processes to manage supplier quality, and consistent mechanisms for providing performance feedback to suppliers. By standardizing these kinds of supplier management processes, the firm can provide a clear and consistent signal to the supplier, avoiding confusion and making it easier for the supplier to respond to customer requirements.

Standardization of raw materials is seen as a mechanism for ensuring flexibility for suppliers to meet global demand from multiple supplier facilities, or conversely for a focal firm to have more flexibility to have raw materials supplied to multiple regions

from suppliers. In other words, as supply becomes interchangeable, the firm has more ability to leverage and more flexibility on a global basis.

Finally, global selection and/or rationalization of suppliers was seen as key to effective management of global suppliers. Historically, companies have operated very independently across regions, and have typically built relationships within each region with multiple suppliers. Different standards and ways of operating have evolved. In order to develop and effectively manage relationships with global suppliers, it is important to have a globally integrated process for selecting suppliers that (1) meets the needs of all regions and (2) reduces the number of suppliers to establish fewer and more strategic relationships.

Managing Relationships with Global Customers

Two of the drivers for globally integrated management at the customer interface are the increasing consolidation that is occurring on a global basis in multiple industries, and the desire on the part of global customers to integrate the management of their supplier interface. In other words, the need for globally integrated management in the customer relationship arena was the mirror image of what was seen in the supplier arena.

The benefits of globally integrated management of the interface with global customers were seen as two-fold, as illustrated in Figure 4-20. First, as customers become more global and demanding of global contracts or globally integrated services, the ability to provide that global integration was seen as a way of building better relationships with strategic customers, creating customer satisfaction and competitive

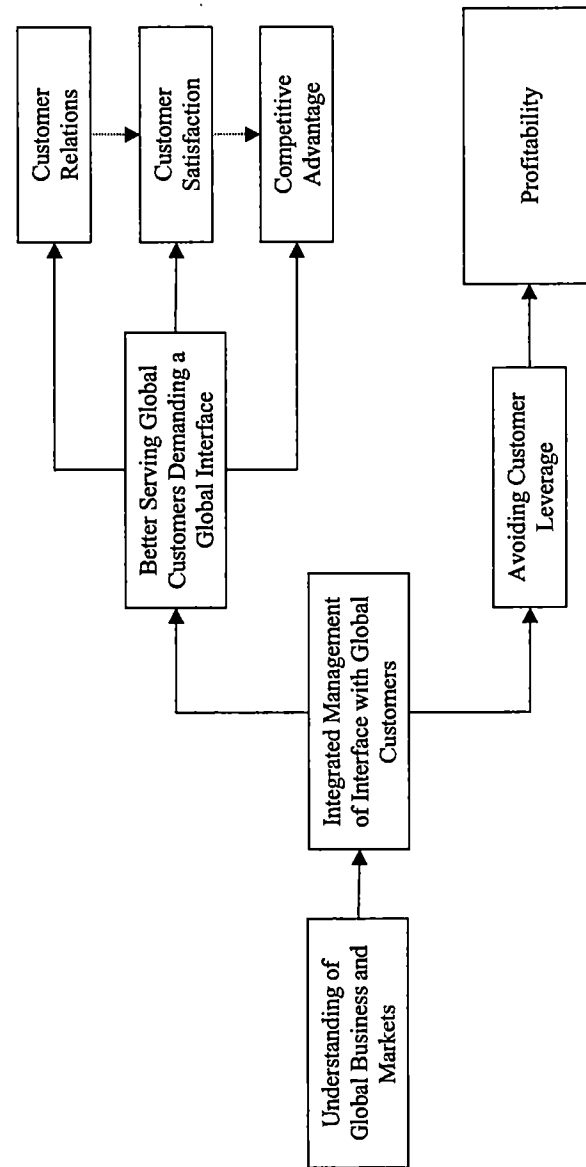


Figure 4-20. Globally-Integrated Management at the Customer Interface

advantage. Conversely, integrated management was seen as a way of preventing the kind of leverage that simply results in lower prices for the customers, to the detriment of the supplier. Having a better understanding of the global business transacted with those global customers, and of the costs, competitive environment and market dynamics of that business, were seen as important to effectively manage the relationship and negotiate global contracts that are mutually beneficial. By negotiating more effectively, appropriate pricing on a global basis can be maintained, and the profitability of the business can be protected or enhanced.

Summary

By examining the overall patterns among and across the hierarchical value maps of each company, it was apparent that the companies' view of the value of global integration of supply chain activities and processes differed in two ways. First, the primary focus of the global integration efforts differed. Second, the degree of cross-functional integration differed. On closer examination, it appeared that these differences were driven by two overall objectives. The first objective is the balancing of supply and demand on a global basis to align scarce sources of supply to selectively meet global demand to optimize business performance. The second is the management of the interface with influential global supply chain partners to improve the relationships, as well as to negotiate more effectively. While these are treated as two distinct objectives, there is a degree of overlap in that the process for effectively identifying strategic opportunities in the global supply / demand balance, and the development of a globally integrated demand forecast and plan

are seen as key elements of managing the interface with global suppliers and customers effectively.

ASSESSMENT OF A PRIORI ASSUMPTIONS

While this research was exploratory and aimed at developing theory, several a priori assumptions served to guide the research, as noted in Chapter 2. It is important to examine the validity of these assumptions based on the findings from the research to lend credibility to the research process and results.

The a priori assumptions, as stated in Chapter 2, were as follows:

1. Global integration of supply chain activities and processes are a critical management issue for global or transnational companies in achieving their strategic objectives.
2. The value of global integration of supply chain activities and processes differs across the multiple dimensions of supply chain activities and processes highlighted in Figure 1-2.
3. The specific supply chain activities and processes for which global integration is more important are influenced by differences in value and cost drivers related to environmental and organizational variables and, thus, differ across industries.
4. The cognitive structures of managers in a given company reflect important cause and effect relationships for their firm, and these cause and effect relationships are reflected in means-end relationships extracted from the interviews and depicted visually in hierarchical value maps (HVM's).

The validity of each of these assumptions was assessed based on the data and conclusions from the research.

1. Global integration of supply chain activities and processes are a critical management issue for global or transnational companies in achieving their strategic objectives.

In all three companies, global integration of supply chain activities and processes was seen as a critical management issue, and was seen as linked to the strategic objectives of the business. This can be readily seen in the summary level hierarchical value maps for each business. Supply chain themes are directly linked to execution and strategic goals, and the pattern of linkages is consistent across all companies.

While the HVM's suggest global integration is seen as a more strategic issue for Global Chemicals and Leading Edge Fibers than for Communications Technologies, it is worth noting that all three businesses have dedicated resources and adjusted organizational structures to focus on global integration. In the purchasing and operations management areas, Communications Technologies has restructured and assigned resources to become more focused on global integration at the supplier interface. Global Chemicals and Leading Edge Fibers have restructured the overall management of the business to drive global integration. Based on the patterns seen in the HVM's and these initiatives aimed at achieving greater global integration, it is apparent that this is a critical management issue for all three businesses.

2. The value of global integration of supply chain activities and processes differs across the multiple dimensions of supply chain activities and processes highlighted in Figure 1-2.

It was not clear a priori at what level of granularity differences in the value of global integration would be seen across the many possibilities presented in Figure 1-2. What was evident in the discussions with managers was they typically do not differentiate for each of the specific functional areas depicted. Rather, they tended to differentiate along three dimensions, consistent with the three areas highlighted in Figure 4-5 as the focus areas for this research: (1) the management of the customer interface, (2) the management of the supplier interface, and (3) the management of the cross-functional supply chain processes. Participants consistently emphasized the importance of a globally integrated supply chain strategy, but much of the focus in the discussion of attributes, consequences, and value was in the planning arena (as was evident in the structure of the HVM's). There was also a fairly consistent view that execution should be locally or regionally managed, but globally directed (i.e., governed by the global plan or the global rules and standards).

At the level of granularity defined by the three research focus areas, the evidence supporting the a priori assumption has been discussed at length in this chapter. The analysis of the HVM's for the three businesses suggests there are differences in the value of global integration of supply chain activities and processes within companies as well as across companies. Communications Technologies puts much greater emphasis on global integration in the management of the purchasing and supplier relations

dimensions of supply chain activities and processes than in other areas, indicating for them the greater value achieved there. For Leading Edge Fibers and Global Chemicals, the greater emphasis is on globally-integrated management from a cross-functional perspective, and there is less emphasis on global integration in the management of the customer and supplier interfaces. Based on the differing levels of emphasis and dominant patterns across the three dimensions of supply chain activities and processes defined in the research domain, this a priori assumption appears to be valid.

3. The specific supply chain activities and processes for which global integration is more important are influenced by differences in value and cost drivers related to environmental and organizational variables and, thus, differ across industries.

The assessment of this a priori assumption is a function of the face validity of the analysis and conclusions, i.e., whether or not the conclusions drawn and the differences in relationships seen in the HVM's are logical based on the differences in the business environment or within the organization. There were distinct differences seen between companies, and these differences were explicable based on factors that differed in the operating environment (e.g., Communications Technologies' focus on the supplier interface is logical given the capacity issues in the industry over the past several years). Thus, this a priori assumption is credible.

4. The cognitive structures of managers in a given company reflect important cause and effect relationships for their firm, and these cause and effect relationships are reflected

in means-end relationships extracted from the interviews and depicted visually in hierarchical value maps (HVM's).

The measure of this a priori assumption is the face validity of the structure of the hierarchical value maps from the perspective of participant companies. After construction of the hierarchical value maps, data from the interviews were reviewed to assess the degree to which the discussions were reflected in the HVM's. Specific passages related to the various constructs were also reviewed to test the meaning in the data against the apparent meaning of the theme when imbedded in the HVM. The maps were seen as credible by one of the independent coders, who had a great deal of familiarity with the actual interview data. Based on these reviews of the HVM's versus the actual interview data, the validity of this a priori assumption, i.e., the validity of the structure of the HVM's as a reflection of the in-depth discussions with the managers, is supported.

SUMMARY

In this chapter, the data analysis methodology, research findings and conclusions were discussed and theoretical frameworks developed based on those conclusions were presented. First, the sample demographics were reviewed and the assessment of theoretical saturation and representativeness were discussed. Next the data analysis process was reviewed, with discussion of the processes used to (1) prepare the data for analysis, (2) identify important concepts or themes, (3) identify important relationships between those themes, and (4) identify dominant patterns in the relationships. Then, business profiles

describing each participating business and hierarchical value maps illustrating the dominant patterns of relationships for each were presented and discussed. Analysis of the patterns of relationships imbedded in the hierarchical value maps was done at several levels. First, summary level relationships among categories of themes were examined to provide a view of patterns at a high level of aggregation of themes. Then, specific relationships among themes for three dimensions related to supply chain were discussed. Finally, an overview of the goal-related themes was provided to summarize the relationships between consequence level themes and the higher level end-state goal themes seen in the individual supply chain related HVM's.

Conclusions were then drawn from the analysis of the business profiles and hierarchical value maps regarding the overall objectives of global integration of supply chain activities and processes as exhibited by these three companies. These objectives fell into two major categories - managing relationships with influential global supply chain partners and balancing global supply and demand. Each of these categories of objectives was examined at a more operational level, and conceptual frameworks presented and discussed to highlight important relationships. Finally, a priori assumptions guiding this research were assessed for validity. In Chapter 5, the implications of the research findings and conclusions will be discussed, along with limitations of this research and areas for future study.

CHAPTER 5: CONCLUSIONS AND IMPLICATIONS

INTRODUCTION

The primary purpose of this research was to develop theory about the value of global integration of supply chain activities and processes in the global company. Prior research regarding global integration focused primarily on firm strategy. Very little emphasis has been placed on global integration of supply chain activities and processes. In Chapter 1, the background for - and underlying logic of - this research was presented. In Chapter 2, global strategy and supply chain research was reviewed to frame the objectives and design for this research. An adaptation of Yip's (1992) global strategy model in the form of a global integration value hierarchy was presented in Figure 1-4 as the guiding framework for this research.

In Chapter 3, the research design was described. The means-end theoretical framework and research methods used in customer value research were applied to examine the value of global integration of supply chain activities and processes. Chapter 4 included a detailed discussion of the data collection and analysis processes, as well as findings and conclusions. Chapter 5 examines findings and conclusions at a summary level. In the first section, the research background is revisited to frame the discussion. In the next section, summary conclusions, theoretical frameworks and research propositions are presented for each of three areas - global integration of cross-functional supply chain processes, global integration at the supplier interface, and global integration at the customer interface. The third section presents summary conclusions across the three

areas. Next, contributions from both a theoretical and managerial perspective are discussed. Finally, limitations of this research are highlighted, and suggestions are made for future research.

RESEARCH BACKGROUND

This research focused on three distinct areas highlighted in Figure 1-5. These are (1) global integration at the supplier interface, (2) global integration at the customer interface, and (3) global integration across supply chain activities and processes. The research questions were:

1. What are the key attributes (actions and tools), consequences (positive and negative) and value (contribution to organizational goals) of global integration of supply chain activities and processes?
2. What are the dominant structural linkages or causal relationships between the actions and tools, and perceived consequences and value?
3. How and why do hierarchical value maps differ across the different dimensions of supply chain activities and processes?
4. How do environmental and organizational factors influence managers' hierarchical value maps?

The global integration value hierarchy shown in Figure 1-4 was used to guide this research. Data were collected through in-depth interviews with 35 managers in three businesses. Data analysis identified important themes and relationships related to global integration, which were reflected in hierarchical value maps (HVM's) created for each

business. These HVM's were used to examine similarities and differences in patterns among the three businesses. Similarities and differences in the HVM's provided important clues about the overall objectives of global integration, as well as important cause and effect relationships.

For the three areas examined, two distinct objectives of global integration of supply chain activities and processes were identified - balancing global supply and demand and managing relationships with global supply chain partners. The first objective - balancing supply and demand - is achieved through global integration of cross-functional supply chain processes. The second objective - managing relationships with global supply chain partners - is achieved through global integration at the supplier and customer interfaces.

Some of the relationships reflected in the global integration value hierarchies are common across all three areas. However, many are not. Consequently, conclusions and theoretical frameworks are discussed separately for each of these areas. First, global integration of cross-functional supply chain processes is addressed. Next, global integration at the supplier interface is discussed. Then, global integration at the customer interface is discussed. Finally, summary comments about the overall implications from the research are offered.

GLOBAL INTEGRATION OF CROSS-FUNCTIONAL SUPPLY CHAIN PROCESSES

This section examines the value of global integration of cross-functional supply chain processes. The value of global integration in this area stems from the ability to

dynamically balance global supply and demand. As demand patterns change globally, dynamic supply/demand balancing allows the firm to utilize global capacity more effectively and align scarce, interchangeable sources of supply with global demand opportunities to optimize business results. The research findings are summarized in the global integration value hierarchy in Figure 5-1.

Global Integration Value Hierarchy

The first two research questions were aimed at identifying attributes, consequences, goals, and values important for global integration and the relationships between them. These are summarized in the value hierarchy shown in Figure 5-1.

Attributes of Global Integration

The attributes that emerged as important for global integration of cross-functional supply chain activities and processes were: (1) *a focal point for global interface*, (2) *regional representation*, (3) *standardization of products and processes*, (4) *global business knowledge*, (5) *globally integrated information systems*, (6) *a global demand forecasting and planning process*, (7) *a global decision-making process to identify strategic customers and markets*, and (8) *an effective global logistics process*.

The need for a *focal point* and *regional representation* in the global integration process was a consistent theme across dimensions. A focal point, typically in the form of a person or a team, provides a mechanism for aggregating global data and information, and making the information accessible and useful for global decision making. *Regional*

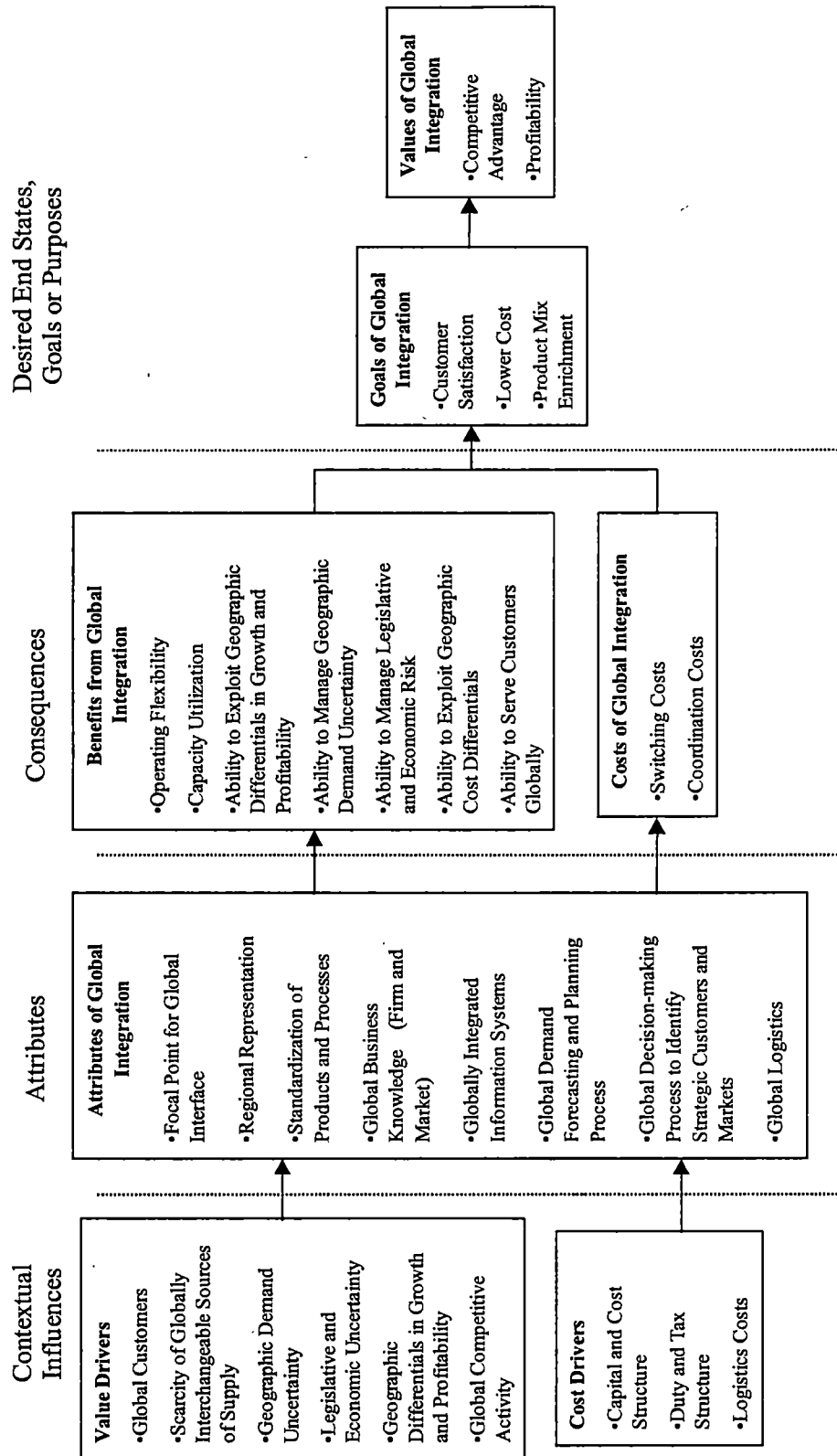


Figure 5-1. Global Integration Value Hierarchy for Cross-Functional Supply Chain Processes

representation in the process is critical to ensure relevant regional information is included in the process.

Standardization of products and processes was also an important attribute of global integration of cross-functional supply chain processes. When products and processes are common across regions, the firm can readily shift production from one location to satisfy demand in another. Switching costs are reduced, and the benefits from shifting the source of supply enhanced, when products and processes are standard.

Another attribute common across all dimensions was *global business knowledge* at both the firm and market levels. Effective global integration is dependent on knowledge of global market dynamics. Understanding customer activities and requirements across regions enables better decisions about how to serve those customers. Information about competitor activities across regions is important to identify opportunities to compete more effectively in particular markets. At the firm level, knowledge of internal supply chain capabilities is critical. Effective global management of supply chain cost and service elements requires a good understanding of supply chain capabilities, requirements, and costs in each region.

Globally integrated information systems are critical to make relevant supply chain information accessible. The ability to quickly access relevant information on a global basis is important to understand the business environment and make good business decisions. Data standardization, compatibility of systems, and linkages between them are critical components of globally integrated information systems.

The need for a *global demand forecasting and planning process* emerged as a dominant theme in global integration of cross-functional processes. Given the objective of aligning scarce, interchangeable sources of supply with global demand opportunities, forecasting global demand is critical. The planning process to satisfy that demand must be globally integrated to effectively allocate scarce sources of supply. Globally integrated information systems are also critical for effective global demand forecasting and planning.

A *global decision-making process to identify strategic customers and markets* is also important to effectively manage across regions. Allocation of interchangeable production capacity and products to strategic customers and markets enables the firm to serve important customers more effectively and enhance the profitability of the product mix.

Finally, global management of cross-functional supply chain activities and processes requires an effective *global logistics* process. Effective distribution of products across regions to strategic markets and customers is critical to achieve the objectives of cross-functional integration. Integrated management of global logistics suppliers is an important aspect of an effective global logistics process. Standardization of elements of the logistics process, e.g., packaging, labeling, and import/export documentation, is also important to an effective global logistics process. Other aspects of the logistics process are best managed at the regional and local levels. Local expertise is required to deal with differences in logistics infrastructure and requirements of local and regional customers.

Consequences of Global Integration

The consequences of global integration of cross-functional supply chain processes, both benefits and costs, are summarized in Figure 5-1. Benefits include (1) *operating flexibility*, (2) *capacity utilization*, (3) *ability to exploit geographic differentials in growth and profitability*, (4) *ability to manage geographic demand uncertainty*, (5) *ability to manage legislative and economic risk*, (6) *ability to exploit geographic cost differentials*, and (7) *ability to serve customers globally*. Costs of global integration include (1) *switching costs* and (2) *coordination costs*.

Operating flexibility is a particularly significant benefit of global integration. The flexibility to shift production and supply across regions as global demand patterns change allows the firm to use capacity more effectively and selectively satisfy demand. This flexibility allows the firm to achieve the other benefits of global integration.

Effective *capacity utilization* reduces cost and increases availability of supply, improving the firm's ability to serve customers globally and the profitability of the firm. Selectively satisfying demand based on strategic priorities allows the firm to satisfy important customers and improve the profitability of the product mix. Products can also be distributed across regions to target profitable and/or high-growth markets, i.e., to *exploit geographic differentials in growth and profitability*.

Operating flexibility to rebalance the supply/demand mix also allows the firm to better *manage geographic demand uncertainty*. When demand is up in one region and down in another, the impact of uncertainty in both regions can be minimized by realigning the supply/demand mix.

Operating flexibility also gives the firm the ability to *manage legislative and economic risk*. Sourcing products across regions allows the firm to minimize investment in new capacity in the face of legislative uncertainty. It also allows the firm to shift the product mix among operations to take advantage of low tax operating environments and minimize the impact of high tax environments. The ability to shift the source of supply to meet global demand also reduces the risk associated with changing tax and duty structures, exchange rate fluctuations, and changing economic conditions.

Operating flexibility to shift the source of supply in response to changing demand also allows the firm to *exploit geographic cost differentials*. Supply chain costs differ from region to region, as well as between regions. To take advantage of differences, a firm must fully understand total supply chain costs on a global basis and shift the supply/demand mix to minimize those costs.

Finally, the *ability to serve customers* is enhanced through operating flexibility. Effective capacity utilization improves the availability of supply, as does flexibility to source from multiple regions. A global demand forecasting and planning process and a good understanding of global supply chain capabilities are important to effectively use operating flexibility to serve customers on a global basis.

Switching costs are a barrier to operating flexibility, and can be reduced by standardizing products and processes globally. By making it easier and less expensive to change the source of supply, a firm gains flexibility to quickly realign the supply/demand mix to satisfy changing global demand.

Finally, *coordination costs* can be significant for global integration of cross-functional supply chain processes. Coordination costs have been recognized as a barrier to global integration by many researchers (Prahalad and Doz 1987; Yip 1992; Min and Eom 1994). A well-structured global demand forecasting and planning process is an important mechanism for global coordination across functions. Regional representation to ensure all relevant input is considered is also important. A globally integrated process with regional representation requires costly resources, information infrastructure, and travel. Globally integrated information systems are critical to reduce the cost of communications and to make relevant information readily accessible - or to reduce coordination costs (Min and Eom 1994).

Goals of Global Integration

Several goals emerged as important in the cross-functional integration of supply chain processes. These were (1) *customer satisfaction*, (2) *lower cost*, and (3) *product mix enrichment*. Using operating flexibility to better serve important global customers increases customer satisfaction and improves the competitive advantage and profitability of the firm. *Lower cost* is achieved by utilizing capacity effectively and taking advantage of supply chain cost differentials among global regions. Global operating flexibility allows the firm to structure the supply/demand mix to use capacity most effectively to optimize costs and yields. Finally, *product mix enrichment* can be achieved by aligning scarce sources of supply with more profitable global demand. Allocating scarce supply

to customers and markets with higher profitability or greater growth potential enhances the profitability of the firm.

Values of Global Integration

The values of global integration that emerged as important are (1) *competitive advantage* and (2) *profitability* of the firm. Using operating flexibility to satisfy important customers globally enhances the competitive advantage of the firm. Using operating flexibility to reduce cost and enrich the product mix enhances the profitability of the firm.

In this section, findings and conclusions related to research questions 1 and 2 were addressed for global integration of cross-functional supply chain processes. The attributes, consequences, goals, and values imbedded in the value hierarchy and the relationships between them were discussed. In the next section, findings and conclusions related to the third research question are discussed.

Differentiation among Dimensions of Supply Chain Activities and Processes

The third research question was aimed at explaining differences in the value of global integration across the multiple dimensions of supply chain activities and processes shown in Figure 1-5.

In the cross-functional dimension of supply chain activities and processes, differences in the value maps across firms reflected different degrees of integration. When the scarce, interchangeable source of supply is raw materials from suppliers, the

degree of cross-functional integration required to align supply with selective global demand is not significant. The focus of global integration is at the supplier interface, and the degree of integration required to execute decisions to realign supply with global demand is minimized. When the scarce, interchangeable source of supply is production capacity, the degree of integration required is significantly increased. In the latter case, operational planning is an important component of the global demand planning process. Global logistics is also critical to effectively execute against a changing product/customer mix.

Environmental and Organizational Factors

The fourth objective of this research was to understand the influence of environmental and organizational factors on the value of global integration. This objective was reflected in the fourth research question.

Environmental factors influencing the value to be achieved through global integration of cross-functional supply chain processes are summarized in Figure 5-1. Several factors influenced the similarities and differences seen in the hierarchical value maps across firms. These fall into two categories - value drivers and cost drivers. Value drivers are factors that enhance the value to be achieved from global integration. Cost drivers are factors related to costs that influence global integration decisions. Value drivers include (1) the presence of *global customers*, (2) *scarcity of globally interchangeable sources of supply*, (3) *geographic demand uncertainty*, (4) *legislative and economic uncertainty*, (5) *geographic differentials in growth and profitability*, and

(6) *global competitive activity*. Cost drivers include (1) *capital and cost structure*, (2) *duty and tax structure*, and (3) *logistics characteristics*.

The presence of *global customers* with common demand across regions influences the importance of global integration of cross-functional supply chain processes. When demand for a product is concentrated regionally, the geographic variability in the supply/demand mix is less complex. When demand for products is global, operating flexibility to shift production in response to changing geographic patterns of demand is more important. Consequently, cross-functional integration is more important.

Scarcity of interchangeable sources of supply was a significant driver for the global integration initiatives of the participating firms. When supply is scarce versus global demand, the opportunity to realign supply with select global demand is greater. Allocation of supply to customers and markets with greater potential for growth or profitability enhances the profitability of the product mix.

The location of the scarce source of supply also influences the degree of integration required to realign supply with global demand. When the scarce source of supply is raw materials procured from global suppliers, global integration at the supplier interface is important to ensure access to supply. Cross-functional integration of demand forecasting and planning processes is also important to allocate scarce raw materials to selectively satisfy global demand. When the source of scarce, interchangeable supply is production capacity, cross-functional supply chain processes to achieve operating flexibility in production and distribution is important.

Geographic demand uncertainty is an important driver of global integration.

With stable demand across geographic regions, aligning supply with demand over a long time horizon is sufficient. Sourcing products from one region to satisfy demand in another may still be advantageous, but the execution becomes a matter of routine. The need to realign sources of supply with changing global demand in a short time horizon requires a greater degree of global integration. The ability to make decisions and execute quickly requires globally integrated processes.

Legislative uncertainty was an important driver for global integration for one participant firm. Because of uncertainty about environmental regulations, investment in production capacity across regions was seen as risky. To minimize the risk, the firm invested in a few production sites and developed the operating flexibility to service global customers from those sites. Legislative risk also arises from uncertainty about economic policy, changes in legal requirements, technical standards, and duty and tax structures (Ghoshal 1987). Operating flexibility enables a firm to realign the supply/demand mix to minimize the impact of changes in the economic and legislative environment.

Geographic differentials in growth and profitability also influence the importance of global integration. As global demand patterns change, allocating supply to customers and markets with greater profitability and/or potential for growth enhances the profitability of the firm. Operating flexibility allows the firm to optimize the supply/demand mix to take advantage of such opportunities.

Global competitor activity does not appear to be a major driver of global integration, but does offer opportunities for benefit. Competitor activity that changes the global supply/demand balance creates opportunities for the firm. For example, if competitor capacity is shut down or idled, shifting supply to competitors' customers may allow the firm to gain new sales and take market share.

Several cost drivers also influence the value to be achieved through global integration. Differences in *capital and cost structure* across regions create opportunities to reduce cost by realigning supply with changing global demand. If particular products are produced more cost effectively in one location versus another, shifting the mix to produce those products at that location can reduce total cost. Changing the supply/demand mix to produce small volumes at a more flexible operation can also reduce total cost.

A second cost element influencing the value of global integration is the *tax and duty structure*. Operating flexibility is a vehicle for shifting the supply/demand balance to minimize taxes for the global product mix. For example, the production mix across global operations can be optimized to produce high value products in low tax environments and lower value items in high tax environments.

Finally, *logistics costs* are an important factor in global integration. Shipping inter-regionally can be advantageous for the firm, but logistics costs are increased. The optimum inter-regional mix must take into account the logistics costs incurred in the process.

Theoretical Model and Research Propositions

Theoretical relationships suggested by this research are presented in Figure 5-2.

The relationships are discussed and presented in the form of research propositions below.

The defining attributes or characteristics of global integration of cross-functional supply chain processes were discussed in detail earlier and are summarized here. A focal point for global interface, in the form of a person or a team, is responsible for collecting, aggregating and disseminating information from all regions for global decision making. Regional representation in the process brings relevant regional information about the business, customers, and markets into the process. A global demand forecasting and planning process is critical for cross-functional integration. The demand planning process includes development of an operational plan against which the regions execute. Globally integrated information systems are the foundation for such a planning process. Global decisions about strategic customers and markets guide decisions about the optimum supply/demand mix. Allocation of supply to markets and customers with the greatest potential for growth and profitability enhances firm performance at a global level. Standardization of products and processes gives the firm the ability to readily switch the source of supply to satisfy global demand. An effective global logistics process is essential to successfully execute against dynamic balancing of the global supply/demand mix.

A primary benefit of global integration of cross-functional supply chain processes is operating flexibility. Operating flexibility has been recognized as an objective of globally integrated strategy (Bartlett and Ghoshal 1998; Kogut 1985; Kogut and

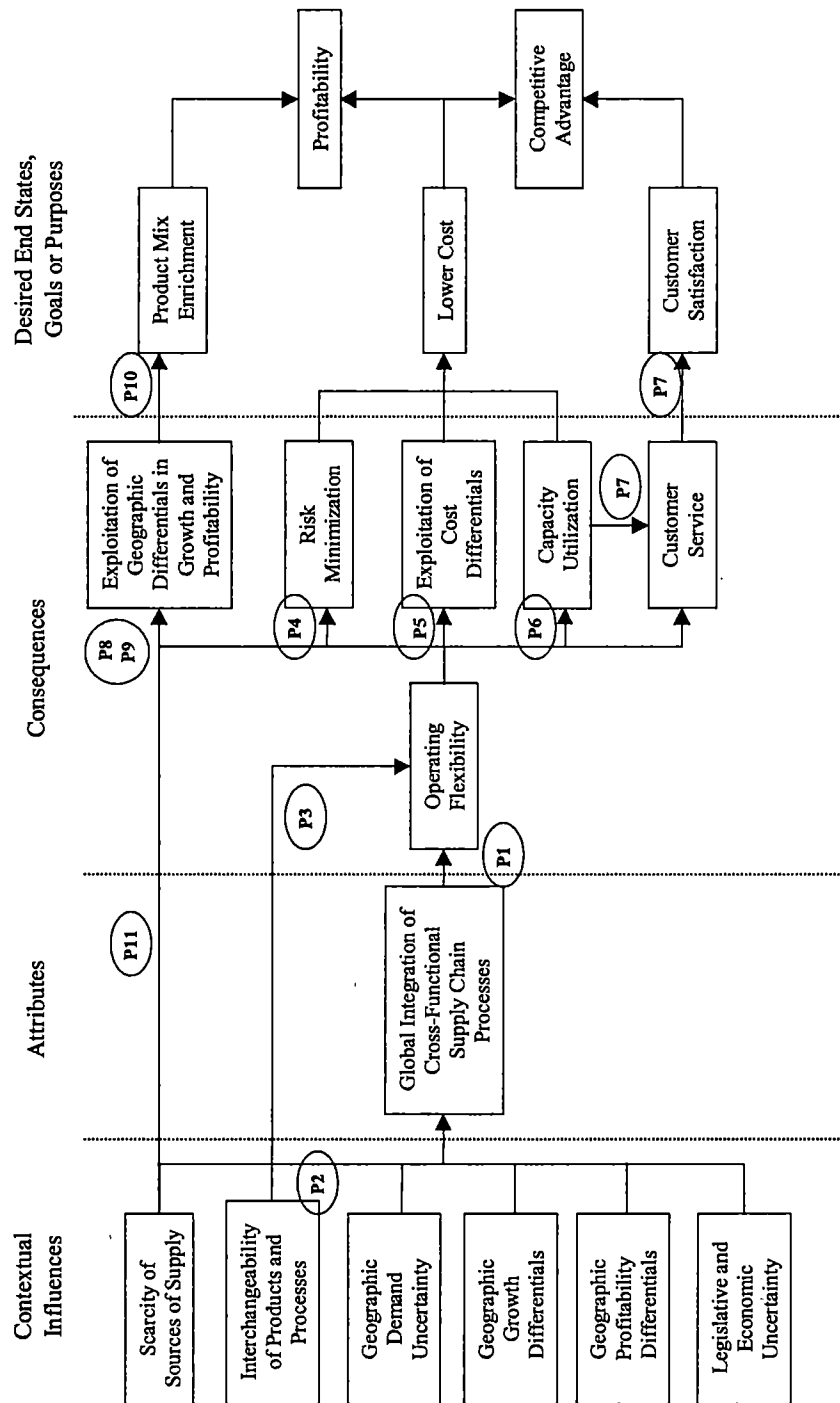


Figure 5-2. Theoretical Model of Global Integration of Cross-Functional Supply Chain Processes

Kulatilaka 1994; Prahalad and Doz 1987; Yip 1992). Operating flexibility has previously been defined as the ability of the firm to shift production from one location to another in response to environmental changes (Kogut 1985; Kogut and Kulatilaka 1994; Prahalad and Doz 1987). However, typically researchers have considered production shifting from a static perspective, with excess capacity as a requirement to take advantage of operating flexibility (Yip 1992). Dynamic balancing of the supply/demand mix has not been considered an important aspect of operating flexibility.

Operating flexibility resulting from global integration of supply chain processes is redefined here *as the ability of the firm to dynamically shift the global supply/demand mix in response to environmental changes and changing geographic demand patterns*. This definition of operating flexibility differs from prior research in two ways. First, excess capacity is not a requirement to take advantage of operating flexibility. Conversely, the findings from this research suggest the value of operating flexibility is greater when production capacity is constrained versus global demand. Secondly, the realignment of product flows in response to geographic demand uncertainty has not previously been considered an objective of operating flexibility. Bartlett and Ghoshal (1998) suggested products flows are reasonably constant and can be adequately forecast such that the management of product flows becomes routine. The findings from this research suggest a primary benefit of operating flexibility is the ability to respond to geographic changes in demand. Global integration of cross-functional supply chain processes is critical to achieve such operating flexibility. This relationship is reflected in the following research proposition.

- P1: Global integration of cross-functional supply chain processes positively influences the operating flexibility of the firm.

The interchangeability of products and processes is both a driver and requirement for operating flexibility. Global integration of cross-functional supply chain processes is not relevant if products and production processes are not common globally. When products and processes are interchangeable, the switching costs associated with shifting production locations to meet global demand requirements is minimized, and operating flexibility is enhanced. These relationships are reflected in the following research propositions.

- P2: Interchangeability of products and processes positively influences the decision of the firm to globally integrate cross-functional supply chain processes.
- P3: Interchangeability of products and processes positively influences the operating flexibility of the firm.

Consistent with the findings from this research, operating flexibility has been recognized as a mechanism to reduce cost by shifting production in response to changes in economic and legislative environments (Kogut 1985; Yip 1992; Kogut and Kulatilaka 1994). As changes occur in exchange rates, tax structures, wages rates, or environmental legislation, the firm can realign the supply/demand mix to minimize the negative impact or maximize the positive. For example, high cost products can be produced in low tax environments and vice versa. This is a much more dynamic issue when variability in global demand is considered. While tax rates may not change frequently, the global demand mix may. As the demand mix changes, realigning the production mix globally in

light of existing economic and legislative environments also enables the firm to minimize cost. Responding to changes in the global demand mix requires a much more dynamic model of operating flexibility.

Operating flexibility also enables the firm to utilize production capacity more effectively. Prior research identified shifting production to utilize excess capacity as a benefit of operating flexibility (Yip 1992). Global optimization of the production mix is also a mechanism to utilize capacity effectively. Products in high demand can be produced in less flexible production centers to minimize changeover costs. Products with less demand can be produced in flexible operations with lower changeover costs. Additionally, by aggregating production for total global demand in a single location, overall costs of changeovers are minimized and yields improved. In the case where production capacity is constrained, yield improvements increase total product availability for customers. Therefore, effective capacity utilization reduces cost, improves service to customers, increases customer satisfaction, and contributes directly to the profitability and competitive advantage of the firm. These relationships are reflected in the following research propositions.

- P4: Operating flexibility reduces the risk from economic, legislative, and geographic demand uncertainty.
- P5: Operating flexibility positively influences the firm's ability to exploit geographic cost differentials.
- P6: Operating flexibility positively influences the firm's capacity utilization to reduce cost and increase the profitability of the firm.

- P7: Operating flexibility positively influences the firm's capacity utilization to improve service to customers, increase customer satisfaction, and improve the competitive advantage and profitability of the firm.

The dynamic balancing of the supply/demand mix allows the firm to take advantage of global opportunities for growth and profitability. Geographic differences in potential for growth and profitability can be exploited if the firm has the operating flexibility to realign supply to satisfy strategic demand opportunities. Consequently, the product mix is enriched to increase the profitability of the firm. When capacity is constrained, the opportunity to enrich the product mix is greater. Scarce supply is allocated to customers and regions where the opportunities for growth and profitability are greater. These relationships are reflected in the following research propositions.

- P8: Operating flexibility positively influences the ability of the firm to exploit geographic differences in growth rates.
- P9: Operating flexibility positively influences the ability of the firm to exploit geographic differences in profitability.
- P10: Operating flexibility positively influences the profitability of the firm's product mix.
- P11: Under conditions of constrained supply, operating flexibility has a more positive impact on the profitability of the product mix.

Summary

In this section, findings and conclusions about the value of global integration of cross-functional supply chain processes were discussed in relation to each of the research questions. Attributes, consequences, goals, and values were identified and discussed.

Important relationships between them were described and presented in a theoretical model. Research propositions developed from the model serve as the basis for future testing of the theoretical model. In the next section, the value of global integration at the supplier interface is discussed.

GLOBAL INTEGRATION AT THE SUPPLIER INTERFACE

At the supplier interface, the value of global integration is derived from effective management of relationships with global suppliers. In Figure 5-3, these relationships are summarized in a value hierarchy.

Global Integration Value Hierarchy

Findings and conclusions related to the first two research questions are discussed below.

Attributes of Global Integration

Attributes important to global management at the supplier interface are summarized in Figure 5-3. These are: (1) *a focal point for global interface*, (2) *regional representation in the purchasing process*, (3) *global business knowledge*, both at the firm level and the industry level, (4) *globally integrated information systems*, (5) *global selection and rationalization of suppliers*, (6) *global demand forecasting and planning*, (7) *standardization of purchasing processes*, and (8) *standardization of raw materials*.

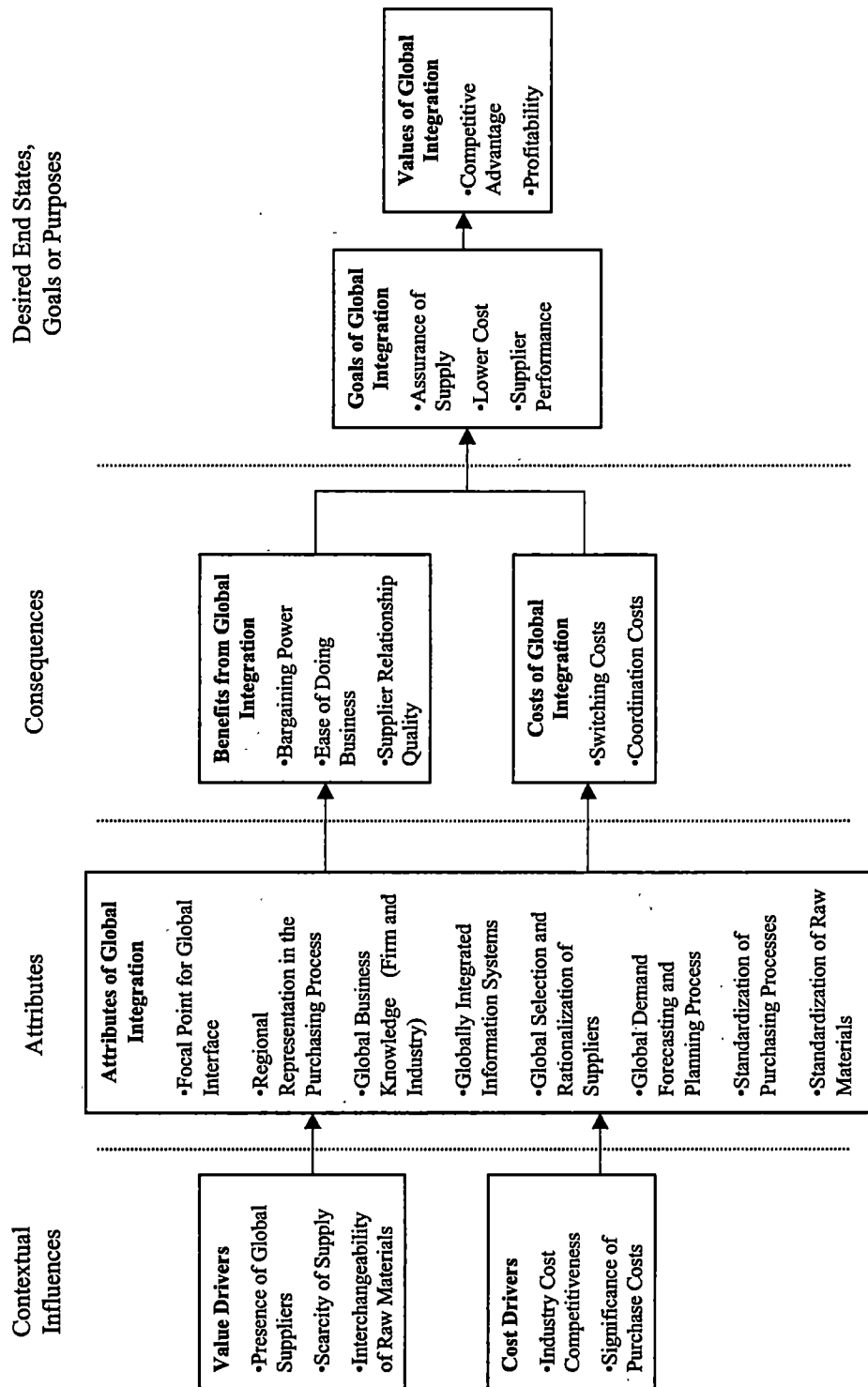


Figure 5-3. Global Integration Value Hierarchy at the Supplier Interface

Each of these attributes and their relationships to consequences, goals, and values are discussed below.

The first attribute of global integration at the supplier interface is a *focal point for global interface*. A focal point, typically in the form of a person or a team, provides a mechanism for aggregating global data and information, and making information accessible and useful for global decision-making. A person acting as the focal point also provides a single point of interface with suppliers, ensuring consistent communications about global requirements. Establishing a single interface for negotiating with suppliers for aggregate global demand enhances the bargaining power of the firm. At the same time, clear, consistent communications of global requirements makes it easier for suppliers to meet those requirements, improves supplier performance, and enhances the quality of supplier relationships.

The second attribute of global integration at the supplier interface is *regional representation in the purchasing process*. Regional representation is important to ensure that relevant information from the firm's global operations is considered in the purchasing process. Having relevant information from the regions is important for effective global management of suppliers in many ways, which are highlighted in subsequent discussions of attributes.

The third attribute of global integration at the supplier interface is *global business knowledge*. Global business knowledge is important at two levels - the firm level and the industry level. At a firm level, an understanding of the requirements and capabilities of global operations is essential. Understanding demand and performance requirements of

regional operations is important to identify opportunities for aggregating purchases and effectively communicating requirements to suppliers. Understanding global operational capabilities is also important to identify opportunities to standardize raw materials and purchasing processes. Both are important for effective global integration at the supplier interface.

At an industry level, knowledge about supplier capabilities on a global basis is essential. Effective global management requires suppliers capable of meeting global needs. The purchasing process must be capable of identifying new suppliers or developing existing suppliers to meet global requirements. Relevant global industry knowledge also includes an understanding of global pricing, competitor activity, and the supply/demand balance of raw materials. Having this knowledge enhances the bargaining power of the buyer. Regional representation is important to bring relevant regional information at both the firm and industry levels into the process.

The fourth attribute of global integration at the supplier interface is *globally integrated information systems*. The need for globally integrated information systems was a consistent theme for all three firms, and is important in all areas of global integration. The ability to quickly access relevant information on a global basis is important to understand the global business environment and make good business decisions. This finding is consistent with prior research. Monzcka and Trent (1991) identified integrated information systems as critical to integrated global procurement and Min and Eom (1994) highlighted the importance of integrated information systems to coordinate the flow of raw materials to global operations.

The fifth attribute of global integration at the supplier interface is *global selection and rationalization of suppliers*. Historically, country or regional operations have developed suppliers to meet their specific requirements. These suppliers may or may not have the capability to meet global requirements. Effective global management at the supplier interface requires rationalizing the multi-regional supplier base and developing relationships with a few suppliers that can most effectively meet global needs.

The sixth attribute important to global integration at the supplier interface is a *global demand forecasting and planning process*. An understanding of global requirements is essential to effectively negotiate and communicate with suppliers. This entails understanding aggregate global demand and translating that demand to specific regional requirements for raw materials. Negotiating based on aggregate demand gives a buyer greater bargaining power with suppliers, resulting in lower purchase costs. Understanding specific regional or local requirements enables a buyer to effectively communicate requirements to suppliers, making it easier for the supplier to meet those requirements. Being easy to do business with enhances the quality of supplier relationships, which helps ensure access to supply in situations where supply is constrained.

The seventh attribute of global integration at the supplier interface is *standardization of purchasing processes*. While much of the purchasing process can be managed through a single global interface, execution takes place in all locations. Coordination of delivery, evaluation of supplier performance, and acceptance of raw materials are examples of activities that must take place at a regional or local level. If

these processes differ, suppliers get inconsistent signals and become less effective in meeting global requirements.

The eighth attribute of global integration at the supplier interface is *standardization of raw materials*. The ability to aggregate total demand with fewer suppliers is greater when supply is interchangeable. With the increased volumes and reduced variation in the product mix, the buyer has greater leverage in negotiations with suppliers. Standardization of raw materials also reduces switching costs, giving the firm greater flexibility to change suppliers. This flexibility to switch suppliers also enhances the buyer's bargaining power. Regional representation is important to standardize purchasing processes and raw materials globally. Regional representatives in the purchasing process help ensure local or regional requirements are considered in standardized purchasing processes and raw materials.

Consequences of Global Integration

The consequence level of the value hierarchy includes both costs and benefits of global integration. Benefits from global management at the supplier interface include (1) enhanced *bargaining power*, (2) *ease of doing business*, and (3) enhanced *supplier relationship quality*. Costs of global integration include (1) *switching costs* and (2) *coordination costs*.

A primary benefit of globally integrated procurement is leveraging global volumes to reduce price and improve performance. An underlying assumption is that by bringing aggregate global requirements to the negotiating table, the *bargaining power* of

the firm is increased and lower prices and/or better supplier performance will result. Several of the attributes discussed earlier are important to increase bargaining power. Global demand forecasting and planning is critical to translate aggregate global demand to total requirements for raw materials. Aggregate volumes can then be used as the basis for negotiations. Standardization of raw materials is a mechanism to increase aggregate volumes and reduce supplier switching costs, both of which enhance bargaining power. Finally, global knowledge of pricing, competitor activity, and the supply/demand balance in the supplier industry enhances the bargaining power of the firm.

Another benefit of global integration at the supplier interface is *ease of doing business*. Making it easy for a supplier to do business with the firm enhances the quality of the relationship and helps ensure favorable treatment when supply is constrained. Other attributes contributing to ease of doing business include (1) a single point of interface with suppliers, (2) consistent communications about global requirements, and (3) globally standard purchasing processes at the regional and local levels.

Supplier relationship quality is also a benefit of global integration. By increasing the volume of business with a few important suppliers capable of meeting global requirements, the quality of relationships can be enhanced. Being easy to do business with also contributes to better relationships with suppliers. The quality of relationships with suppliers contributes to improved supplier performance and access to supply.

The costs of global integration at the supplier interface are (1) *switching costs* and (2) *coordination costs*. *Switching costs* can be a significant barrier to global integration at the supplier interface. Rationalizing the supplier base and consolidating purchase

requirements with fewer suppliers requires some regional organizations to change suppliers. This is made easier if the raw materials are standard globally, but still requires resources to develop new relationships and establish procedures to manage the process. If materials are not standard, switching suppliers may require changing products or production processes to accommodate different specifications.

Coordination costs can also be a barrier to global integration. These costs are reduced by globally integrated information systems and managing processes. Coordination costs are incurred in the interaction between the focal person and regional representatives. Communications are required to exchange important information about suppliers and supplier industries and coordinate decision-making. Similarly, communications and resources are required to standardize products and processes. Thus, coordination costs can be significant to achieve global integration at the supplier interface.

Goals of Global Integration

Three goals of global integration at the supplier interface were identified. They are (1) *assurance of supply*, (2) *lower cost*, and (3) *supplier performance*. *Assurance of supply* is important in the case where supply is constrained and access to supply is critical to the firm's competitive advantage. Leveraging global purchases to reduce cost emerged as important to all the participating firms. Leveraging global volumes can result in lower prices and/or improved *supplier performance*. Both will result in *lower cost* for the firm. Supplier performance is also improved when the buyer is able to provide a consistent

message about global requirements. This makes it easier for the supplier to meet those requirements.

Values of Global Integration

The values of global integration at the supplier interface are *competitive advantage* and increased *profitability*. Reducing cost by leveraging global volumes contributes directly to the bottom line profitability of the firm. Competitive advantage is enhanced through reduced cost, especially in industries that are particularly cost competitive. Assurance of supply also contributes to competitive advantage, especially in an industry with supply constraints.

In this section, findings related to research questions 1 and 2 were addressed for global integration at the supplier interface. The attributes, consequences, goals, and values imbedded in the value hierarchy and the relationships between them were discussed. In the next section, findings related to the third research question are discussed.

Differentiation among Dimensions of Supply Chain Activities and Processes

A third objective of this research was to understand differences in the value of global integration across the multiple dimensions of supply chain activities and processes shown in Figure 1-5. This objective was reflected in research question #3.

Two dimensions shown in Figure 1-5 are relevant to global integration at the supplier interface - supplier relations and purchasing. Research participants did not

differentiate between globally integrated management of supplier relations and a globally integrated purchasing process. They saw these as part of an integrated process. Thus, the discussion of global integration at the supplier interface addresses this integrated process.

Environmental and Organizational Factors

A fourth objective of this research was to understand the influence of environmental and organizational factors on the value of global integration. In this section, environmental and organizational factors influencing the value of global integration at the supplier interface are discussed.

Environmental and organizational factors influencing global integration at the supplier interface are summarized in Figure 5-3. Value drivers include (1) the presence of *global suppliers*, (2) *scarcity of supply*, and (3) *interchangeability of raw materials*. At the supplier interface, the presence of large, *global suppliers* was seen across firms. The term "global supplier" was defined by participants in two ways. First, a supplier firm producing in a single location and shipping worldwide was considered a global supplier. Secondly, a supplier firm producing in multiple locations and selling into multiple regions was considered a global supplier. In both cases, firms saw an opportunity to benefit from managing the supplier interface in a globally integrated way.

Interchangeability of supply was seen as a driver for global integration in all three firms. Where raw materials are common across global operations, the opportunity to benefit from leveraging global volumes is increased. At the same time, the cost of

switching to a single global source of supply is decreased. Thus, the value of global integration is greater when supply is interchangeable across global operations.

Scarcity of supply versus global demand is also a significant driver for global integration. For Communications Technologies, the ability to aggregate global volumes and manage the supplier interface more effectively is important to assure access to supply. Because of shortages in critical components faced by the firm in recent years, assurance of supply is a significant contributor to the competitive advantage of the firm. The importance of assurance of supply to competitive advantage was not seen in the other two firms where supply has been readily available.

Cost drivers influencing the value of global integration include (1) *industry cost competitiveness* and (2) the *significance of purchase costs* to the firm. In a highly cost competitive industry, the ability to reduce purchase costs is particularly important to the firm's competitive position. In such case, global integration as a means to reduce cost is important. The *significance of purchase costs* is also an important consideration in the global integration decision. In industries where raw materials are a significant part of product costs, the potential to benefit from global integration is greater. Even within a given firm, not all raw materials are candidates for globally integrated purchasing. Rather, those that represent a significant portion of the firm's product costs offer greater opportunity.

In the previous sections, findings and conclusions related to the value of global integration at the supplier interface were discussed in relation to each of the four research questions. The attributes, consequences, goals, and values of global integration at the

supplier interface were summarized in a value hierarchy in Figure 5-3. Environmental and organizational factors influencing global integration at the supplier interface were identified. In the next section, a theoretical model describing important relationships is presented and discussed. These relationships are also described in research propositions that form the basis for future testing of the model.

Theoretical Model and Research Propositions

Theoretical relationships suggested by this research are presented in Figure 5-4. These relationships are discussed and presented as research propositions below.

The defining attributes or characteristics of global integration at the supplier interface were discussed in detail earlier and are summarized here. A focal person acts as a single point of contact at the interface between regional representatives of the firm and the supplier. The focal person negotiates with select global suppliers based on aggregate global demand requirements as well as specific regional requirements of the firm. A global demand forecasting and planning process is the basis for understanding and communicating those requirements. Integrated information systems provide access to relevant data and information from all regions. Interaction between the focal person and regional representatives enhances global knowledge of the firm's regional operations and the supplier's industry. This knowledge enhances the bargaining power of the buyer. Standardization of purchasing processes across regions facilitates the firm's ability to communicate clear, consistent requirements to the supplier, making it easier for the supplier to meet those requirements. Finally, standardization of raw materials increases

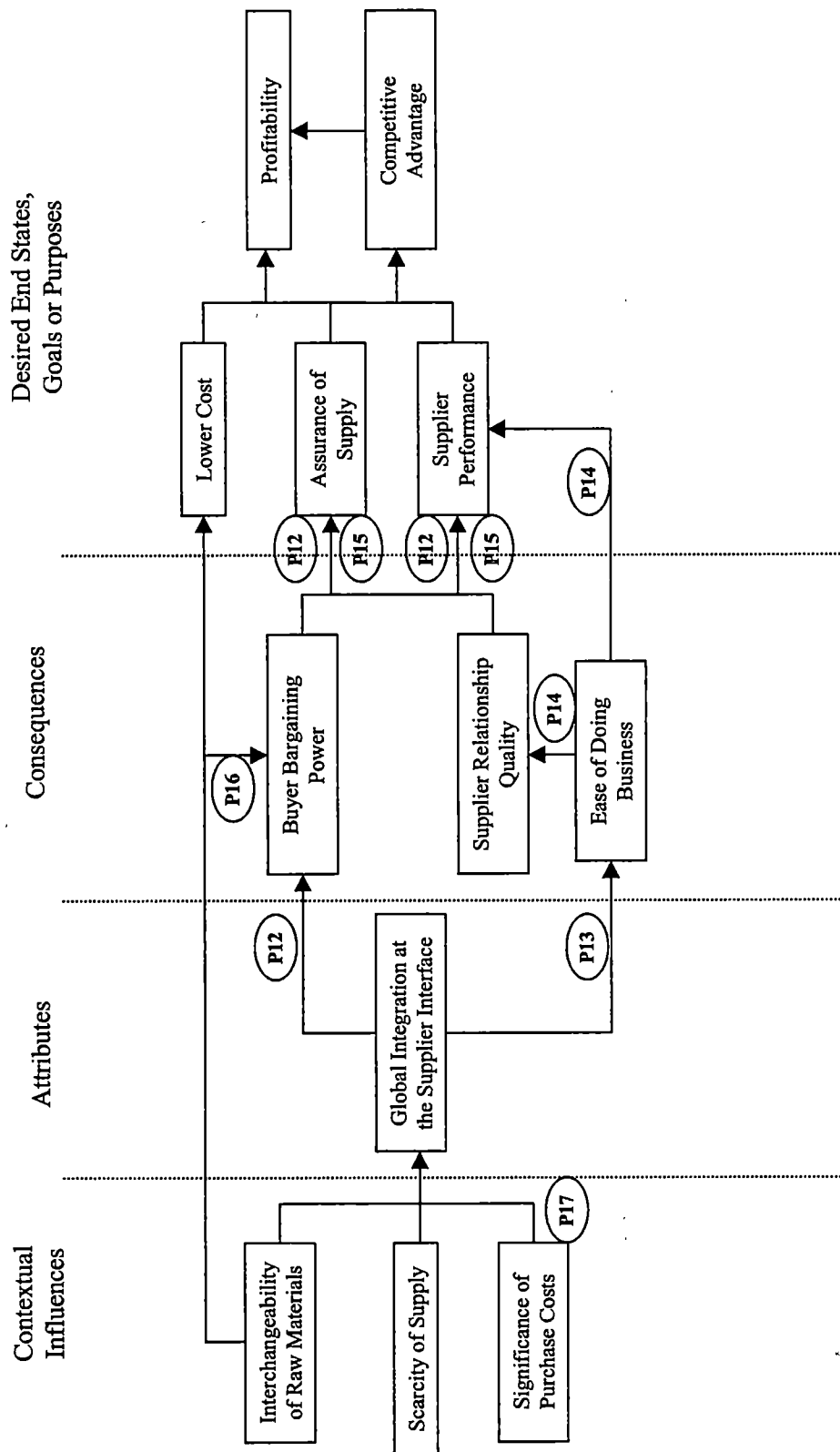


Figure 5-4. Theoretical Model of Global Integration at the Supplier Interface

the firm's ability to leverage global volumes with suppliers by increasing aggregate global volumes for specific raw materials and reducing the costs associated with changing suppliers.

The findings from this research suggest the primary benefit of global integration to the firm is buyer bargaining power. Negotiating based on aggregate global volumes brings strength to the bargaining table. Prior research has also linked leveraging global volumes to improvements in price, delivery performance, and assurance of supply (Monzcka and Trent 1991). These relationships are reflected in the following research proposition.

P12: Global integration at the supplier interface positively influences buyer bargaining power, which results in lower price, better supplier performance, and assurance of supply, and contributes to increased profitability and competitive advantage of the firm.

A secondary benefit of global integration suggested by this research is the ease of doing business with the buyer firm. Sending consistent messages about global and regional requirements and standardizing purchasing processes across regions makes it easier for the supplier to understand and meet those requirements. Making it easier for the supplier to do business with the firm also improves supplier relationship quality and performance. The quality of the supplier relationship influences the firm's ability to access supply when capacity is constrained versus global demand. Improved supplier performance and assurance of supply increase the profitability and competitive advantage of the firm.

- P13: Global integration at the supplier interface positively influences the ease of doing business with the buyer firm.
- P14: The ease of doing business with the buyer firm positively influences supplier performance and relationship quality.
- P15: Supplier relationship quality positively influences supplier performance and assurance of supply for the buyer firm, and contributes to increased profitability and competitive advantage for the buyer firm.

Environmental and organizational factors influencing the value of global integration at the supplier interface include (1) scarcity of supply, (2) interchangeability of supply, and (3) significance of purchase costs. Scarcity of supply influences the importance of assurance of supply to the firm. Interchangeability of raw materials also influences the value of global integration to the firm. When raw materials are interchangeable, switching costs are reduced and bargaining power is increased. By simplifying the product mix and increasing total aggregate volumes, the buyer firm brings greater strength to the bargaining table. When raw materials are interchangeable, the buyer firm can more readily switch between suppliers, which also increases bargaining power. This relationship is reflected in the following research proposition.

- P16: Interchangeability of raw materials positively influences buyer bargaining power, which leads to lower price, better supplier performance, and greater assurance of supply.

Finally, significance of purchase costs for raw materials influences the value of global integration to the firm. Since global integration is resource intensive and costly, only raw materials representing a significant portion of a firm's purchase costs are viable candidates. The significance of purchasing costs for raw materials is a driver for global

integration at the supplier interface. This relationship is reflected in the following research proposition.

P17: The significance of purchase costs to the firm positively influences the firm's decision to pursue global integration at the supplier interface.

Summary

In this section, findings and conclusions about the value of global integration at the supplier interface were discussed in relation to each of the research questions. Attributes, consequences, goals, and values were identified and discussed. Important relationships between them were described and presented in a theoretical model. Research propositions developed from the model will serve as the basis for future testing of the theoretical model. In the next section, the value of global integration at the customer interface is discussed.

GLOBAL INTEGRATION AT THE CUSTOMER INTERFACE

Global management at the customer interface has gained the interest of marketing researchers in recent years (Montgomery, Yip and Villalonga 2000; Arnold, Birkinshaw and Toulan 2000), with the primary focus on global account management (GAM). GAM is the assignment of global account managers to coordinate relationships with global customers. The overall management of customer relationships is typically a responsibility of the sales and/or marketing organizations, and is beyond the scope of this

research. The only aspects of global account management important to this research are those involving supply chain activities and processes.

Global integration of supply chain activities and processes was not seen by participants as particularly relevant to managing the customer interface. However, for one firm dealing with large, global customers, several relationships emerged as important. These relationships are primarily related to accessibility of global supply chain information to facilitate the management of relationships with global customers. These findings are discussed in the following sections.

Global Integration Value Hierarchy

Relationships important to global integration at the customer interface are summarized in the value hierarchy in Figure 5-5. Summary findings are discussed in relation to each of the research questions.

Attributes of Global Integration

Attributes of global integration at the customer interface suggested by this research are (1) *global business knowledge*, (2) *a focal point for global interface*, (3) *regional representation*, (4) *integrated information systems*, and (5) *a global demand forecasting and planning process*.

The attribute that emerged as most important at the customer interface is *global business knowledge*. Global business knowledge at both the firm and market levels is

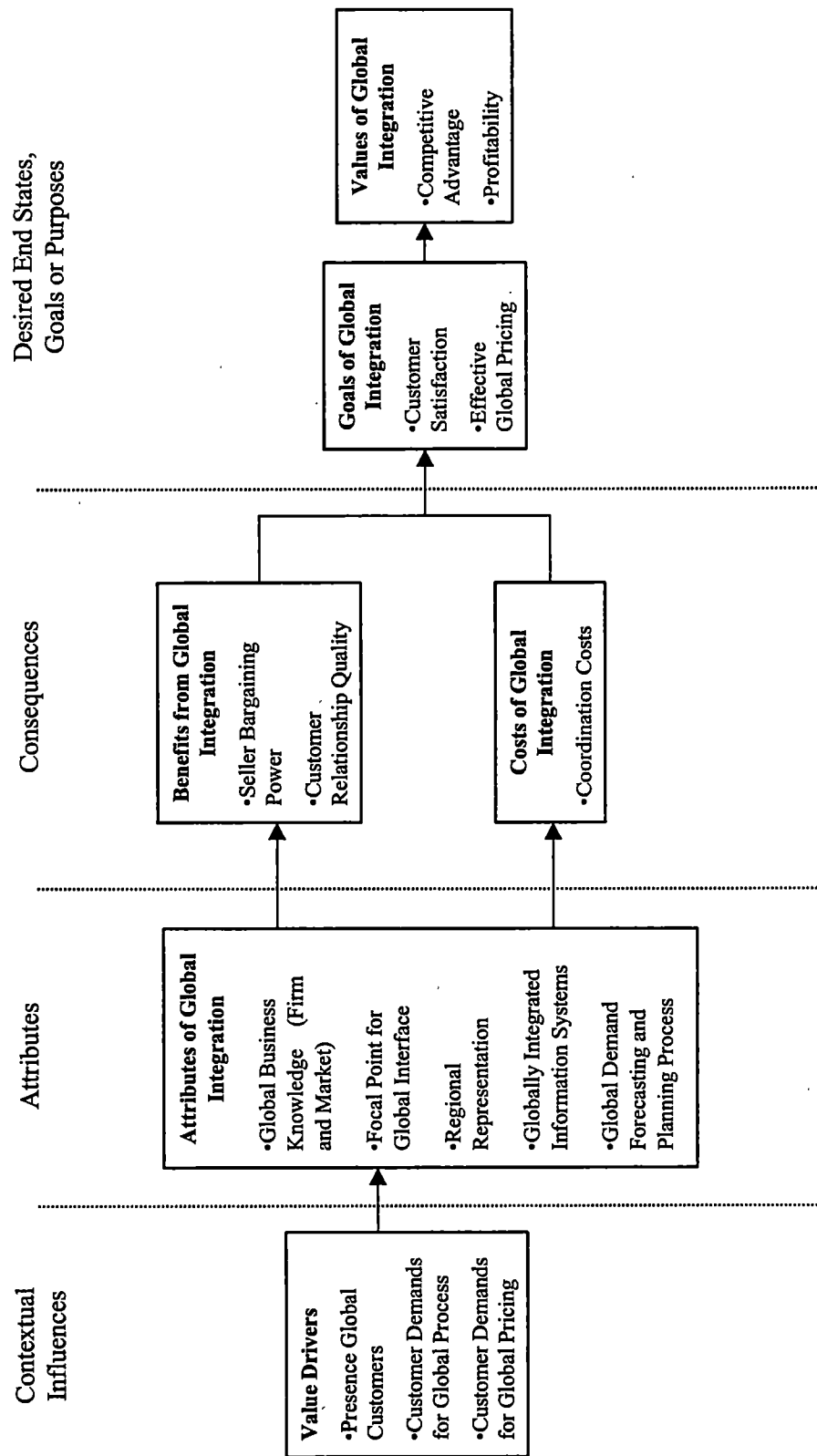


Figure 5-5. Global Integration Value Hierarchy at the Customer Interface

important for global integration at the interface with global customers. This is especially important when customers globally integrate their purchasing processes and demand global pricing. Knowledge of global supply chain costs and capabilities enables the account manager to negotiate global pricing structures that are reasonable. By avoiding global leveraging of prices by customers, the firm can protect its profitability. If a customer is global, but relationships are managed regionally, understanding the regional dynamics with that customer helps the firm manage high-level relationships more effectively. At the market level, understanding market dynamics and competitor activity across regions also helps the firm manage global customer relationships more effectively.

There was little discussion by participants of other requirements to achieve global integration at the customer interface. Nor was there much discussion of what is required to have relevant global business knowledge. However, global business knowledge is an attribute of global integration at the supplier interface, as well as for cross-functional supply chain processes. Inferences about attributes important to global integration at the customer interface were drawn from those areas.

A focal point to collect, aggregate, and disseminate information is important to make relevant global business information accessible. *Regional representation* is critical to bring relevant information from all regions into the global process. *Globally integrated information systems* and *a global demand forecasting and planning process* are also important vehicles to make global business information readily accessible.

These findings are consistent with prior research on global account management. Arnold, Birkinshaw and Toulan (2000) also highlighted the importance of internal coordination,

coordination across geographic regions, and information processing to effective global account management.

Consequences of Global Integration

The consequence level of the value hierarchy includes both benefits and costs of global integration. In the management of the customer interface, benefits from global integration include (1) enhanced *bargaining power* to avoid customer leverage and (2) improved *customer relationship quality*.

Avoiding customer leverage emerged as an important consequence for one participant firm. They have been pressured by large, global customers with globally integrated purchasing processes to establish global prices. They indicated global knowledge about supply chain costs and activities increases their *bargaining power* in negotiations with global customers. A globally integrated internal process to manage the flow of supply chain information and coordinate customer strategies gives the account manager the knowledge required to gain negotiating strength and avoid global pricing.

Prior research also identified the avoidance of customer leverage (or reduction of customer price arbitrage) as an objective of global account management (Montgomery, Yip and Villalonga 2000). There is, however, a difference in global account management and the approach to global integration seen in this research. Global account management, as defined by Montgomery, Yip and Villalonga (2000), requires central coordination of worldwide activities serving a multinational customer by a single person or team. However, for this firm, having global knowledge while continuing to manage

relationships regionally was seen as a way to maintain power in the relationship. Global account management is expected to result in a loss of power in the relationship.

A second, and somewhat contradictory, benefit from global integration at the customer interface is *customer relationship quality*. Firms recognize that global integration in response to demands from important global customers can be beneficial. The ability to manage in a globally integrated way in response to such demands is important to the quality of relationships with those customers.

The focus of global integration of supply chain activities and processes at the customer interface is on information access and exchange. The need for integrated information systems and communications processes to coordinate the flow of supply chain information is evident. As discussed previously, the associated *coordination costs* are likely to be a significant barrier.

Goals of Global Integration

Two goals emerged as important at the customer interface - maintaining *effective global pricing* and *customer satisfaction*. Global knowledge of supply chain costs and activities and market dynamics allows the firm to negotiate more effectively with global customers. Adoption of global pricing structures detrimental to the profitability of the firm can be avoided. Rather, pricing structures that reasonably reflect differences in supply chain costs among regions can be maintained. *Effective global pricing* that considers global supply chain costs and activities protects and/or enhances the profitability of the firm.

Responding to customer demands for globally integrated processes is also important. Global integration in response to such demands enhances the quality of the relationship and leads to *customer satisfaction*. Satisfying important global customers contributes to the competitive advantage of the firm.

Values of Global Integration

The two values seen as important for global integration at the customer interface are *competitive advantage* and *profitability*. Satisfying the demands of important global customers for globally integrated processes contributes to the *competitive advantage* of the firm. Bringing global supply chain information and knowledge to the negotiating table enhances bargaining power, and helps ensure effective global pricing. An effective global pricing structure protects or enhances the *profitability* of the firm.

In this section, findings and conclusions related to the first two research questions were addressed for global integration at the customer interface. The attributes, consequences, goals, and values imbedded in the value hierarchy and relationships between them were discussed. In the next section, findings and conclusions related to the third research question are discussed.

Differentiation among Dimensions of Supply Chain Activities and Processes

The third research question was aimed at understanding differences in the value of global integration across multiple dimensions of supply chain activities and processes.

At the customer interface, the three dimensions highlighted in Figure 1-5 are (1) logistics, (2) customer service, and (3) customer relations. In general, participants did not see global integration of supply chain activities and processes at the customer interface as particularly important. The need to deal with diversity - in terms of customer requirements, culture, language, logistics infrastructure, and government regulations - suggests these activities and processes are best managed locally or regionally. However, there are some specific areas where global integration at the customer interface is beneficial.

As discussed earlier, globally integrated management of customer relations allows a firm to respond to customer demands for global pricing or processes. Access to accurate information about global supply chain costs and capabilities is important to effectively negotiate global pricing structures. Operating flexibility and globally standard processes allow suppliers to respond effectively to customer demands for global processes. Global integration of cross-functional supply chain processes enhances the supplier's ability to respond to such demands for global pricing or processes.

Global logistics only emerged as an important theme for the global integration of cross-functional supply chain processes. When operating flexibility is important to a firm, an effective global logistics process is critical. Global integration in managing the interface with global logistics suppliers is important, but other aspects of the logistics process are best managed at the local and/or regional level.

Customer service is an outcome of a globally integrated cross-functional process. However, the management of the customer service activities and processes was seen as a

local or regional requirement. Dealing with diverse languages, time zones, cultures, and customer requirements requires local and regional expertise. Thus, customer service activities are more effectively managed at the local or regional level.

In summary, globally integrated management at the customer interface is not particularly important from a supply chain perspective. However, access to global supply chain information is important to effectively manage relationships with large, global customers. Global integration of cross-functional supply chain processes (1) makes relevant information more readily accessible, thus contributes to a firm's ability to effectively manage those relationships; and (2) enables the firm to respond to customer demands for globally integrated processes.

Environmental and Organizational Factors

The fourth research question was aimed at understanding the influence of environmental and organizational factors on the value of global integration. In this section, findings and conclusions related to this research objective are discussed.

Only one of the participant firms saw global integration at the customer interface as particularly relevant. This firm sells products into markets dominated by large, global companies known for leveraging their suppliers. Global integration was not seen as desirable, but necessary to respond effectively to the globalization initiatives of customers. Thus, the only environmental factors identified as important to the value of global integration are customer related.

The three factors influencing the value of global integration at the customer interface are (1) the presence of *global customers*, (2) *customer demands for global processes*, and (3) *customer demands for global pricing*. Only one participant firm deals with global customers with integrated purchasing processes. For the other two firms, there are few global customers and none that manage their purchasing process in a globally integrated way. Thus, global management at the customer interface was not considered important.

When influential global customers demand a globally integrated interface from suppliers, the ability to respond is important to maintain good relations. At the same time, global integration to maintain or enhance bargaining power in dealing with those customers is a defensive measure to protect global pricing and profitability. Global knowledge of supply chain costs and activities is important to defend against customer demands for global pricing.

Theoretical Model and Research Propositions

Global integration at the customer interface was not seen as particularly important from a supply chain perspective. Relationships that emerged as important are more appropriate to global account management, which is typically a responsibility of sales or marketing organizations. The importance of global integration of supply chain activities and processes at the customer interface lies in the ability to access relevant global supply chain information and respond to customer demands for global processes. As discussed earlier, global knowledge of supply chain costs and capabilities is an attribute of global

integration of cross-functional supply chain processes. Arnold, Birkinshaw and Toulan (2000) highlighted the importance of internal coordination, coordination across geographic regions, and information processing to effective global account management. These are important aspects of global integration of cross-functional supply chain processes. This suggests global integration of supply chain activities and processes contributes to effective global account management by making relevant global supply chain information readily accessible and creating the capability to respond to customer demands for global processes.

Theoretical relationships suggested by this research are presented in Figure 5-6. These relationships are discussed and presented as research propositions below. A defining attribute of global integration at the customer interface relevant to supply chain activities and processes is global business knowledge at the firm and market levels. Having information about supply chain costs and activities enables account managers to negotiate more effectively with global customers and respond to demands for global pricing. Knowledge of customer and competitor activity at a market level also gives the firm more strength in negotiating with global customers.

Other attributes shown in Figure 5-5 are inferred from their importance to global business knowledge. A focal point for global interface plays an important role in collecting, aggregating, and disseminating relevant information. Regional representation is also important to ensure all relevant information is included in the process. Globally integrated information systems and standardized data across regions are the foundations for accessibility of relevant information. Finally, a global demand forecasting and

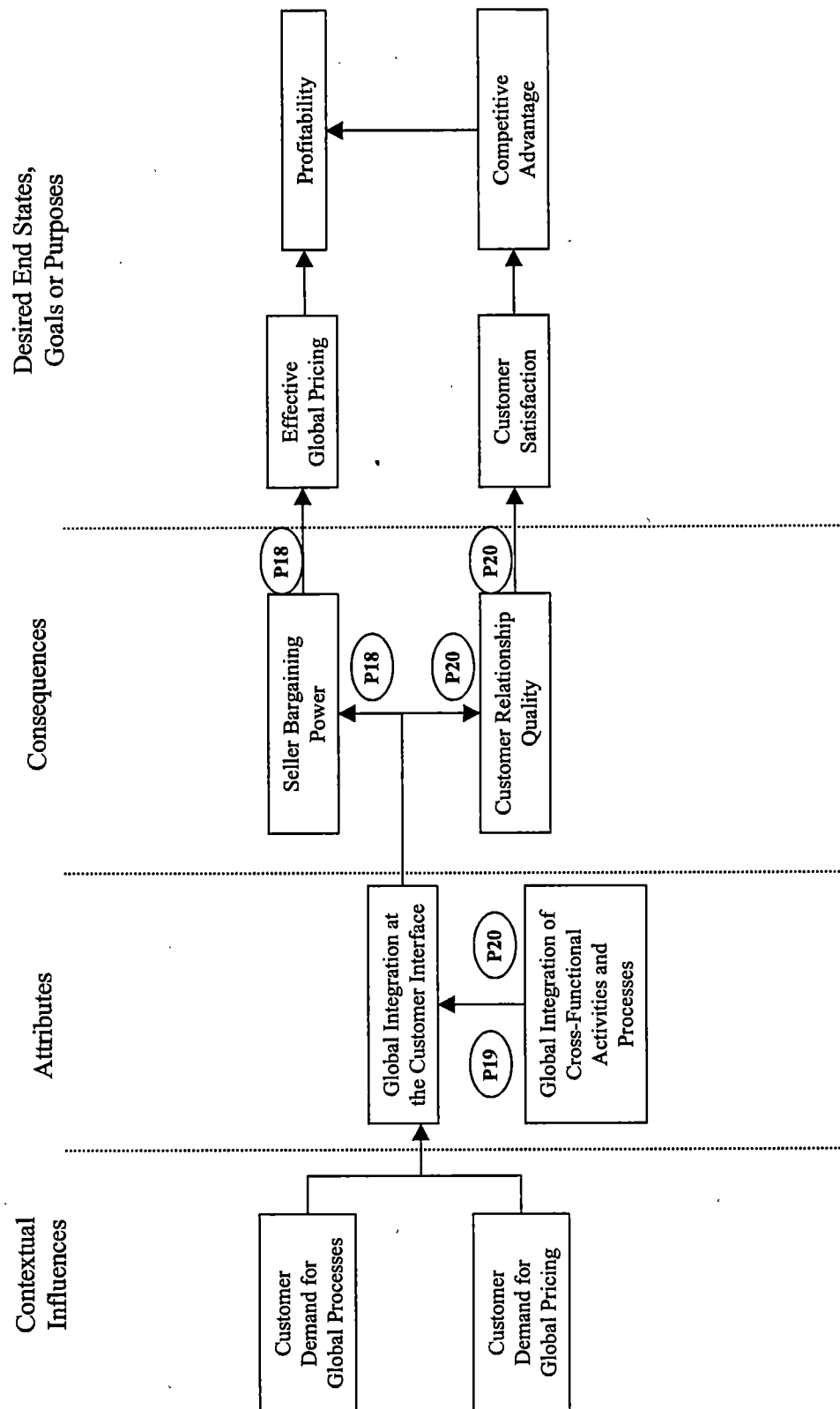


Figure 5-6. Theoretical Model of Global Integration at the Customer Interface

planning process facilitates the flow of information about supply chain activities. These are also attributes of global integration of cross-functional supply chain processes.

This research also suggests buyer expectations about delivery and performance increase as the buyer firm globally integrates at the supplier interface. As buyer firms build operating flexibility to dynamically balance global supply and demand, the requirement for global processes from suppliers increases. The ability of a global supplier to respond to customer demands for global processes is important to the relationship. Thus, global integration of cross-functional supply chain activities and processes enhances the ability of the supplier firm to respond to customer demands for global processes. These relationships are reflected in the following research propositions.

- P18: Global integration at the customer interface positively influences seller bargaining power in responding to customer demands for global pricing, which contributes to effective global pricing.
- P19: Global integration of cross-functional supply chain processes positively influences the accessibility of global supply chain information for global integration at the customer interface.
- P20: Global integration of cross-functional supply chain processes positively influences the ability of the firm to respond to customer demands for global processes, which enhances the quality of customer relationships.

Summary

In this section, findings and conclusions about the value of global integration at the customer interface were discussed in relation to each of the research questions.

Attributes, consequences, goals, and values were identified and discussed. Important

relationships specific to supply chain activities and processes were described and presented in a theoretical model. Research propositions developed from the model serve as the basis for future testing of the model.

SUMMARY CONCLUSIONS

In the previous sections, findings and conclusions related to each of three areas included in the domain of this research were discussed. These areas are (1) global integration of cross-functional supply chain processes, (2) global integration at the supplier interface, and (3) global integration at the customer interface. In this section, summary conclusions across the three areas are discussed in relation to each of the research questions.

Global Integration Value Hierarchy

Relationships important to global integration in managing supply chain activities and processes differ across the three dimensions discussed earlier. There are distinct differences among the value hierarchies for these three dimensions. However, there are also a number of similarities.

Attributes of global integration common to all three areas include: (1) *global business knowledge*, (2) *a focal point for global interface*, (3) *regional representation*, (4) *globally integrated information systems*, and (5) *a global demand forecasting and planning process*. Each of these is important to the ability of the firm to bring relevant information to global activities and decisions. A focal point provides a mechanism for

collecting, aggregating and disseminating relevant information, while regional representation ensures relevant information is included in the process. Globally integrated information systems provide the foundation for making data and information readily accessible. Standardization of data, compatibility of systems, and linkages between them are important for global integration of information systems. A global demand forecasting and planning process is the key to understanding aggregate global demand and aligning scarce resource to optimize the global supply/demand mix. This set of attributes is important to identify global issues and opportunities, evaluate alternatives, and set strategic priorities for the firm (Figure 4-17).

At the consequence level, there are distinct differences among the value hierarchies. However, at the supplier and customer interface, common benefits are bargaining power and relationship quality with supply chain partners. Coordination costs are common across all three dimensions. Switching costs are common to global integration at the supplier interface and global integration of cross-functional supply chain processes. In both cases, switching costs are reduced by standardizing products and processes globally.

Reducing cost is a common goal across all three areas. Clearly, there are opportunities for cost reduction through global integration of supply chain activities and processes. Values related to global integration are also common across all three. Global integration of supply chain activities and processes can make an important contribution to the competitive advantage and profitability of the global firm.

Differentiation among Dimensions of Supply Chain Activities and Processes

The third research question was aimed at understanding differences in the value of global integration across the multiple dimensions of supply chain activities and processes illustrated in Figure 1-2. To address this question, research findings are examined from two perspectives. First, differences related to the supply chain activities and processes depicted in Figure 1-2 are discussed. Next, firm-level differences in the value associated with global integration across these dimensions are discussed.

Differences Across Supply Chain Activities and Processes

The research findings suggest several differences in relation to the supply chain activities and processes depicted in Figures 1-2. First, the functional activities and processes found to be candidates for global integration at the supplier and customer interfaces differed somewhat from those suggested *a priori*. Second, the objectives of global integration differed across specific functions. Third, the perceived importance of global integration differed across specific functional areas.

At the supplier interface, management of supplier relations and purchasing were initially represented as two distinct functional processes, with each a candidate for global integration. The research findings suggest these are not two distinct processes, but rather elements of a single integrated process. Effective global integration at the supplier interface requires a globally integrated purchasing and supplier management process. Global integration at the supplier interface enables a firm to manage relationships with

global suppliers more effectively, and is particularly important for firms facing shortages in raw materials or significant purchasing costs.

At the customer interface, three functional areas were initially considered candidates for global integration - logistics, customer service, and management of customer relations. Global integration of logistics and customer service was not considered important in managing the customer interface. Rather, these functions are best managed locally or regionally to deal with the diversity of requirements at the customer interface. The area where global integration is most beneficial is the management of customer relations. Global integration in managing customer relations allows the firm to manage relationships with global customers more effectively, and provides the means to respond to customer demands for global pricing and processes.

In general, global integration at the customer interface was seen as less important than global integration at the supplier interface. One reason for this difference is the need to manage regional and national diversity to effectively serve customers at a local level. A second reason for this difference may be the internal focus of this research. The difference in importance attached to global integration at the supplier interface versus the customer interface reflects an internal focus on the balance of power in relationships with large global players. Global integration at the supplier interface was seen as favorably influencing the balance of power with large global suppliers, while global integration at the customer interface was associated with the loss of power in relationships with large global customers. This focus on balance of power suggests an internal orientation rather than an external supply chain orientation. Future research should examine the

implications of global integration at the supplier and customer interfaces from an external supply chain perspective.

The primary objective of cross-functional integration is to effectively balance supply and demand on a global basis. This is particularly important for firms dealing with constrained sources of supply and dynamic global demand. From a cross-functional perspective, differences in the value of global integration are influenced by environmental and organizational variables at the firm and/or industry levels. Findings related to these differences are discussed in the next section.

Another dimension highlighted in Figure 1-2 relates to managerial level. It was suggested *a priori* that there might be differences in the value of global integration among three managerial levels - the strategy, planning, and operational levels. Because of the need to narrow the scope of this research, a detailed analysis of differences among these three levels was not included in this study. However, some general observations are offered.

Global integration at the strategy level was seen as essential to any global initiatives. A globally integrated supply chain strategy was seen as a mechanism to align regional organizations toward common objectives on a global basis. Participant discussions about global supply chain strategy quickly moved to an emphasis on global planning. Global integration of strategy and planning were seen as closely interconnected. There was a significant emphasis on global demand planning as an essential component of global integration across all dimensions of supply chain activities and processes.

Participants clearly differentiated between global integration at the strategy and planning levels versus the operations level. In general, operational activities were seen as best managed at a local or regional level. Globalization initiatives at the operations level were focused on standardization of data, information, metrics, and/or processes to enable effective local or regional execution against global strategies and plans. Further exploration of the interaction between these three managerial levels and elements important to each is an area for future research.

Differentiation across Firms

As discussed in Chapter 4, there are distinct differences in the approach to global integration adopted by the three participant firms. Differences were seen in two dimensions - the *focus of global integration initiatives* and the *degree of cross-functional integration* (Figure 4-18).

In all three firms, scarcity of interchangeable sources of supply appeared to be the catalyst for global integration. For Communications Technologies, scarce component parts from suppliers focused global integration initiatives at the supplier interface. For Global Chemicals and Leading Edge Fibers, scarce production capacity focused global integration initiatives on cross-functional supply chain processes to gain operating flexibility in production and distribution. Thus, location of scarce interchangeable sources of supply influences the *focus of global integration initiatives*.

Degree of cross-functional integration is also influenced by the location of scarce interchangeable sources of supply. For Communications Technologies, the degree of

cross-functional integration required to align the global supply/demand mix is less significant than for the other two firms. Global demand forecasting and planning is important to understand aggregate demand, make decisions about regional allocations, and communicate requirements to suppliers. However, globally integrated operational planning and global logistics are not as important. For the other two firms, the dynamic realignment of the supply/demand mix requires a much higher degree of global integration of cross-functional supply chain processes. Globally integrated operational planning and global logistics are much more important to the process.

These findings support the idea there are differences in the value of global integration among various dimensions of supply chain activities and processes. Environmental factors (e.g., scarcity of supply), as well as organizational factors (e.g., interchangeability of products or processes and location of scarce sources of supply), directly influence the value of global integration across various dimensions. Consequently, the value of global integration of specific dimensions of supply chain activities and processes differs at the firm and/or industry level.

Environmental and Organizational Factors

Environmental and organizational factors influencing global integration differ across the three dimensions. There are few similarities. At the supplier and customer interfaces, the presence of influential global supply chain partners is common. A common factor to global integration at the supplier interface and global integration of cross-functional supply chain processes is interchangeability. At the supplier interface,

interchangeability of raw materials and purchasing processes reduces switching costs and makes global integration a feasible option. For global integration of cross-functional supply chain processes, interchangeability of products and processes has the same effect.

Summary

In this section, summary conclusions related to all three areas of global integration of supply chain activities and processes were discussed. Each of the research questions was addressed and similarities and differences among the global integration value hierarchies were highlighted. In the next section, the contributions of this research are discussed.

CONTRIBUTIONS OF THIS RESEARCH

There are a number of contributions from this research. In the following sections, contributions are discussed from both a theoretical and managerial perspective.

Theoretical Implications

A major contribution of this research is the development of theoretical models and identification of constructs and relationships important to global integration of supply chain activities and processes. These models were presented and discussed earlier in this chapter. Research propositions were developed for future testing across a broader sample. A number of specific contributions to the existing body of knowledge are discussed here.

An important contribution from this research is the support for the importance of global integration of supply chain activities and processes to achieve the objectives of global integration. A great deal of research has focused on global strategy, but little attention has been given to global integration in the area of supply chain management. This research identified numerous benefits to the firm from global integration of supply chain activities and processes.

A second contribution relates to differences and similarities among the multiple dimensions of supply chain activities and processes highlighted in Figure 1-2. A primary objective of this research was to identify those areas with the greatest potential for value from global integration. The findings suggest the value of global integration differs across dimensions based on environmental and organizational drivers. These drivers influence both the focus of integration initiatives and the degree of integration appropriate for a firm. For a firm facing shortages of raw materials or dealing with large influential suppliers, global integration at the supplier interface is appropriate. For the firm with interchangeable production capability and geographic uncertainty in global demand patterns, global integration of cross-functional supply chain processes to achieve operating flexibility is more important. For the firm facing pressures for global pricing and processes from customers, global integration at the customer interface is important. Thus, the optimal approach to global integration of supply chain activities and processes differs across firms and/or industries.

A third contribution from this research is the identification of differences in the relative importance to the firm of global integration among various supply chain activities

and processes. The findings suggest there is greater benefit from global integration at the supplier interface than at the customer interface. This difference stems, in part, from the need to be responsive to local differences at the customer interface. This finding may also reflect the internal focus of this research. The value of global integration was examined at a firm level rather than a supply chain level. As firm's adopt a supply chain orientation, global integration at the customer interface may be more important. This area warrants further research.

A fourth contribution is the identification of critical processes to achieve global integration of supply chain activities and processes. Little research has been done to understand the underlying business processes important to global integration. The identification of important attributes of global integration of supply chain activities and processes and their relationships to the goals and values of global integration is an important contribution.

A fifth contribution is the extension of prior definitions of operating flexibility. Operating flexibility resulting from global integration of cross-functional supply chain processes is defined as *the ability of the firm to dynamically shift the global supply/demand mix in response to environmental changes and changes in geographic demand patterns*. Previous definitions of operating flexibility were based on a static view of the supply/demand mix. As defined here, operating flexibility achieved through global integration of supply chain processes extends the capability of the firm to achieve important objectives of global integration by changing the supply/demand mix.

A sixth contribution is related to the redefinition of operating flexibility.

Geographic demand uncertainty and geographic differentials in growth and profitability have not previously been seen as significant drivers of global integration. Operating flexibility to realign the supply/demand mix allows the firm to respond to changes in demand and selectively satisfy global demand to take advantage of opportunities for growth and profitability. Thus, global integration creates more value for the firm when demand uncertainty is great and/or geographic differences in growth and profitability exist.

A seventh contribution relates to the influence of scarcity of interchangeable sources of supply on global integration. This research suggests the importance of global integration to the firm is greater when interchangeable sources of supply are scarce. At the same time, the location of scarce sources of supply influences the focus and degree of global integration required. The ability of the firm to selectively satisfy global demand when supply is scarce contributes to the profitability and competitive advantage of the firm. Future research should examine the role of operating flexibility when supply exceeds demand.

The eighth contribution is the extension of prior models of operating flexibility to include an external focus on customers. Prior research focused on internal benefits from operating flexibility such as capacity utilization and risk management. The findings from this research suggest operating flexibility is a vehicle to improve service to important customers and increase customer satisfaction.

Finally, this research contributes to the body of knowledge by demonstrating the utility of means-end theory and the value hierarchy in theory development at the firm level. This approach has predominantly been used to examine customer value related to specific products at the individual consumer level. For this research, the approach was used to identify important constructs and relationships to build theory at the firm level. A comparison of value hierarchies across firms provided clues about important relationships related to the value of global integration of supply chain activities and processes. Theoretical frameworks were developed to reflect these important cause and effect relationships. This research demonstrates the applicability of the means-end theoretical framework at the level of the firm.

Managerial Implications

The first implication for managers is the importance of global integration of supply chain activities and processes to achieve the global objectives of the firm. For each of the participant companies, global integration was seen as important to their competitive advantage and profitability. However, time and resources are required to achieve global integration. This research provides important insights to assist managers in identifying opportunities and understanding requirements for global integration. Managers' efforts should be focused on the opportunities that create the greatest value for the firm.

A second managerial implication is the importance of understanding specific industry and/or organizational drivers for global integration, and the implications in terms

of which supply chain activities and processes should be integrated globally. The appropriate focus of a firm's global integration initiatives is directly related to industry and/or firm level drivers. Understanding these influencing factors is important to clearly define the objectives of global integration and focus resources on the globalization initiatives with the greatest potential for benefit. If the objective is operating flexibility to balance supply and demand globally, managers should focus their efforts on global integration across supply chain functions. If the objective is to manage relationships with global suppliers and/or customers more effectively, global integration at the supplier or customer interface is more appropriate.

A third implication for managers is the need to differentiate the supply chain activities and processes that are best managed locally or regionally from those best managed globally. Since the costs associated with global integration can be significant, only those activities directly related to the desired benefits should be considered candidates for global integration. For areas heavily impacted by differences in culture, language, infrastructure, and legal requirements, such as logistics and customer service, a local or regional approach may be more appropriate. Managers should assess the costs and benefits of global integration of specific activities and processes, and differentiate global integration initiatives to effectively balance global integration and local responsiveness.

A fourth managerial implication is the importance of understanding the global patterns of customer demand. Commonality of requirements across regions creates the potential for value from global integration. A related implication is the importance of

interchangeability of products and processes. The advantages of operating flexibility result from dynamic balancing of the supply/demand mix to optimize cost and service on a global basis. When production location can readily be realigned to selectively satisfy global demand, the firm can take advantage of global opportunities and respond favorably to environmental changes. It is important for managers to understand the commonalities in the global supply/demand mix to identify opportunities to benefit from global integration.

A fifth managerial implication is the importance of understanding the dynamics of global supply and demand. Global integration is particularly important when interchangeable sources of supply are constrained. Under such conditions, the firm should focus on global integration at the supplier interface to clearly communicate requirements and assure access to supply. Under conditions of geographic demand uncertainty, managers should focus their efforts on creating operating flexibility to dynamically align interchangeable sources of supply with changing global demand patterns.

A sixth managerial implication relates to the role of global demand forecasting and planning in global integration. Global demand forecasting and planning is an important vehicle to identify opportunities and set strategic priorities for the business. At the supplier interface, global demand forecasting and planning allows the buyer firm to leverage the buying power of the total business and clearly communicate demand requirements. From a cross-functional perspective, global operational planning to achieve operating flexibility is also important. For a firm pursuing a strategy of operating

flexibility, a global sales and operational planning process is an important tool to achieve the objectives of global integration. Managers pursuing global integration initiatives should focus on developing and implementing a robust global demand forecasting and planning process that identifies opportunities, sets strategic priorities, and optimizes the supply/demand mix to achieve strategic objectives.

A seventh implication for managers is the importance of understanding global supply chain costs and capabilities. Decisions about the global supply/demand mix must be guided by a good understanding of the cost structure of global operations, the logistics costs of inter-regional transfers, and the duties and taxes associated with those transfers. To have access to relevant supply chain information, managers should establish a focal point that collects, aggregates, and disseminates relevant information. It is also important to involve regional representatives in the process to ensure relevant information is included. An understanding of global supply chain costs and capabilities is also critical in managing the interface with global customers. As customers demand global pricing, the effectiveness of seller negotiations is dependent on having this knowledge. Firms pursuing a global integration strategy should develop processes that ensure a thorough understanding of global supply chain costs and capabilities.

The eighth managerial implication relates to the importance of standardizing products and processes to achieve the objectives of global integration. The ability to readily switch sources of supply is critical to operating flexibility. Standard production and order fulfillment processes allow the firm to quickly shift production location to respond to changes in global demand patterns. Standard purchasing processes are

important to ensure consistency at the interface with global suppliers. Similarly, standardization of packaging and logistics processes ensures consistency at the interface with global customers. It is important for managers to establish a focal point for coordination and regional representation to ensure relevant input in standardizing products and processes.

A ninth implication for managers is the importance of globally integrated information systems to achieve the objectives of global integration. Accessibility of global information is a significant attribute of global integration. A focal point for global interface and regional representation are both critical to the flow of relevant information. Global demand forecasting and planning are also important to develop and disseminate relevant information. The foundation for accessibility of relevant global information is globally integrated information systems. To achieve global integration of information systems, managers must ensure data and data formats are standard and regional systems are compatible and linked.

Finally, the tenth implication for managers relates to the importance of global logistics to achieve operating flexibility. The ability to quickly shift sources of supply as global demand patterns change is dependent on an effective global logistics process. Requirements for effective global logistics include globally integrated management at the interface with global logistics suppliers and standardization of processes to ensure consistency at the interface with global customers. However, logistics requirements differ across countries and regions, which means that most elements of the logistics process are best managed at the local or regional level.

RESEARCH LIMITATIONS

Many steps were taken to ensure credibility and representativeness of the findings from this research. These steps are described in detail in Chapter 4. However, there are limitations in any research. Five limitations of this research are highlighted here.

The first limitation is generalizability of findings. The benefits of qualitative research are in the richness and depth of data and information that can be accessed, and the possibility of new insights in a substantive or theoretical area not researched extensively in the past. In this study, which aimed at gaining understanding in an area where little research has been done, qualitative research was an appropriate tool. However, this approach required a limitation on the sample size in terms of both numbers of companies and participants. Efforts were made in sample selection to ensure representativeness of results. Participant firms represented three distinct industries. The managers interviewed represented multiple supply chain functions, levels of management, and geographic regions. Thus, representativeness of the research was extended through sample selection. However, research involving only three companies has an inherent limitation on generalizability. Because of this limitation, additional research to extend generalizability is needed. Future research should use a quantitative approach to test findings across a broader sample of companies.

The second limitation of the research also stems from sample selection. The focus of this research was the global company. Efforts were made to ensure a global perspective by including managers from all regions in the sample. However, the sample

included only US-based firms. A number of interviews were conducted with managers from Asian and European multinational companies, but none were included in the final analysis. These were excluded because either the firm had not adopted a global business model or the sample of participants accessible for interviews was inadequate. A question remains as to whether the models developed from this research are representative of global companies based outside the US. Future research should extend sampling to include global companies based in regions outside the US.

A third limitation stems from the breadth and scope of the research questions. Because of the breadth and scope of the questions, analysis and findings from the research are necessarily at a broad, conceptual level. Thus, many of the more specific nuances of the attributes, consequences, goals, and values associated with global integration could not feasibly be examined in detail. The findings presented here provide useful insights about important relationships and point to a number of areas for future research. However, many organizational elements and managing processes important to achieving global integration of supply chain activities and processes remain largely unexplored. This provides an opportunity for future research as well.

The fourth limitation also stems from the breadth and scope of the research questions. The focus of this research was on understanding and explaining patterns and structures imbedded in the data rather than on specificity and purity of theoretical constructs. No attempt was made in this research to purify constructs to ensure uniqueness and completeness. This research looked for broad, conceptual relationships rather than specification of constructs for measurement. Given the exploratory nature of

this research, this lack of specificity was appropriate. However, future research should focus on developing specificity of constructs and creating measures as the basis for testing the relationships uncovered in this research.

Finally, the fifth limitation relates to the internal focus of this research. The value of global integration of supply chain activities and processes was examined only at the firm level. However, a fundamental premise of supply chain management is the potential benefit from integrating activities and processes with important suppliers and customers. The value associated with global integration at the customer and supplier interfaces may differ for firms adopting an external supply chain orientation. This is an area where further research is warranted.

SUGGESTIONS FOR FUTURE RESEARCH

A number of areas have been identified as important for future research. The primary purpose of this research was to develop theory related to global integration of supply chain activities and processes. In this chapter, theoretical models were presented in three distinct areas - global integration of cross-functional supply chain processes, global integration at the supplier interface, and global integration at the customer interface. Important constructs and relationships were identified for each. Research propositions were developed as the basis for future research. Testing of these research propositions across a broader sample is important to extend the validity and generalizability of the research findings.

A second area for future research relates to specificity of constructs. Because of the breadth and scope of this research, relationships and constructs were examined at a broad, conceptual level. Future research should focus on developing specificity of the constructs and developing measures for future testing. Testing the relationships in the theoretical models is important, not only to support and extend generalizability of the findings, but also to assess the significance of these relationships to firm performance.

The third area for future research is to extend sampling to include global firms based outside the US. The research sample included managers from different regions, but all participant firms are based in the US. Future research should investigate whether there are differences in perceptions of the value of global integration in firms based in other regions and cultures.

The fourth area for future research relates to the need to closely examine the organizational and managing processes identified as important for global integration. Because of the breadth and complexity of the research, attributes of global integration could only be examined at a broad, conceptual level. Closer investigation of these attributes will provide important insights for managers about how to structure and govern organizational and managing processes. A number of questions related to the attributes of global integration should be addressed. As an example, a number of questions need to be addressed relating to global demand forecasting and planning. What are the elements of an effective global demand forecasting and planning process? Who should be involved at the regional and global levels? What are the organizational and cultural barriers to establishing and using such a process? What control mechanisms are

appropriate to ensure local execution against a global plan? What is the most appropriate organizational form to manage the process? What metrics should be put in place?

Exploring organizational and managing processes related to the attributes of global integration identified in this research is fertile ground for future research opportunities.

A fifth area for future research is related to the significance of scarcity of supply in explaining the value of global integration. This relationship raises several questions for future research. What is the impact of excess supply versus global demand on the attributes, consequences, goals, and values of global integration? What are the organizational implications for managing the downside versus the upside of an imbalance in supply and demand? Incorporating a complete view of the supply/demand equation is important to ensure robustness in the models of global integration of supply chain activities and processes.

A sixth area for future research is related to the internal focus of this research. The research questions were aimed at understanding the value of global integration of internal supply chain activities and processes from the perspective of the firm. Differences in perception of value at the customer and supplier interfaces reflected a focus on firm-level benefits rather than supply chain benefits. An area for future research is the investigation of global integration at the customer and supplier interfaces from an inter-firm or supply chain perspective. As individual supply chain members become more global, the benefits from global integration at the interfaces are likely to increase. Thus, research in this area seems warranted.

Finally, a seventh area for future research is the further exploration of global integration across the strategy, planning, and operations levels of management. This research suggests global integration at the strategy and planning levels is critical, but operations level management is best done at the local or regional level. However, certain elements of operations should be standardized and coordinated to ensure local execution against global strategies and plans. An exploration of the interactions between these three levels, as well as the critical elements of global integration for each, will provide useful insights to assist managers in implementing global integration initiatives.

CONCLUDING REMARKS

The findings from this research support the idea that global integration of supply chain activities and processes is important for firms to achieve their global objectives. The value of global integration was explored for three distinct areas - cross-functional supply chain processes, at the supplier interface, and at the customer interface. The findings suggest global integration of supply chain activities and processes is more important for cross-functional processes and at the supplier interface and less important at the customer interface. At the customer interface, global integration of supply chain activities and processes appears to be important only in responding to demands from customers for global processes and pricing.

Global integration value hierarchies developed for the three areas of interest highlight important attributes, consequences, goals, and values of global integration (Figures 5-1, 5-3, 5-5). Environmental and organizational factors influencing the

hierarchical relationships were also highlighted. While there are distinct differences in the value hierarchies for each of the three areas, there are also a number of commonalities. The common elements across the three areas relate to the availability of global information and the requirement for a global demand forecasting and planning process. These are important to identify global issues and opportunities and to set strategic priorities for the business.

This research contributes to the body of knowledge by addressing an area where little research has been done. Global integration has been recognized as important at the strategy level, but little work has been done to understand the role of global integration of supply chain activities and processes. This research provides empirical evidence of the importance of global integration of supply chain activities and processes for the firm to achieve their strategic objectives. The global integration value hierarchies developed from this research offer useful insights to assist managers in prioritizing their global integration initiatives. Theoretical models developed from this research serve as a foundation for future research in this area.

In conclusion, this research has provided important insights about global integration of supply chain activities that should benefit both researchers and managers. It has also created the foundation for a rich and rewarding stream of research.

REFERENCES

REFERENCES

- Arnold, David, Julian Birkinshaw, and Omar Toulan, (2000), "Implementing Global Account Management in Multinational Corporations," Marketing Science Institute, Working Paper Report No. 00-103.
- Bagchi, Prabir K. (1992), "International Logistics Information Systems," *International Journal of Physical Distribution & Logistics Management*, 22 (9), 11-19.
- Bagozzi, Richard P. and Pratibha A. Dabholkar (1994), "Consumer Recycling Goals and Their Effect on Decisions to Recycle: A Means-End Chain Analysis," *Psychology & Marketing*, 11 (4), 313-340.
- Bartlett, Christopher A. and Sumantra Ghoshal (1998), *Managing Across Borders: The Transnational Solution*, Boston, Massachusetts, Harvard Business School Press.
- Bechtel, Christian and Jayanth Jayaram (1997), "Supply Chain Management: A Strategic Perspective," *The International Journal of Logistics Management*, 8 (1), 15-34.
- Birou, Laura M. and Stanley E. Fawcett (1993), "International Purchasing: Benefits, Requirements, and Challenges," *International Journal of Purchasing and Materials Management*, Spring , 28-37.
- Bonoma, Thomas V. (1985), "Case Research in Marketing: Opportunities, Problems, and a Process," *Journal of Marketing Research*, XXII (May), 199-208.
- Calori, Roland, Gerry Johnson and Philippe Sarnin (1994), "CEO's Cognitive Maps and the Scope of the Organization," *Strategic Management Journal*, 15 , 437-457.
- Carter, Joseph R. and Ram Narasimhan (1990), "Purchasing in the International Marketplace: Implications for Operations," *Journal of Purchasing and Materials Management*, 26 (Summer), 2-11.
- Cooper, James C. (1993), "Logistics Strategies for Global Businesses," *International Journal of Physical Distribution and Logistics Management*, 23 (4), 12-24.
- Cooper, Martha C. and Lisa M. Ellram (1993), "Characteristics of Supply Chain Management and the Implications for Purchasing and Logistics Strategy," *The International Journal of Logistics Management*, 4 (2), 13-24.
- Cooper, Martha C., Douglas M. Lambert and Janus D. Pagh (1997), "Supply Chain Management: More Than a New Name for Logistics," *The International Journal of Logistics Management*, 8 (1), 1-13.

Davies, G. J. (1987), "The International Logistics Concept," *International Journal of Physical Distribution and Materials Management*, 17 (2), 20-27.

Day, George S. (1994), "The Capabilities of Market-Driven Organizations," *Journal of Marketing*, 58 (October), 37-52.

Dominguez, Luis, V. and Walter Zinn (1994), "International Supplier Characteristics Associated with Successful Long-term Buyer/Seller Relationships," *Journal of Business Logistics*, 15 (2), 63-87.

Doz, Yves L. (1997), "Strategic Management and International Business Research: An Empirical Convergence?," *International Business: An Emerging Vision*, Toyne, Brian and Douglas Nigh, Columbia, South Carolina, University of South Carolina Press, 488-496.

Doz, Y. L. and C. K. Prahalad (1991), "Managing DMNCs: A Search for a New Paradigm," *Strategic Management Journal*, 12 , 145-164.

Durgee, Jeffrey F., Gina Colarelli O'Connor and Robert W. Veryzer (1996), "Observations: Translating Values into Product Wants," *Journal of Advertising Research*, November/December, 90-99.

Eccles, Robert G. and Richard L. Nolan (1993), "A Framework for the Design of the Emerging Global Organizational Structure," *Globalization, Technology and Competition*, Bradley, Stephen P., Jerry A. Hausman and Richard L. Nolan, Boston, Massachusetts, Harvard Business School Press.

Ellram, Lisa M. (1991), "Supply Chain Management: The Industrial Organization Perspective," *International Journal of Physical Distribution and Logistics Management*, 21 (1), 13-22.

Ellram, Lisa M. (1992), "Patterns in International Alliances," *Journal of Business Logistics*, 13 (1), 1-25.

Ellram, Lisa M. (1996), "The Use of the Case Study Method in Logistics Research," *Journal of Business Logistics*, 17 (2), 93-138.

Ellram, Lisa M., B. J. LaLonde and Mary Margaret Weber (1989), "Retail Logistics," *International Journal of Physical Distribution and Materials Management*, 19 (12), 29-39.

Fawcett, Stanley E., Laura Birou and Barbara Cofield Taylor (1993), "Supporting Global Operations Through Logistics and Purchasing," *International Journal of Physical Distribution & Logistics Management*, 23 (4), 3-11.

Fawcett, Stanley E. and Stanley A. Fawcett (1995), "The Firm as a Value-Added System: Integrating Logistics, Operations and Purchasing," *International Journal of Physical Distribution & Logistics Management*, 25 (5), 24-42.

Gattorna, John L., Norman H. Chorn and Abby Day (1991), "Pathways to Customers: Reducing Complexity in the Logistics Pipeline," *International Journal of Physical Distribution and Logistics Management*, 21 (8), 5-11.

Gengler, Charles E., Daniel J. Howard and Kyle Zolner (1995), "A Personal Construct Analysis of Adaptive Selling and Sales Experience," *Psychology & Marketing*, 12 (July, 4), 287-304.

Gentry, Julie J. and David B. Vellenga (1996), "Using Logistics Alliances to Gain a Strategic Advantage in the Marketplace," *Journal of Marketing - Theory and Practice*, Spring, 37-44.

Ghoshal, Sumantra (1987), "Global Strategy: An Organizing Framework," *Strategic Management Journal*, 8, 425-440.

Ghoshal, Sumantra and Christopher A. Bartlett (1990), "The Multinational Corporation as an Interorganizational Network," *Academy of Management Review*, 15 (4), 603-625.

Glaser, Barney G. and Anselm L. Strauss (1967), *The Discovery of Grounded Theory: Strategies for Qualitative Research*, New York, Aldine Publishing Company.

Glesne, Corine and Alan Peshkin (1992), *Becoming Qualitative Researchers: An Introduction*, White Plains, Longman.

Goodstein, Leonard D. and Howard E. Butz (1998), "Customer Value: The Linchpin of Organizational Change," *Organizational Dynamics*, Summer, 21-33.

Govindarajan, Vijay (1988), "A Contingency Approach to Strategy Implementation at the Business Unit Level: Integrating Administrative Mechanisms with Strategy," *Academy of Management Journal*, 31 (4), 828-853.

Gupta, Anil K. and Vijay Govindarajan (1991a), "Knowledge Flows and the Structure of Control within Multinational Corporations," *Academy of Management Review*, 16 (4), 768-792.

- Gupta, Anil K. and V. Govindarajan (1991b), "Knowledge Flow Patterns, Subsidiary Strategic Roles, and Strategic Control within MNC's," *Academy of Management Proceedings*.
- Gutman (1982), "A Means-End Chain Model Based on Consumer Categorization Processes," *Journal of Marketing*, 46 (2), 60-72.
- Gutman, Jonathan (1997), "Means-end Chains as Goal Hierarchies," *Psychology and Marketing*, 14 (6), 545-560.
- Hill, Charles W. L. (1997), *International Business: Competing in the Global Marketplace*, Chicago, Richard D. Irwin.
- Hitt, Michael A. (1997), "Commentary: The Evolution of Multinational Corporations: Integration of International Diversification and Strategic Management," *International Business: An Emerging Vision*, Toyne, Brian and Douglas Nigh, Columbia, South Carolina, University of South Carolina Press, 488-496.
- Horscroft, Peter and Alan Braithwaite (1990), "Enhancing Supply Chain Efficiency - The Strategic Lead Time Approach," *The International Journal of Logistics Management*, 1 (2), 47-52.
- Houlihan, John B. (1985), "International Supply Chain Management," *International Journal of Distribution and Materials Management*, 15 (1), 22-38.
- Houlihan, John B. (1988), "International Supply Chains: A New Approach," *Management Decision*, 26 (3), 13-19.
- Jones, Thomas C. and Daniel W. Riley (1987), "Using Inventory for Competitive Advantage through Supply Chain Management," *International Journal of Physical Distribution and Materials Management*, 17, 94-104.
- Kassarjian, Harold H. (1977), "Content Analysis in Consumer Research," *Journal of Consumer Research*, (June), 8-18.
- Kelly, George (1970), "A Brief Introduction to Personal Construct Theory," printed posthumously in *Perspectives in Personal Construct Theory*, Bannister, D., London and New York, Academic Press, 1-29.
- Kerlinger, Fred N. (1992), *Foundations of Behavioral Research*, Orlando, Florida, Harcourt Brace College Publishers.
- Kim, W. Chan (1997), "Commentary: Three Questions for Mapping and Developing Strategic Perspectives on International Business," *International Business: An Emerging*

Vision, Toyne, Brian and Douglas Nigh, Columbia, South Carolina, University of South Carolina Press, 488-496.

Kogut, Bruce (1985), "Designing Global Strategies: Profiting from Operational Flexibility," *Sloan Management Review*, Fall , 27-38.

Kogut, Bruce (1989), "Research Notes and Communications: A Note on Global Strategies," *Strategic Management Journal*, 10 , 383-389.

Kogut, Bruce (1997), "The Evolutionary Theory of the Multinational Corporation: Within- and Across-Country Options," *International Business: An Emerging Vision*, Toyne, Brian and Douglas Nigh, Columbia, South Carolina, University of South Carolina Press, 3 - 26.

Kogut, Bruce and Nalin Kulatilaka (1994), "Operating Flexibility, Global Manufacturing, and the Option Value of a Multinational Network," *Management Science*, 40 (1), 123-139.

Konsynski, Benn R. and Jahangir Karimi (1993), "On the Design of Global Information Systems," *Globalization, Technology and Competition*, Bradley, Stephen P., Jerry A. Hausman and Richard L. Nolan, Boston, Massachusetts, Harvard Business School Press.

Krein, Mordechai E. (1998), *International Economics: A Policy Approach*, Orlando, FL, Harcourt Brace College Publishers.

Lincoln, Yvonna S. and Egon Guba (1985), *Naturalistic Inquiry*, Beverly Hills, Sage Publications.

Malone, Thomas W. and John F. Rockart (1993), "How Will Information Technology Reshape Organizations: Computers as Coordination Technology," *Globalization, Technology and Competition*, Bradley, Stephen P., Jerry A. Hausman and Richard L. Nolan, Boston, Massachusetts, Harvard Business School Press.

Mascarenhas, Briance (1997), "Four Perspectives on International Competition and Industry Evolution," *International Business: An Emerging Vision*, Toyne, Brian and Douglas Nigh, Columbia, South Carolina, University of South Carolina Press, 488-496.

McCracken, Grant (1988), *The Long Interview*, Beverly Hills, California, Sage.

Mentzer, John T., James S. Keebler, Soonhong Min, Nancy W. Nix, Carlo D. Smith and Zach G. Zacharia (2000), "A Unified Definition of Supply Chain Management," *Supply Chain Management*, Sage Publications, December.

- Min, Hokey and Sean B. Eom (1994), "An Integrated Decision Support System for Global Logistics," *International Journal of Physical Distribution and Logistics Management*, 24 (1), 29-39.
- Min, Hokey and William P. Galle (1991), "International Purchasing Strategies of Multinational U.S. Firms," *International Journal of Purchasing and Materials Management*, Summer , 9-18.
- Monczka, Robert M. and Robert J. Trent (1991), "Global Sourcing: A Development Approach," *International Journal of Purchasing and Materials Management*, Spring , 2-8.
- Montgomery, David B., George S. Yip and Belen Villalonga (2000), "An Industry Explanation of Global Account Management," presented at Academy of International Business Conference, Phoenix, AZ, November.
- Narver, John C. and Stanley F. Slater (1990), "The Effect of a Market Orientation on Business Profitability," *Journal of Marketing*, October , 20-35.
- Nohria, Nitin and Sumantra Ghoshal (1997), *The Differentiated Network: Organizing Multinational Corporations for Value Creation*, San Francisco, Jossey-Bass Publishers.
- Novack, Robert A., C. John Langley and Lloyd M. Rinehart (1995), *Creating Logistics Value: Themes for the Future*, Oak Brook, IL, Council of Logistics Management.
- Ohmae, Kenichi (1989), "Planting for a Global Harvest," *Harvard Business Review*, July - August, 136-142.
- Ohmae, Kenichi (1999), *The Borderless World: Power and Strategy in the Interlinked Economy*, 2nd Edition, New York, NY, HarperCollins Publishers.
- Partsch, Wolfgang, Alan Montgomery, Bruce Myers, Dan Robinson, Gene Tyndall, Karl Manrodt and Nancy Nix (1998), *Confronting Change: A Global Report on Supply Chain Management in the Chemical Industry*, Ernst & Young and the University of Tennessee.
- Prahalad, C. K. and Yves L. Doz (1987), *The Multinational Mission: Balancing Local Demands and Global Vision*, New York, Free Press.
- Reynolds, Thomas J. and Jonathan Gutman (1988), "Laddering Theory, Method, Analysis, and Interpretation," *Journal of Advertising Research*, February/March , 11-31.
- Rokeach, M. (1973), *The Nature of Human Values*, New York, Free Press.

Roth, K. and A. Morrison (1992), "Implementing Global Strategy: Characteristics of Global Subsidiary Mandates," *Journal of International Business Studies*, 23 (4), 715-736.

Rubin, Herbert J. and Irene S. Rubin (1995), "Chapter 2: Foundations of Qualitative Interviewing," *Qualitative Interviewing: The Art of Hearing Data*, Sage Publications, 17-41.

Schwartz, Shalom H. and Wolfgang Bilsky (1987), "Toward a Universal Psychological Structure of Human Values," *Journal of Personality and Social Psychology*, 53 (3), 550-562.

Spivey, W. Allen and Lawrason D. Thomas (1990), "Global Management: Concepts, Themes, Problems and Research Issues," *Human Resource Management*, 29 (1), 85-97.

Stevens, Graham C. (1990), "Successful Supply Chain Management," *Management Decision*, 28 (8), 25-30.

Strauss, Anselm and Juliet Corbin (1990), *Basics of Qualitative Research: Grounded Theory Procedures and Techniques*, Newbury Park, CA, SAGE Publications, Inc.

Taylor, R. E. (1994), "Qualitative Research," *Mass Communication Research*, New York, Longman, 265-279.

Toyne, Brian (1997), "International Business Inquiry: Does It Warrant A Separate Domain?," *International Business: An Emerging Vision*, Toyne, Brian and Douglas Nigh, Columbia, South Carolina, University of South Carolina Press, 62-76.

UNCTAD (1994), *1994 World Investment Report: Transnational Corporations, Employment and the Workplace*. New York, United Nations.

UNCTAD (1995), *1995 World Investment Report: Transnational Corporations and Competitiveness*. New York, United Nations.

UNCTAD (2000), *World Investment Report 2000: Cross-border Mergers and Acquisitions and Development*. New York and Geneva, United Nations.

Wallendorf, Melanie and Russell W. Belk (1989), "Assessing Trustworthiness in Naturalistic Consumer Research," *Interpretive Consumer Research*, Hirschman, Elizabeth C., Provo, UT, Association for Consumer Research, 69-84.

White, Roderick E. and Thomas A. Poynter (1989), "Achieving Worldwide Advantage with the Horizontal Organization," *Business Quarterly*, Autumn, 55-60.

Wilkins, Mira (1997), "The Conceptual Domain of International Business," *International Business: An Emerging Vision*, Toyne, Brian and Douglas Nigh, Columbia, South Carolina, University of South Carolina Press, 31 - 50.

World Bank (2000 July), "World Development Indicators database," Retrieved May 15, 2001, from the World Wide Web: <http://www.devdata.worldbank.org>.

Wood, Donald, F. (1990), "International Logistics Channels," *International Journal of Physical Distribution and Logistics Management*, 20 (9), 3-9.

Woodruff, Robert B. and Sarah F. Gardial (1996), *Know Your Customer*, Cambridge, MA, Blackwell Publishers.

Yip, George S. (1992), *Total Global Strategy: Managing for Worldwide Competitive Advantage*, Paramus, New Jersey, Prentice Hall.

Zeithaml (1988), "Consumer Perceptions of Price, Quality and Value: A Means-End Model and Synthesis of Evidence," *Journal of Marketing*, 52 (July), 2-22.

APPENDICES

APPENDIX A-1: RESEARCH PROTOCOL

THE VALUE OF GLOBAL INTEGRATION OF SUPPLY CHAIN ACTIVITIES AND PROCESSES IN THE MNC

1. RESEARCH QUESTIONS

- (a) What are the key attributes (actions and tools), consequences (positive and negative) and value (contribution to organizational goals) of global integration of supply chain activities and processes?
- (b) What are the dominant structural linkages or causal relationships between the actions and tools, and perceived consequences and value?
- (c) How and why do hierarchical value maps differ across the different dimensions of supply chain activities and processes?
- (d) How do environmental and organizational factors influence managers' hierarchical value maps?

2. METHODOLOGY

(a) Multiple Company / SBU Design (3 SBU's, 2 Companies)

- i) Multiple SBU's in different companies were chosen to achieve greater representativeness of the sample. SBU's from different industries were selected to maximize the variation in the data.
- ii) A hierarchical value map (HVM) was developed for each company to facilitate the identification of differences related to contextual factors. The individual companies were provided with the HVM for their company, as well as the composite for the set of companies to allow them to benchmark themselves against the overall results.
- iii) Composite data about each company were written up in summary form, with description of the industry, customer, supplier and supply chain characteristics relevant to this research.

(b) Sample Selection

- i) Target companies were selected to ensure representativeness and variation among the participants. Overriding issues in sample selection were ensuring adequacy of the sample while balancing issues of accessibility and willingness

to participate on the part of companies, as well as time and financial constraints of the interviewer. Desired geographic representation included companies based in Asia, Asia-Pacific, Europe and North America. Target industries included: electronics, telecommunications, chemicals, automotive, pharmaceutical, heavy equipment, rubber and plastics. The three participating SBU's represented the telecommunications, chemicals and synthetic fibers (plastics) industries.

- ii) Within each company, appropriate participants with responsibility for or adequate knowledge of the global integration of supply chain activities and processes were selected. The following information was provided to the initial contact in each company as they were solicited to participate. After gaining their agreement to participate, and identifying the key contact to coordinate the research, specific selection of interviewees was based on dialogue about the purpose of the research, and the best way to achieve the research objectives considering the company's organizational structure. Documentation containing company background information was also requested as a supplement to contextual information gathered in the interviews.

Excerpt from Company Solicitation Letter (Appendix A-3)

"Representatives from each of the following areas should be included in the interviewing process.

- Sourcing / Purchasing
- Sales and Operational Planning (Sales forecasting, production planning, capacity planning)
- Logistics
- Customer Service
- Information Systems (specific to supply chain systems)

It is important that managers who are decision-makers regarding strategy, planning and operations are included in the interviews.

Background information about your industry and your company will also be required. This can be gathered through a combination of background material provided prior to the interviews, and information gathered through the interviews. Background material needed includes information such as:

- (1) the nature of your business and products,
- (2) global location of offices and plants,
- (3) company size by global region,
- (4) organizational structure,

- (5) information capabilities,
- (6) current state of global integration, and
- (7) degree to which customers and suppliers operate globally.

A key contact should be identified that can act as a liaison and coordinate the scheduling of interviews. This key contact would also be asked to review the overall findings from the interviews to be sure that any errors in fact are corrected before final publication of findings. All data will be disguised in the publication of findings to ensure anonymity of participating firms."

(c) Soliciting Participants

- i) The first step in soliciting participants was identification of contacts within appropriate MNC's through personal networking. Since the sampling for this research was purposive, care was taken to ensure appropriate representativeness, while using the personal network approach to contact companies. The initial contact was done through a combination of a letter (Appendix A-3) and a follow-up phone call to answer questions and determine whether there was any interest.
- ii) Benefits to participating companies were highlighted in the contact letter, as shown in Appendix A-3:

Excerpt from Solicitation Letter (Appendix A-3):

"How the company will benefit?"

By participating in this research, you can make an important contribution to our understanding the trade-offs in the decision about global versus regional or local management of the supply chain, as well as the influence of industry and organizational factors on the decision. You will be provided with the overall results from the study, as well as information specific to your company that can be of value to you in your globalization efforts. The information specific to your company will:

- (1) enable you to benchmark the perceptions of your managers versus those of all of the companies who participate, and
- (2) provide useful insights about managerial perceptions within your company – both across organizations and across geographic regions.

Since differences in perceptions of value among managers can be a barrier to the cooperation and collaboration required for global integration,

these insights may be very valuable to you in implementing your global strategies.”

(d) Interview Process

- i) Interviews were conducted in the offices of the participating firm, and were one-on-one, in-depth interviews. All interviews were personally conducted by the researcher, and audio-taped for subsequent transcription. Most were conducted face-to-face, with the few exceptions that could not be scheduled face-to-face conducted by phone. The interviews were a combination of open-ended questioning and directed probes to discover linkages and a deeper understanding of areas relevant to the research.
- ii) An interview guide (Appendix A-2) was used to ensure the interviews remained focused on the research questions, yet the researcher was flexible to pursue important insights that arose during the course of the interviews.

Excerpt from Solicitation Letter

“This study will require a series of in-depth interviews (1 - 1 ½ hours) with key managers and decision-makers in each region where you are operating. Interviews would be audio-taped for later transcription and analysis by the researcher. However, all interviews will be strictly confidential and no information specific to interviewees will be included in the final report or in the firm specific information provided to you.”

- iii) Additional documentation provided by the company was used only to access relevant demographic data or factual information about the company. Examples included: organizational structure, type of products, location of offices, industry sector. This documentation was not used to make causal inferences, and thus analysis of the data were not part of the research process. It was used as supplemental company background information, additional to that gathered during the interview process.

(e) Data Analysis

- i) The first data analysis step was content analysis and coding. Individual thoughts contained within the data were first labeled as attributes, consequences or values. These thoughts were then assigned to more abstract categories relevant to the research. As a step to ensure validity and reliability, a second independent coder was also asked to assign thoughts to categories and classify them according to level of abstraction in the value hierarchy. Any discrepancies between the coding by the researcher and the independent coder were resolved through subsequent discussion.

- ii) An implication matrix and hierarchical value map (HVM) were developed for each company for each of the following:
 - (a) Summary level for all categories
 - (b) For each supply chain function and process examined
- iii) Implication matrices and HVM's were examined for differences, and data re-examined to identify explanations for those differences. An analysis of dominant elements and structural linkages was done using frequency counts and researcher judgment. Peer debriefing was utilized as a check to ensure objectivity by the researcher and face validity of the findings.

3. FINDINGS AND FINAL REPORT

Both quantitative and qualitative analyses were utilized to apply means-end theory to develop substantive theory about global integration of supply chain activities and processes in the MNC. A summary implication matrix was developed, and quantitative measures of frequency and percentages were utilized to identify dominant structural linkages in the hierarchical value maps (HVM's) of managers. Qualitative analysis examining the influence of environmental and organizational factors on managers' HVM's was also done, and conceptual frameworks were developed and presented based on the findings.

4. VALIDITY AND RELIABILITY

- (a) Audio taping and verbatim transcribing of interviews for subsequent analysis was done to ensure data reflect actual thoughts of the interviewees, rather than researcher interpretation.
- (b) An independent coder was utilized to ensure reproducibility and guard against researcher bias.
- (c) Peer debriefing was done to provide an independent check on researcher interpretations.
- (d) The researcher developed and maintained a chain of evidence through on-going documentation of research process, company background information, and data analysis process.
- (e) Individual company background information and HVM were forwarded to the key contact at participating companies for feedback on face validity and to identify any errors in fact.

5. REPORT-BACK TO COMPANIES

Upon completion of research, an executive summary with composite findings, along with HVM and summary comments about the individual company was provided to each company. Key contacts were asked to review the findings for face validity, and the specific company information for errors in fact.

6. TIME TABLE

Activity	Timing
Defend Proposal	February 2000
Participants Solicited	January - March 2000
Data Collected	January - June 2000
Complete Data Analysis	July 2000 – April 2001
Complete Final Chapters	June 2001
Final Defense	July 2001

APPENDIX A-2: INTERVIEW GUIDE

VALUE OF GLOBAL INTEGRATION

Setting the Stage:

The researcher will be taping the interviews so that they can be transcribed for analysis. This is to ensure that interviewee responses are appropriately represented in the analysis. Confidentiality agreements will be signed by the interviewer, transcriber and analysts, all data will be treated confidentially by the researcher, and anonymity is ensured in subsequent publication of results. Analysis will be at the summary level to create a composite hierarchical value map for participant companies. Individual company data will not be identifiable in the final report. However, individual company data will be provided to the company, as a benchmark against the composite data for all participants.

Background Information (information can be gathered through company documents and general discussion):

Name _____

Company _____

Division _____

Industry _____

Job Title _____

Amount of Experience in Supply Chain Activities / Processes _____

1. How would you characterize your business and products?
2. What are the locations of your plants and offices on a worldwide basis?
3. What is the relative size of your business by geographic region?
4. How are you currently organized to manage your global operations?
5. How would you describe your current information systems capabilities on a global basis?

6. How would you characterize the degree to which your products, supply chain, customers or suppliers are global?

Referring to the framework representing the multiple dimensions of supply chain activities and processes:

7. Which of these dimensions falls within your scope of responsibility or do you have direct knowledge about? If the dimensions being addressed are functional dimensions, does this responsibility include a single SBU or multiple SBU's?

The following set of questions will be asked for each of those dimensions:

8. I am interested in your thoughts about global integration and what is required to achieve global integration in this dimension. Requirements might include actions, activities, processes or tools that deal with issues of communication, coordination and control, or human resources. Please describe what global integration in this dimension means to you, and what you think is required to achieve it. Please provide as much detail as possible.
9. As important ideas surface, floating prompts will be used to explore them further. Examples of such prompts are: (1) Tell me more about that. (2) Can you tell me what you mean by that?
10. After the interviewee discusses global integration and the requirements to achieve it, specific attributes that are identified from the discussion may be revisited with directed probes, such as: (1) Why would that be important to the organization? (2) What problems are associated with meeting that particular requirement? These questions will be repeated as many times as required to move from consequences to end states. Negative laddering may also be used to move from consequences mentioned by the interviewee to specific attributes or tools required. For example, (1) Can you tell me what would have to be done in the organization to achieve "X"? (2) What would be required to accomplish that?

These questions are designed to gain additional insight into the relative value to be achieved through global integration across the multiple dimensions, as well as the perceived costs.

11. Of the dimensions we have discussed, for which would you consider global integration to be most important for your business? Which dimensions are most appropriately managed at the local / regional level? Why?

12. Which dimensions are you currently managing on a global basis? If the interviewee feels a particular dimension should be managed globally, but that is not currently the case, ask why not.

This question is designed to get additional information about the environmental factors influencing the value of global integration.

13. What do you see as the key issues / competitive challenges facing your business (or the businesses you are supporting)?

APPENDIX A-3: SOLICITATION LETTER

December 3, 1999

Dear :

In an increasingly competitive and global economic environment, firms are continually faced with a complex array of decisions as to which strategic initiatives have the greatest potential to enhance their competitive position. Success depends on being able to focus scarce resources on those opportunities with the greatest potential to create value for the firm and its stakeholders. Yet, all too often, there is little guidance available to help managers understand the potential value of alternative choices.

Two such strategic initiatives that have received a great deal of attention in recent years are those of global integration and supply chain management. As you well know, both have significant implications for firms such as yours. I am a doctoral candidate in the Department of Marketing, Logistics and Transportation at the University of Tennessee, and my doctoral research is aimed at understanding the requirements, costs, and potential value of global integration of supply chain activities and processes. The purpose of this letter is to ask for your participation in that research. Through your participation, you can gain important insights specific to your firm, as well as benchmark how your firm compares to other firms participating in the research. More details about the research, the potential benefits to you, and what will be required of participating firms is provided in the attached "Participant Guidelines."

Your participation would make an important contribution to this research, which I believe will have great value for global firms such as yours. If you have additional questions, you can reach me by phone at 252-449-8936 or by e-mail at nnix@utk.edu. Otherwise, I will follow up with you by phone within the next few weeks. I hope that your company

will be able to participate in what I believe to be an important area of research. Thank you in advance for your consideration.

Sincerely,

Nancy W. Nix
Doctoral Candidate
Department of Marketing, Logistics
& Transportation
University of Tennessee

Participant Guidelines

**Nancy W. Nix
Dissertation Research**

Understanding the Value of Global Integration of Supply Chain Activities and Processes

Research

This research is designed to understand managers' perceptions of the requirements, costs, and potential value of global integration of supply chain activities and processes. Specifically, the areas that will be explored are the sourcing and logistics functions, as well as for the sales and operational planning processes. By focusing on each of these areas, differences in managers' perceptions of value for global integration of functional activities versus business processes can be examined. Specific questions that this research will address are:

- What is required to integrate globally?
- What are the costs and benefits of integrating globally?
- What is the value that can be contributed to the firm's objectives through global integration?
- How do the perceptions of value for functional integration versus business process integration differ?
- What differences are there in the perceptions of value for integrated strategy versus integrated planning versus integrated operations?
- How do industry and organizational factors influence the perceived value of global integration of supply chain activities and processes?

How the company will benefit?

By participating in this research, you can make an important contribution to our understanding the trade-offs in the decision about global versus regional or local management of the supply chain, as well as the influence of industry and organizational factors on the decision. You will be provided with the overall results from the study, as well as information specific to your company which can be of value to you in your globalization efforts. The information specific to your company will:

- (1) enable you to benchmark the perceptions of your managers versus those of all of the companies who participate, and
- (2) provide useful insights about managerial perceptions within your company – both across organizations and across geographic regions.

Since differences in perceptions of value among managers can be a barrier to the cooperation and collaboration required for global integration, these insights may be very valuable to you in implementing your global strategies.

Requirements from Study Participants

This study will require a series of in-depth interviews (1 to 1 ½ hours) with key managers and decision-makers in each region where you are operating. Interviews will be audio-taped for later transcription and analysis by the researcher. However, all interviews will be strictly confidential and no information specific to interviewees will be included in the final report or in the firm specific information provided to you. Representatives from each of the following areas should be included in the interviewing process.

- Sourcing / Purchasing
- Sales and Operational Planning (Sales forecasting, production planning, capacity planning)
- Logistics
- Customer Service
- Information Systems (specific to supply chain systems)

It is important that managers who are decision-makers regarding strategy, planning, and operations are included in the interviews.

Background information about your industry and your company will also be required. This can be gathered through a combination of background material provided prior to the interviews, and information gathered through the interviews. Background material needed would include information such as:

- (1) the nature of your business and products,
- (2) global location of offices and plants,
- (3) company size by global region,
- (4) organizational structure,
- (5) information capabilities,
- (6) current state of global integration, and
- (7) degree to which customers and suppliers operate globally.

A key contact should be identified that can act as a liaison and coordinate the scheduling of interviews. This key contact would also be asked to review the overall findings from

the interviews to be sure that any errors in fact are corrected before final publication of findings. All data will be disguised in the publication of findings to ensure confidentiality for participating firms.

Funding requested from participants is limited to reimbursement for travel expenses incurred for interviews within their company and expenses for transcription of audio tapes from those interviews.

APPENDIX A-4: DOCUMENTATION OF THE CODING PROCESS

FLOW OF CODING PROCESS

1. Primary researcher edits transcriptions and highlights areas that are relevant to the research and are to be coded.
2. Researcher provides coders with copies of transcriptions with sections to be coded highlighted.
3. Coders and researcher will code one interview and discuss assignments to categories and coding process for calibration and upgrade to the coding process.
4. Each coder then reviews 5 additional transcripts and codes for attributes, consequences (costs and benefits), and goals or values. Codes are assigned as attribute, consequence (cost and benefit), and goals and values according to definitions proposed in dissertation and summarized below.
5. Two coders then reconcile assignments and researcher serves as a tiebreaker.
6. Evaluation of inter-coder reliability is done after 5 transcripts are coded to determine whether double coding is required on 100% of the transcripts, or only on some representative sample of the remaining interviews.
7. Coders and researchers will once again discuss the coding process and make upgrades as needed.
8. After initial coding is completed, a second round of coding is done to assign the attributes, consequences (costs and benefits) and goals and values into specific categories.
9. Secondary categories are determined by the primary researcher based on an analysis of the initial coding assignments.
10. Primary researcher provides coders with secondary coding scheme, and initial codes are assigned into secondary codes.
11. A small sample of interviews will be coded and inter-coder reliability checked on secondary coding to determine total number of interviews that must be double coded.
12. For secondary coding, two coders again reconcile assignments and researcher serves as a tiebreaker.

Reliability

1. Coders will keep log of the number of assignments of each type on which they initially agree. These figures will be utilized to calculate intercoder reliability.

CODING PROCESS

1. Within the highlighted areas, all independent thoughts are to be coded separately. Length of coded segment will vary widely – from one sentence to complete paragraphs. Most important is to isolate each unique thought.
2. Coders will read through entire interview once to get a general overview, then re-read to focus on content and specific ideas. If important ideas are identified that are not highlighted by the researcher, coders should highlight and code those ideas. If none are identified on reading through twice, then only highlighted areas should be coded. It is also possible that some highlighted areas do not contain specific unique thoughts that will be coded. The highlights only serve to focus the attention of the coders on relevant passages as they begin the actual coding process.
3. Coded sections will be indicated by brackets on the left margin that completely enclose the coded areas. Specific ideas to be coded will be enclosed in brackets within the text. Actual code assignments will be written over the specific idea in brackets, or outside the brackets in the left margin for larger pieces of text. Where the respondent clearly links attributes, consequences and goals or values, coder should draw the linkage on the printed interview. In addition, any clear linkages made by the respondent between external or organizational factors and either attributes, consequences and goals or values should also be highlighted.
4. There may be multiple codes assigned to a given thought. For example, if a respondent is talking about Logistics Strategy and mentions a benefit – 3 codes would be assigned: Logistics, Strategy, and Benefit.
5. A particular subject may be coded differently based on context. For example – if a respondent describes the customer base as global, it would be coded “Customer” – an influencing factor. However, if a respondent talks about satisfying customers as a result of global integration, it would be coded as a “Goal or Value.” Precedence is given to the Attribute – Consequence – Goal or Value hierarchy rather than to the “Influencing Factor” codes.

CODING STRUCTURE

1. HIERARCHY LEVELS

Values & Goals

Values and goals represent the desired end-states that businesses are trying to achieve through global integration. Since there may be multiple examples of values and goals, and in some cases, values may be at a higher level in the value hierarchy than more definitive goals, we will code these individually.

Values:

Examples of values would typically be very broad objectives that companies are trying to achieve with global integration, and are often implied rather than stated overtly.

Examples of such values would be:

- Reduced cost
- Customer satisfaction
- Greater profitability
- Greater market share
- Competitive advantage

Goals:

Goals would also represent desired end-states at a lower level in the hierarchy. These are more likely to be articulated by the respondents, and examples would include:

- Eliminating duplication of resources or effort
- Taking advantage of economies of scale – i.e. leveraging volume
- Gaining flexibility
- Improving bargaining position with suppliers
- Better access to materials or technology
- Improved competitive position
- Improved delivery of supplies

Consequences (Costs and Benefits)

Consequences are the more tangible results of global integration. These are likely to be stated overtly by the respondent, and can be in the form of costs or benefits. All consequences will be coded as such, and a + or – used to indicate whether the respondent views that particular consequence as a positive or negative.

Benefits

Examples of benefits might be:

- Develop close relationships with suppliers or customers
- Be viewed as most favored customer
- Easy to do business with
- Deal effectively with suppliers

Costs:

Examples of costs might be:

- We lose our focus on the customer
- We give up functionality in specific regions or facilities
- We cannot achieve our own individual objectives or targets because we have to compromise local needs to achieve global needs.

Attributes (Requirements to Achieve Global Integration)

Typically, the requirements to achieve global integration will be actions that a company must take, activities they must engage in, tools that have to be put in place. They may involve means of communicating, systems or processes to collect or share information, metrics, organizational structure, mechanisms for decision-making, etc. Task teams, committees, conference calls, formal meetings are examples of communication or organizational processes that might fall into this category. Information systems or establishing global goals, metrics and reward systems might be viewed as tools required to achieve global integration. In Stage 1 of the coding process, these would simply be coded as "Attributes."

2. DIMENSIONS OF SUPPLY CHAIN ACTIVITIES AND PROCESSES

During each interview, we refer to Figure 1-5 - "Dimensions of Global Integration of Supply Chain Activities and Processes." The discussion may be focused on any of these dimensions, or we may refer to several during the discussion. When there is a clear statement about which dimension(s) are being referred to, codes should be assigned that categorize the dimension being discussed as shown below. It is likely that these will be umbrella codes that will be assigned to large portions of an interview, and that hierarchy codes or other factor codes will be assigned within these.

- **Supplier Relationship Management / Purchasing**
- **Logistics**
- **Customer Service / Customer Relationship Management**
- **Strategy**
- **Planning**
- **Operations / Execution**
- **Supply Chain Strategy**
- **Sales & Operational Planning**

OTHER FACTOR CODES

One objective of this research is to understand the factors that influence the importance of global integration for a business. The background questions asked during the interview are designed to understand those influencing factors (see Page 1 of the Interview Protocol). Generally, these background factors will be related to the categories of questions asked – for example:

- The nature of the business or products of the firm,
- Organizational factors (such as organizational culture, tradition or evolution of the organization, or organizational structure),
- Characteristics of the customer base
- Characteristics of the supplier base
- Key issues or competitive challenges faced by the firm

Respondents are also asked to identify the supply chain dimension that it is most important to manage in a globally integrated way. Responses to this question should also be coded.

Table A-4.1. Coding for Levels in the Value Hierarchy

Hierarchy Level	Sample Comments
Values	❖ We should have more ability to guarantee supply at the expense of our competitors
Goals	❖ So that we maximize leverage ❖ In a crunch, it should give me more share of capacity ❖ It should give me the best product.... ❖ It should give me best delivery
Consequences (-)	❖ By all reports, we did give away some functionality
Consequences (+)	❖ A buyer at one desk could manage a part for the whole world ❖ We have to be most favored customer ❖ We've got to be easy to do business with
Attributes – Refers to activities, tools, systems, processes that are required to achieve global integration. Examples might be organizational structure, metrics, communications processes, information systems, etc.	❖ If we had the right degree of record accuracy... ❖ It's important to reduce the supply base ❖ We need a single point of contact with our suppliers

Table A-4.2. Coding for Supply Chain Dimensions

Supply Chain Dimensions	Sample Comments
Supplier Relationship Management / Purchasing (SR/Purch)	❖ These should be coded where they are stated overtly by the respondent or interviewer.
Logistics (Log)	
Customer Service / Customer Relationship Management (CS)	
Strategy	
Planning	
Operations or Execution (Opns)	
Cross-Functional Supply Chain Processes (SC Strategy)	
Sales & Operational Planning (S&OP)	

Table A-4.3. Coding for Other Factors

Other Factors	Sample Comments
Role	❖ Each respondent is asked to describe his or her role. The description they provide should be coded "Role"
Customer Base	❖ Respondents are asked to describe the degree to which their customer base is global, regional, or local. They may also refer to customer characteristics during the course of other portions of the interview. Comments which specifically <i>describe the customer base</i> should be coded "Customer."
Organization	❖ Respondents are asked to describe how they are organized to manage globally. They may also describe characteristics of their organization as factors that influence their ability to globally integrate. These comments should be coded "Organization"
Supplier Base	❖ Respondents are asked to describe the degree to which their supplier base is global. They may also describe characteristics of their suppliers as factors that influence their ability to globally integrate. These comments should be coded "Supplier"
Business / Products	❖ Respondents are asked to describe the nature of their business and products. These comments should be coded "Business / Products"
Competitors	❖ Typically, respondents have not been specifically asked about competitors. However, if they offer comments which describes their comments, these should be coded "Competitors"
Government	❖ The US government has strict environmental regulations that countries in Asia do not have. ❖ Tariffs have been reduced so that now it makes sense to ship product from Europe to India.
Other Environmental Factors	❖ It is difficult to communicate when you are working across time zones from Asia to Europe to the US
Key Issue / Challenge	❖ The final question asked of respondents is their key issue or competitive challenge. These responses should be coded "Key Issue"
Most Important	❖ After discussing the dimensions for which the respondent is responsible, they are asked for which dimension it is most important that they be globally integrated. Their discussion of the most important dimensions should be coded "Most Important."

APPENDIX A-5: SUMMARY OF UNIQUE THEMES

Table A-5.1. Communications Technologies – Goal Related Themes

Communications Technologies						
Rank within Hierarchy Level	Themes	Total Number of Times Mentioned	Total Number of Respondents	Number of Respondents Mentioning Category	% of Respondents Mentioning Category	# of Mentions Per Respondent
Goals						
1	Competitive Advantage	13	15	8	53.33	1.63
2	Customer Satisfaction	11	15	7	46.67	1.57
3	Profitability	10	15	6	40.00	1.67
4	Market Success	6	15	5	33.33	1.20
5	Customer Relationships	8	15	4	26.67	2.00

Table A-5.2. Global Chemicals – Goal Related Themes

Global Chemical						
Rank within Hierarchy Level	Themes	Total Number of Times Mentioned	Total Number of Respondents	Number of Respondents Mentioning Category	% of Respondents Mentioning Category	# of Mentions Per Respondent
Goal Categories						
1	Profitability	39	12	10	83	3.90
2	Competitive Advantage	28	12	10	83	2.80
3	Business Success	19	12	10	83	1.90
4	Operational Excellence	19	12	8	67	2.38
5	Market Success	17	12	8	67	2.13
6	Customer Relationships	11	12	7	58	1.57
7	Customer Satisfaction	8	12	5	42	1.60
8	Product Mix Enrichment	7	12	5	42	1.40

Table A-5.3. Leading Edge Fibers – Goal Related Themes

Leading Edge Fibers						
Rank within Hierarchy Level	Themes	Total Number of Times Mentioned	Total Number of Respondents	Number of Respondents Mentioning Category	% of Respondents Mentioning Category	# of Mentions Per Respondent
Goal Categories						
1	Competitive Advantage	25	8	8	100.0%	3.1
2	Market Success	23	8	7	87.5%	3.3
3	Profitability	21	8	7	87.5%	3.0
4	Customer Satisfaction	10	8	7	87.5%	1.4
5	Business Success	10	8	5	62.5%	2.0
6	Customer Relationships	5	8	4	50.0%	1.3
7	Product Mix Enrichment	7	8	3	37.5%	2.3
8	Operational Excellence	0	8	0	0.0%	0.0

Table A-5.4. Communications Technologies - Consequence Themes

Communications Technologies						
Rank within Hierarchy Level	Themes	Total Number of Times Mentioned	Total Number of Respondents	Number of Respondents Mentioning Category	% of Respondents Mentioning Category	# of Mentions Per Respondent
Consequences						
1	Serving Customers	28	15	13	86.67	2.15
2	Simplification	29	15	12	80.00	2.42
3	Capacity Utilization	25	15	11	73.33	2.27
4	Global Demand Planning	24	15	11	73.33	2.18
5	Cost Reduction	20	15	11	73.33	1.82
6	Manage Supply / Demand	47	15	10	66.67	4.70
7	/ Local Issues	40	15	10	66.67	4.00
8	Complexity	15	15	10	66.67	1.50
9	Supplier Relationships	32	15	9	60.00	3.56
10	Execution Capability	26	15	9	60.00	2.89
11	Focus	20	15	9	60.00	2.22
12	Suppliers	16	15	9	60.00	1.78
13	Optimization	28	15	8	53.33	3.50
14	Management	22	15	8	53.33	2.75
15	Easy to do Business	32	15	7	46.67	4.57
16	Supplier Selection	17	15	7	46.67	2.43
17	Supply & Demand Allocation	17	15	7	46.67	2.43
18	Efficiency	16	15	7	46.67	2.29
19	Global Demand Forecast	10	15	7	46.67	1.43
20	Supplier Performance	9	15	6	40.00	1.50
21	Visibility	17	15	5	33.33	3.40
22	Managing Material Flow	17	15	5	33.33	3.40
23	Assurance of Supply	15	15	5	33.33	3.00

Table A-5.5. Global Chemicals Consequence Themes

Global Chemical						
Rank within Hierarchy Level	Themes	Total Number of Times Mentioned	Total Number of Respondents	Number of Respondents Mentioning Category	% of Respondents Mentioning Category	# of Mentions Per Respondent
Consequence Categories						
1	Lower Cost	74	12	12	100	6.17
2	Global Demand Planning	65	12	12	100	5.42
3	Serving Customers	37	12	12	100	3.08
4	Balancing Local / Regional / Global Issues	23	12	12	100	1.92
5	Execution Capability	50	12	11	92	4.55
6	Managing Material Flow	36	12	11	92	3.27
7	Global Demand Forecast	30	12	10	83	3.00
8	Manage Supply Demand	30	12	10	83	3.00
9	Capacity Utilization	26	12	9	75	2.89
10	Management	31	12	8	67	3.88
11	Simplification	23	12	8	67	2.88
12	Efficiency	18	12	8	67	2.25
13	Suppliers	44	12	7	58	6.29
14	Optimization	17	12	7	58	2.43
15	Target Market	13	12	7	58	1.86
16	Inventory Management	13	12	6	50	2.17
17	Customer Commitment	9	12	6	50	1.50
18	Avoid Customer Leverage	9	12	6	50	1.50
19	Supplier Selection	8	12	6	50	1.33
20	Supplier Relationships	18	12	5	42	3.60
21	Minimize Investment	14	12	5	42	2.80
22	Managing Complexity	9	12	5	42	1.80
23	Visibility	9	12	5	42	1.80
24	Assurance of Supply	9	12	4	33	2.25
25	Supplier Performance	8	12	3	25	2.67
26	Suppliers	1	12	1	8	1.00
27	Tax Minimization	1	12	1	8	1.00

Table A-5.6. Leading Edge Fibers Consequence Themes

Leading Edge Fibers						
Rank within Hierarchy Level	Themes	Total Number of Times Mentioned	Total Number of Respondents	Number of Respondents Mentioning Category	% of Respondents Mentioning Category	# of Mentions Per Respondent
Consequence Categories						
1	Global Demand Planning	57	8	8	100.0%	7.1
2	Lower Cost	59	8	7	87.5%	8.4
3	Execution Capability	30	8	7	87.5%	4.3
4	Capacity Utilization	26	8	7	87.5%	3.7
5	Manage Supply / Demand	25	8	7	87.5%	3.6
6	Visibility	16	8	7	87.5%	2.3
7	Serving Customers	32	8	6	75.0%	5.3
8	Minimize Investment	20	8	6	75.0%	3.3
9	Global Demand Forecast	13	8	6	75.0%	2.2
10	Target Market	11	8	6	75.0%	1.8
11	Supplier Selection	16	8	5	62.5%	3.2
12	Optimization	15	8	5	62.5%	3.0
13	Managing Material Flow	11	8	5	62.5%	2.2
14	Managing Global Suppliers	34	8	4	50.0%	8.5
15	Balancing Global / Regional / Local Issues	11	8	4	50.0%	2.8
16	Global Account Management	7	8	4	50.0%	1.8
17	Managing Complexity	6	8	4	50.0%	1.5
18	Tax Minimization	6	8	4	50.0%	1.5
19	Avoid Customer Leverage	4	8	3	37.5%	1.3
20	Simplification	3	8	3	37.5%	1.0
21	Assurance of Supply	8	8	2	25.0%	4.0
22	Supplier Performance	5	8	2	25.0%	2.5
23	Supplier Relationships	2	8	2	25.0%	1.0
24	Focus	2	8	2	25.0%	1.0
25	Easy to do Business	0	8	0	0.0%	0.0

Table A-5.7. Communications Technologies Attribute Themes

Communication Technologies						
Rank within Hierarchy Level	Codes	Total Number of Times Mentioned	Total Number of Respondents	Number of Respondents Mentioning Category	% of Respondents Mentioning Category	# of Mentions Per Respondent
Attributes						
1	Information	114	15	15	100.00	7.60
2	Information Technology	77	15	14	93.33	5.50
3	Focal Point	66	15	13	86.67	5.08
4	Alignment	43	15	13	86.67	3.31
5	Vision	40	15	12	80.00	3.33
6	Standardization	106	15	11	73.33	9.64
7	Decisions	49	15	11	73.33	4.45
8	Communication	33	15	11	73.33	3.00
9	Balancing Short-term / Long-term Issues	30	15	11	73.33	2.73
10	Diversity	27	15	11	73.33	2.45
11	Business / Markets	24	15	11	73.33	2.18
13	Global Processes	46	15	10	66.67	4.60
14	Speed	33	15	10	66.67	3.30
15	Flexibility	27	15	10	66.67	2.70
16	Linkages	25	15	10	66.67	2.50
17	Leadership	17	15	10	66.67	1.70
18	Teamwork	20	15	9	60.00	2.22
30	Rules & Standards	41	15	8	53.33	5.13
19	Skills and Capabilities	20	15	8	53.33	2.50
20	Mindset	9	15	8	53.33	1.13
21	Metrics	51	15	7	46.67	7.29
22	Leverage	19	15	7	46.67	2.71
23	Data	18	15	7	46.67	2.57
24	Representativeness	16	15	7	46.67	2.29
25	Global Production	12	15	7	46.67	1.71
26	Managing Change	11	15	7	46.67	1.57
27	Shared Learnings	22	15	6	40.00	3.67
28	Performance Feedback	14	15	6	40.00	2.33
29	Teamwork / Behavior	9	15	6	40.00	1.50

Table A-5.8. Global Chemicals Attribute Themes

Global Chemical						
Rank within Hierarchy Level	Themes	Total Number of Times Mentioned	Total Number of Respondents	Number of Respondents Mentioning Category	% of Respondents Mentioning Category	# of Mentions Per Respondent
Attribute Categories						
1	Information	101	12	12	100	8.42
2	Communication	72	12	12	100	6.00
3	Markets	63	12	12	100	5.25
4	Global Production	23	12	12	100	1.92
5	Focal Point	40	12	11	92	3.64
6	Information Technology	39	12	11	92	3.55
7	Vision	36	12	11	92	3.27
8	Decisions	39	12	10	83	3.90
9	Speed	35	12	10	83	3.50
10	Leadership	20	12	10	83	2.00
11	Data	34	12	9	75	3.78
12	Flexibility	24	12	9	75	2.67
13	Standardization	19	12	9	75	2.11
14	Diversity	25	12	8	67	3.13
15	Alignment	16	12	8	67	2.00
16	Rules & Standards	12	12	8	67	1.5
17	Processes	44	12	7	58	6.29
18	Representativeness	21	12	7	58	3.00
19	Teamwork	18	12	7	58	2.57
20	Organizational Structure	16	12	7	58	2.29
21	Discipline	25	12	6	50	4.17
22	Share Learnings	20	12	6	50	3.33
23	Metrics	14	12	6	50	2.33
24	Linkages	9	12	6	50	1.50
25	Short-term Issues	6	12	6	50	1.00
26	Leverage	16	12	5	42	3.20
27	Managing Change	12	12	5	42	2.40
28	Global Logistics	11	12	5	42	2.20
29	Skills and Capabilities	10	12	5	42	2.00
30	Stability or Predictability	3	12	1	8	3.00

Table A-5.9. Leading Edge Fibers Attribute Themes

Leading Edge Fibers						
Rank within Hierarchy Level	Themes	Total Number of Times Mentioned	Total Number of Respondents	Number of Respondents Mentioning Category	% of Respondents Mentioning Category	# of Mentions Per Respondent
Attribute Categories						
1	Information Technology	44	8	8	100.0%	5.5
2	Information	41	8	8	100.0%	5.1
3	Standardization	40	8	8	100.0%	5.0
4	Focal Point	33	8	8	100.0%	4.1
5	Flexibility	23	8	8	100.0%	2.9
6	Decisions	20	8	8	100.0%	2.5
7	Data	24	8	7	87.5%	3.4
8	Vision	24	8	7	87.5%	3.4
9	Global Production	20	8	7	87.5%	2.9
10	Inventory Management	19	8	7	87.5%	2.7
11	Global Logistics	18	8	7	87.5%	2.6
12	Understanding Business & Markets	16	8	7	87.5%	2.3
13	Managing Diversity	15	8	7	87.5%	2.1
14	Managing Change	15	8	6	75.0%	2.5
15	Communication	14	8	6	75.0%	2.3
16	Alignment	13	8	6	75.0%	2.2
17	Stability or Predictability	13	8	6	75.0%	2.2
18	Representativeness	9	8	6	75.0%	1.5
19	Innovation	20	8	5	62.5%	4.0
20	Speed	15	8	5	62.5%	3.0
21	Teamwork	13	8	5	62.5%	2.6
22	Organizational Structure	11	8	5	62.5%	2.2
23	Metrics	10	8	5	62.5%	2.0
24	Mindset	12	8	4	50.0%	3.0
25	Leadership	12	8	4	50.0%	3.0
26	Share Learnings	10	8	4	50.0%	2.5
27	Rules & Standards	11	8	4	50.0%	2.8
28	Global Processes	8	8	4	50.0%	2.0
29	Skills and Capabilities	7	8	4	50.0%	1.8
30	Balancing Short-term and Long-term Issues	5	8	4	50.0%	1.3
31	Leverage	10	8	3	37.5%	3.3
32	Linkages	7	8	3	37.5%	2.3
33	Discipline	2	8	2	25.0%	1.0

APPENDIX A-6: SUMMARY IMPLICATION MATRICES

Table A-6.1. Communications Technologies Summary Implication Matrix (Total Direct and Indirect Linkages)

	Org.	Business Process Management										Information				Supply Chain				Goals																							
		Alignment	Teamwork	Balance Regional / Global	Balance ST / LT	Communications	Decisions	Focus	Managing Diversity	Processes	Shared Learnings	Simplification	Speed	Standardization	Vision	Business / Market Knowledge	Data	Information	IT	Linkages	Metrics	Assurance of Supply	Flexibility	Global Planning	Leverage	Manage Supply / Demand	Serving Customers	Supplier Performance	Supplier Relations	Supplier Selection	Visibility	Competitive Advantage	Customer Satisfaction	Execution Capability	Lower Cost	Optimization	Profitability	Resource Utilization					
Organizational Themes																																											
	Alignment	7	9				10	5			5			7	7			16							4	14									5	5	5	5	5	5			
	Leadership	4	4				6								4			7																									
	Representativeness																																										
Business Process Management Themes	Teamwork																																										
	Balance Regional / Global																																										
	Communications	6	8																																								
	Decisions																																										
	Focus																																										
	Performance Feedback																																										
	Processes																																										
	Rules & Standards																																										
	Simplification																																										
	Speed																																										
	Standardization																																										
	Vision																																										
Information Related Themes	Business / Market Knowledge																																										
	Data																																										
	Information																																										
	IT																																										
Supply Chain Related Themes	Linkages																																										
	Metrics																																										
	Demand Forecast																																										
	Easy to do Business																																										
	Flexibility																																										
	Global Planning																																										
	Global Production																																										
	Leverage																																										
	Manage Supply / Demand																																										
	Managing Global Suppliers																																										
	Serving Customers																																										
	Supplier Relations																																										
Goal Related Themes	Supplier Selection																																										
	Efficiency																																										
	Optimization																																										
	Grand Total	35	32	32	4	4	55	12	8	10	5	24	15	16	19	42	15	87	21	16	6	9	29	23	3	40	37	11	20	4	19	6	7	10	38	26	4	30	774				

Table A-6.2. Global Chemicals Summary Implication Matrix (Total Direct and Indirect Linkages)

APPENDIX A-7: DESCRIPTIONS OF THEMES

Table A-7.1. Descriptions of Supply Chain Related Themes

Type of Supply Chain Category	#	Theme	Description of Theme
CUSTOMER RELATED	1	Avoid Customer Leverage	Comments related to defending against pressure from global customer for global pricing and price reductions.
	2	Customer Commitments	Comments related to having the ability to make or keep commitments to customers about product availability or delivery.
	3	Global Account Management	Comments related to the ability to manage accounts with large, global customers.
	4	Pricing	Comments related to the need for or ability to manage pricing.
	5	Serving Customers	Comments related to providing service to customers on a global basis.
	6	Target Markets	Comments related to identifying or pursuing specific markets or market segments on a global basis.
FIRM LEVEL	1	Global Demand Forecast	Comments related to the need for or ability to create forecasts of global demand.
	2	Flexibility to Ship Inter-regionally	Comments related to having the ability to supply customers in one regions with products from another region.
	3	Global Logistics	Comments related to the having the logistics capability to ship globally.
	4	Global Demand Planning	Comments related to the process of planning to meet global
	5	Global Production	Comments related to having global production capability or managing production capability on a global basis.
	6	Balance Supply / Demand	Comments related to managing the supply requirements and production mix to meet global demand.
	7	Managing Inventory	Comments related to planning, managing, or reducing inventory levels.
	8	Managing Material Flow	Comments related to managing the physical movement of materials.
	9	Production Stability	Comments related to stabilizing production plans, typically as a result of improved forecasting and planning.
	10	Supply Chain Visibility	Comments related to having the ability to track shipments and inventory levels globally.

Table A-7.1. (Continued)

Type of Supply Chain Category	#	Theme	Description of Theme
SUPPLIER RELATED	1	Assurance of Supply	Comments related to ensuring access to raw materials required to meet global demand.
	2	Global Purchasing	Comments related to the purchasing of raw materials from global suppliers.
	3	Leverage	Comments related to consolidating purchases to be able to negotiate with suppliers for larger volumes to reduce cost.
	4	Managing Global Suppliers	Comments related to the process or capability to manage large, global suppliers.
	5	Supplier Relations	Comments related to managing or improving relationships with global suppliers.
	6	Supplier Selection	Comments related to rationalizing suppliers globally, or selecting suppliers that can meet global requirements.
	7	Easy to do Business	Comments related to making it easier for suppliers to work with the company, and consequently to meet the requirements of global operations.
	8	Supplier Performance	Comments related to improving the performance of suppliers in meeting global requirements.

Table A-7.2. Descriptions of Goal Related Themes

Generic Category	Type of Goal	#	Theme	Description of Theme
GOALS	EXECUTION GOALS	1	Efficiency	Comments related to improving efficiency of operations or work processes.
		2	Execution Capability	Comments related to having the ability to execute effectively against strategy and plans.
		3	Minimize Investment	Comments related to minimizing investment in production capacity or inventory.
		4	Lower Cost	Comments related to reducing cost.
		5	Optimization	Comments related to optimization or balancing of several goals, such as cost, service, and capacity utilization.
		6	Product Mix Enrichment	Comments related to changing the mix of products to improve profitability.
		7	Quality Improvement	Comments related to improving product quality and consistency.
		8	Capacity Utilization	Comments related to effective use of capacity to improve overall performance.
		9	Tax Minimization	Comments related to reducing the overall tax burden of the business.
	STRATEGIC GOALS	1	Business Success	Comments related to achieving success as a total business, typically in contrast to achieving success as an individual region.
		2	Competitive Advantage	Comments related to beating the competition or improving the overall competitive position of the business.
		3	Customer Relations	Comments related to managing or improving relationships with customers globally.
		4	Customer Satisfaction	Comments related to satisfying and/or meeting specific needs of customers.
		5	Market Success	Comments related to gaining market share or increasing revenue.
		6	Operational Excellence	Comments related to achieving excellence in production and distribution.
		7	Profitability	Comments related to improving margins or overall profitability of the business.

Table A-7.3. Descriptions of Organizational Themes

Generic Category	#	Theme	Description of Theme
ORGANIZATION RELATED	1	Alignment	Comments related to gaining agreement or consensus, having common goals and objectives, or working from a common plan.
	2	Discipline	Comments related to commitment and adherence to rules, processes, and plans.
	3	Focal Point	Comments related to having a mechanism to bring together regional issues, information, and goals to develop a global view.
	4	Leadership	Comments related to top level management or leadership requirements.
	5	Mindset	Comments related to attitudes or ways of thinking influencing global integration.
	6	Organizational Structure	Comments related to reporting lines or organizational structure influencing global integration.
	7	People	Comments related to the need for or impact on people in the organization.
	8	Representativeness	Comments related to the participation of representatives from the various regions in global processes.
	9	Skills & Capabilities	Comments related to the skills and capabilities of people, typically those required for global integration or enhanced through global integration.
	10	Teamwork	Comments related to individuals or regional organizations working together toward a common objective.

Table A-7.4. Descriptions of Information Related Themes

Generic Category	#	Theme	Description of Theme
INFORMATION RELATED	1	Business/Market Knowledge	Comments related to the need for or importance of having a good understanding of the firm's global operations and business, or external markets and competitive activity globally.
	2	Data	Comments related to having easy and timely access to global business data.
	3	Information	Comments related to the accessibility and utility of information.
	4	Information Technology	Comments related to information systems, frequently related to the need for standardization and commonality of systems.
	5	Information Linkages	Comments related to the connectivity between regional systems - focused primarily on data transfer capability.
	6	Metrics	Comments related to performance and cost measures.

Table A-7.5. Descriptions of Business Process Management Themes

Generic Category	#	Theme	Description of Theme
GENERIC BUSINESS PROCESS MANAGING THEMES	1	Balance Regional / Global	Comments related balancing global objectives and local or regional requirements, or managing the conflict between the two.
	2	Balance Short-term and Long-term Issues	Comments related to balancing short-term and long-term requirements or objectives.
	3	Managing Change	Comments related to importance of or need for change management processes.
	4	Communications	Comments related to communications processes.
	5	Coordination	Direct references to the need for or importance of coordination.
	6	Decisions	Comments related to decision-making processes.
	7	Innovation	Comments related to research and development or new product development.
	8	Integration	Direct references to the need for or importance of integration.
	9	Managing Complexity	Comments related to managing the scope and/or complexity of a global organization.
	10	Managing Diversity	Comments related to managing the diversity in the global environment, such as multiple languages, cultures, currencies, and time zones.
	11	Performance Feedback	Comments related to processes designed to give performance feedback or information about metrics to organizations or individuals.
	12	Global Processes	General comments about global processes with no mention of specific processes.
	13	Rules & Standards	Comments about need for or importance of having established rules, guidelines, standards, or requirements on a global basis.
	14	Shared Learnings	Comments about the need for or importance of communicating learnings in one region to another.
	15	Simplification	Comments related to simplifying or streamlining work processes, typically as a result of standardizing systems and processes.
	16	Speed	Comments related to the need for or importance of speed, often resulting from integrated information flows and referring to speed of decision making or product flows.
	17	Standardization	Comments related to establishing commonality across regions, typically referring to data, information, products, and/or processes.
	18	Vision	Comments related to a clear sense of direction or set of objectives.

APPENDIX A-8: HIERARCHICAL VALUE MAPS FOR GENERIC THEME CATEGORIES

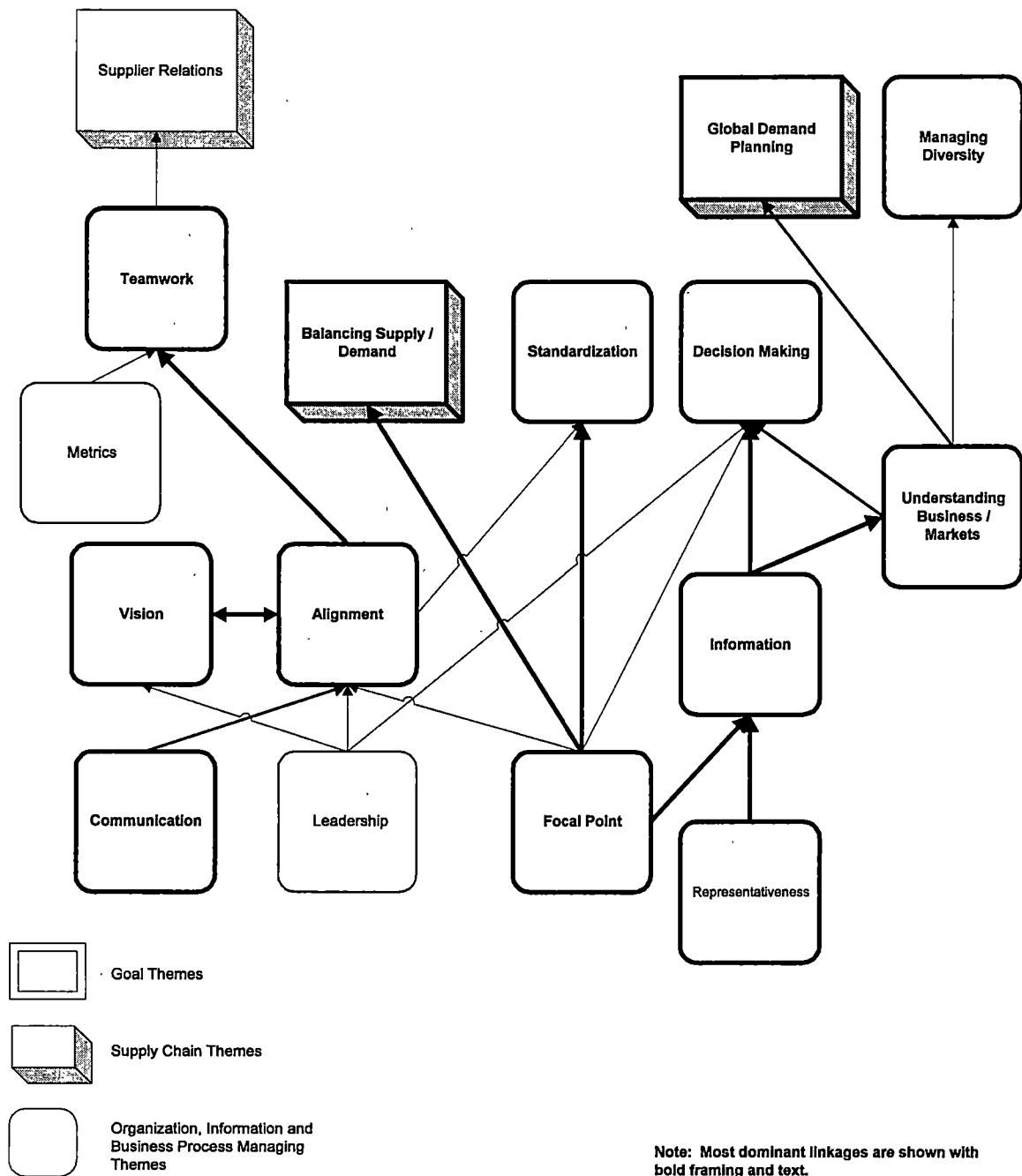


Figure A-8.1. Communications Technologies: Organizational Themes Hierarchical Value Map

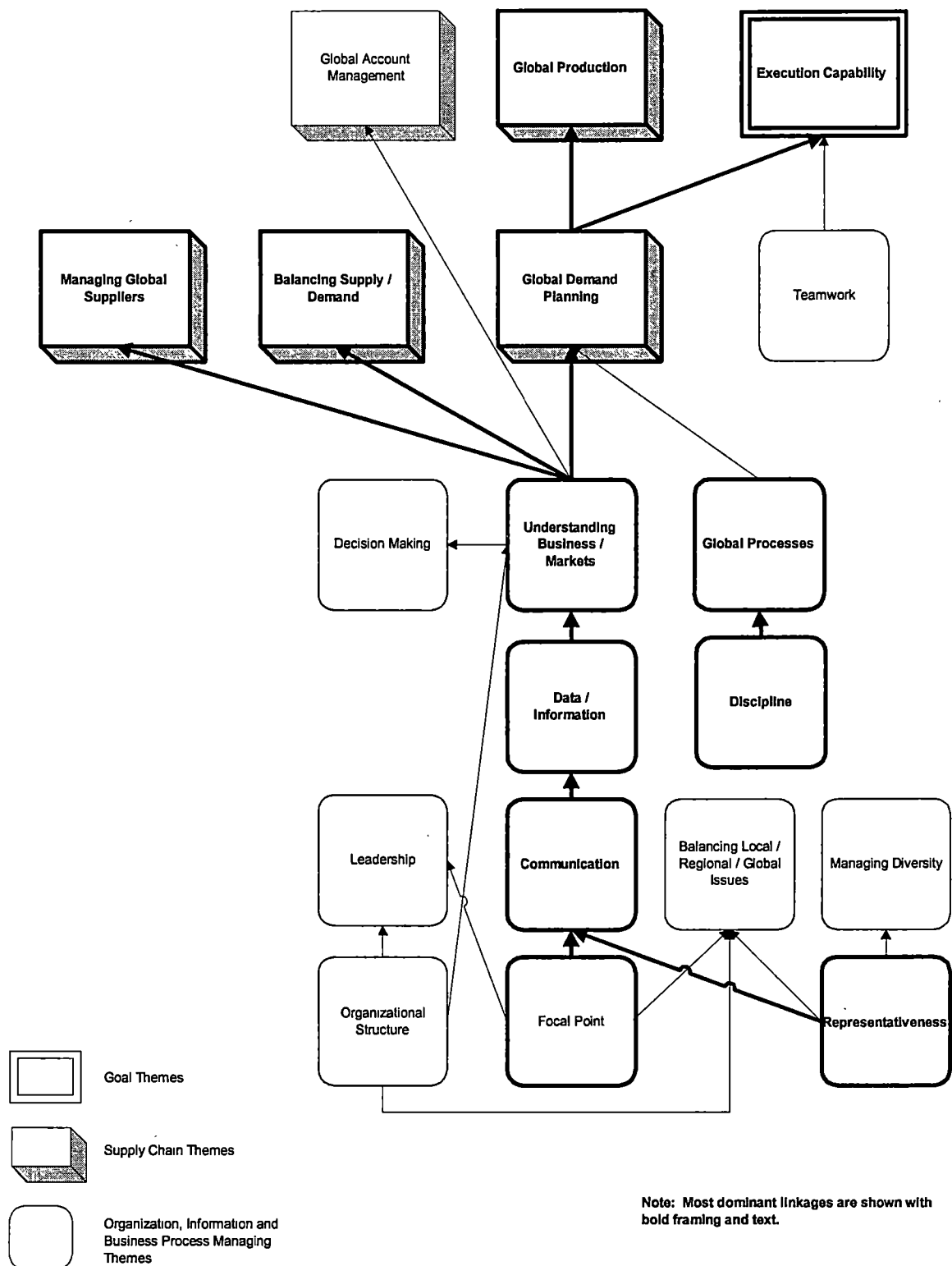


Figure A-8.2. Global Chemicals: Organizational Themes Hierarchical Value Map

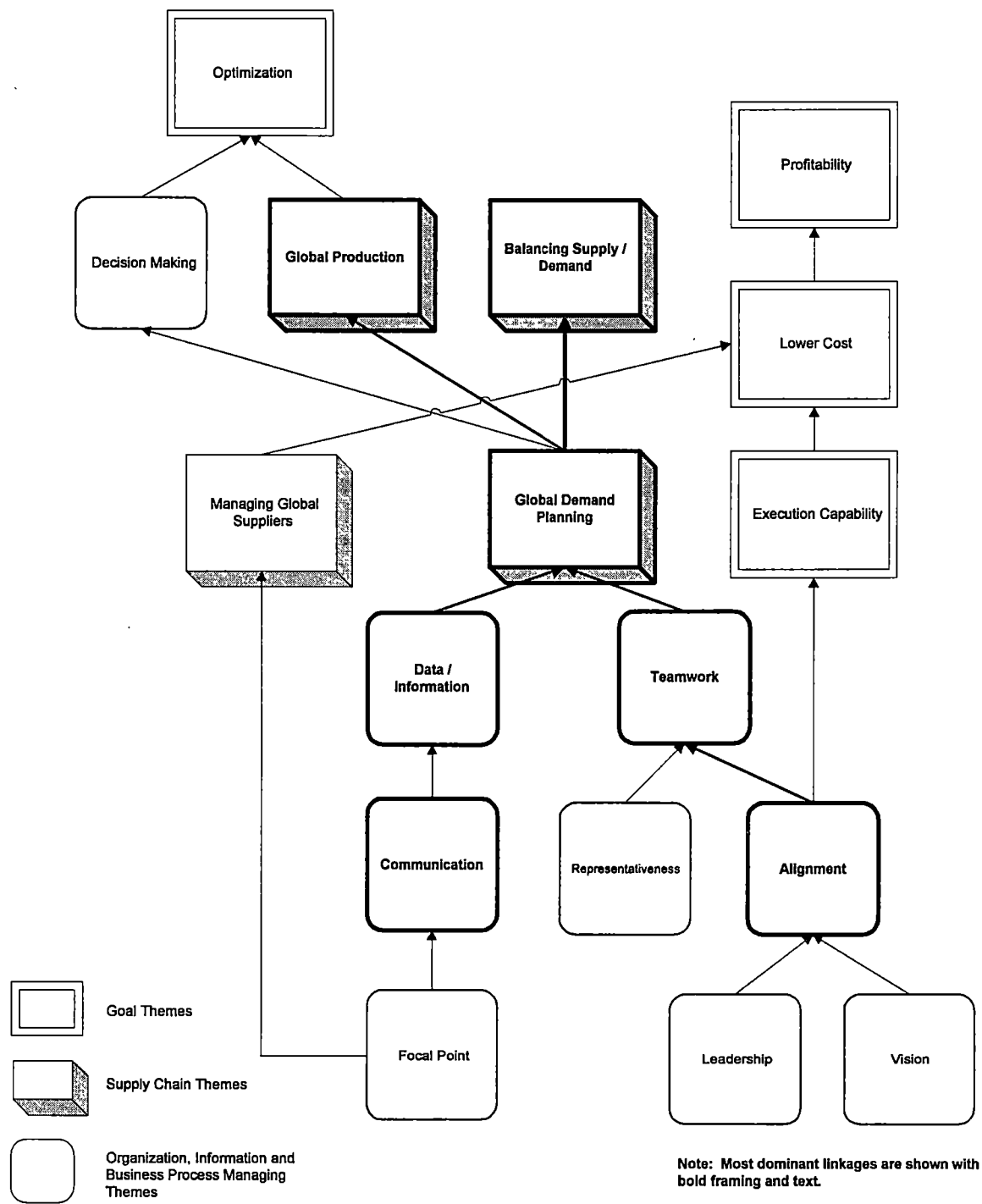


Figure A-8.3. Leading Edge Fibers: Organizational Themes Hierarchical Value Map

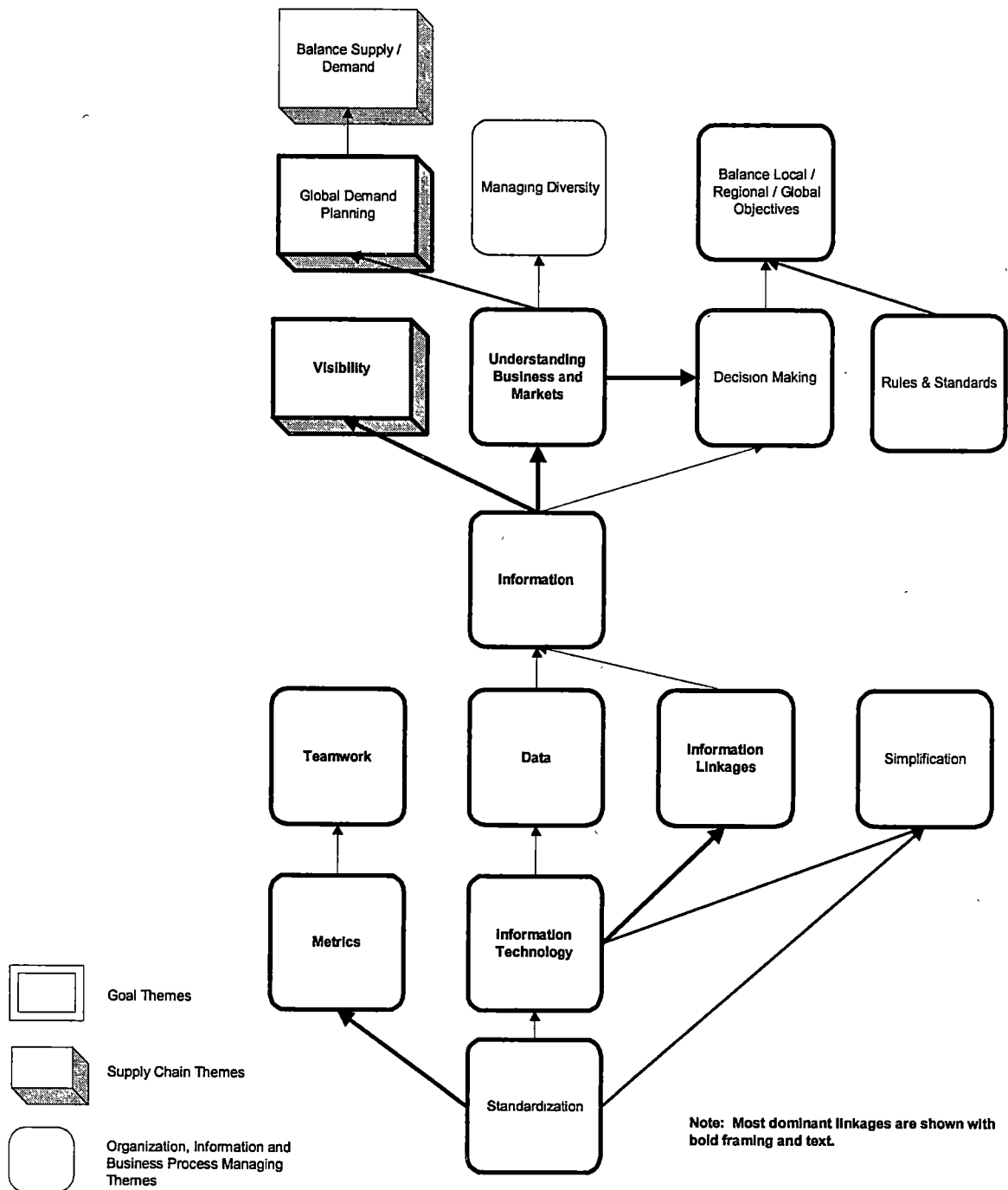


Figure A-8.4. Communications Technologies: Information Related Themes Hierarchical Value Map

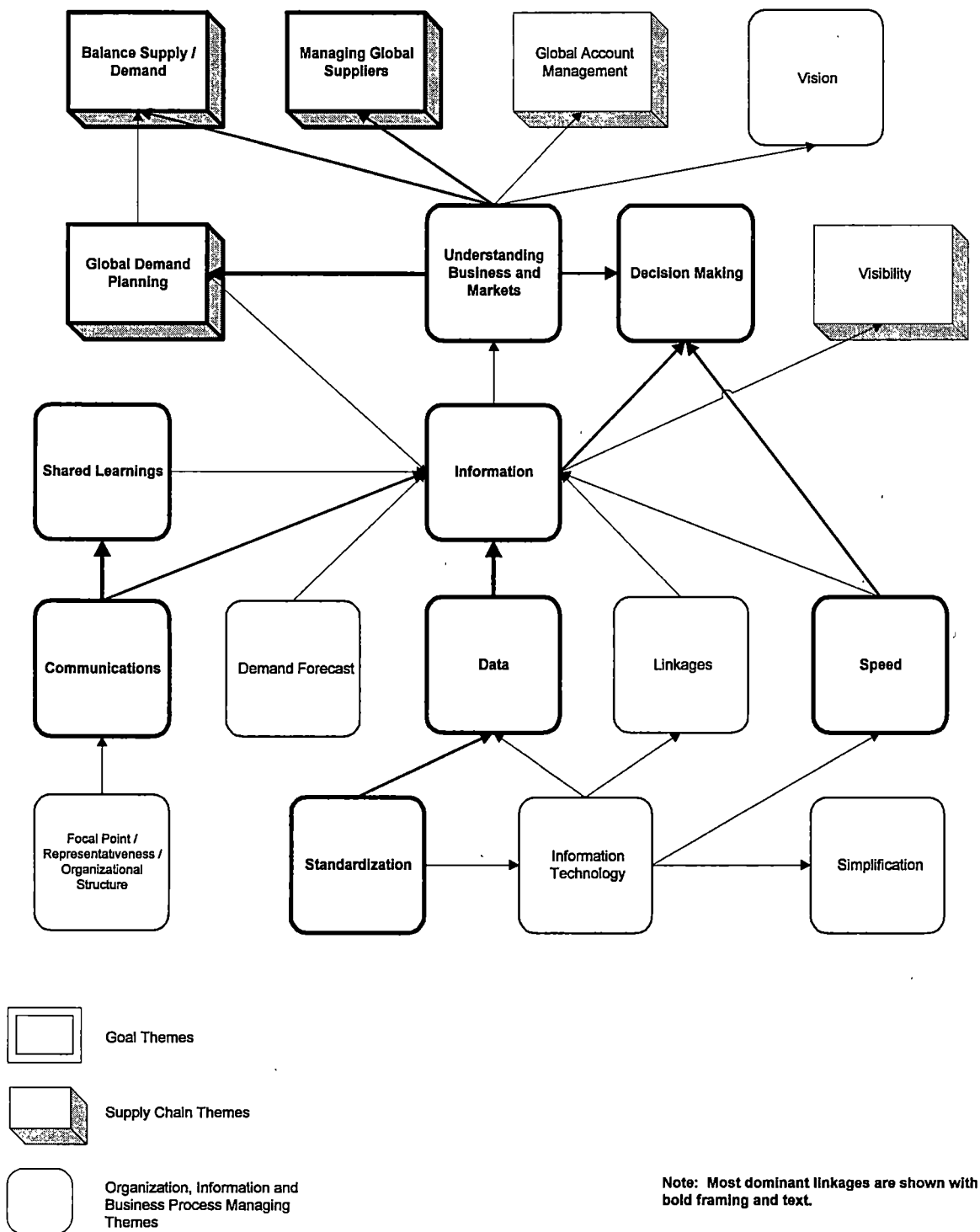


Figure A-8.5. Global Chemicals: Information Related Themes
Hierarchical Value Map

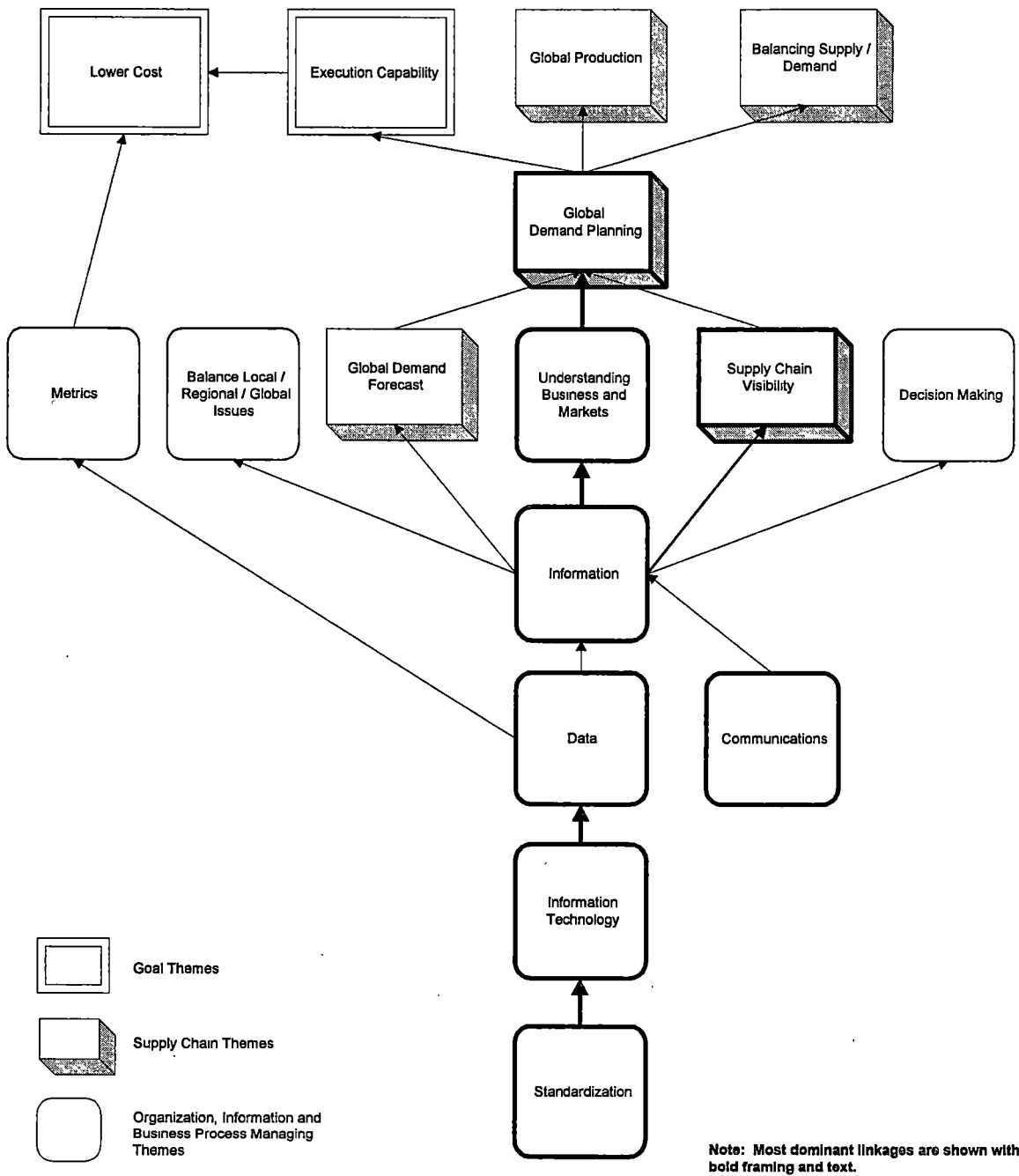


Figure A-8.6. Leading Edge Fibers: Information Related Themes
Hierarchical Value Map

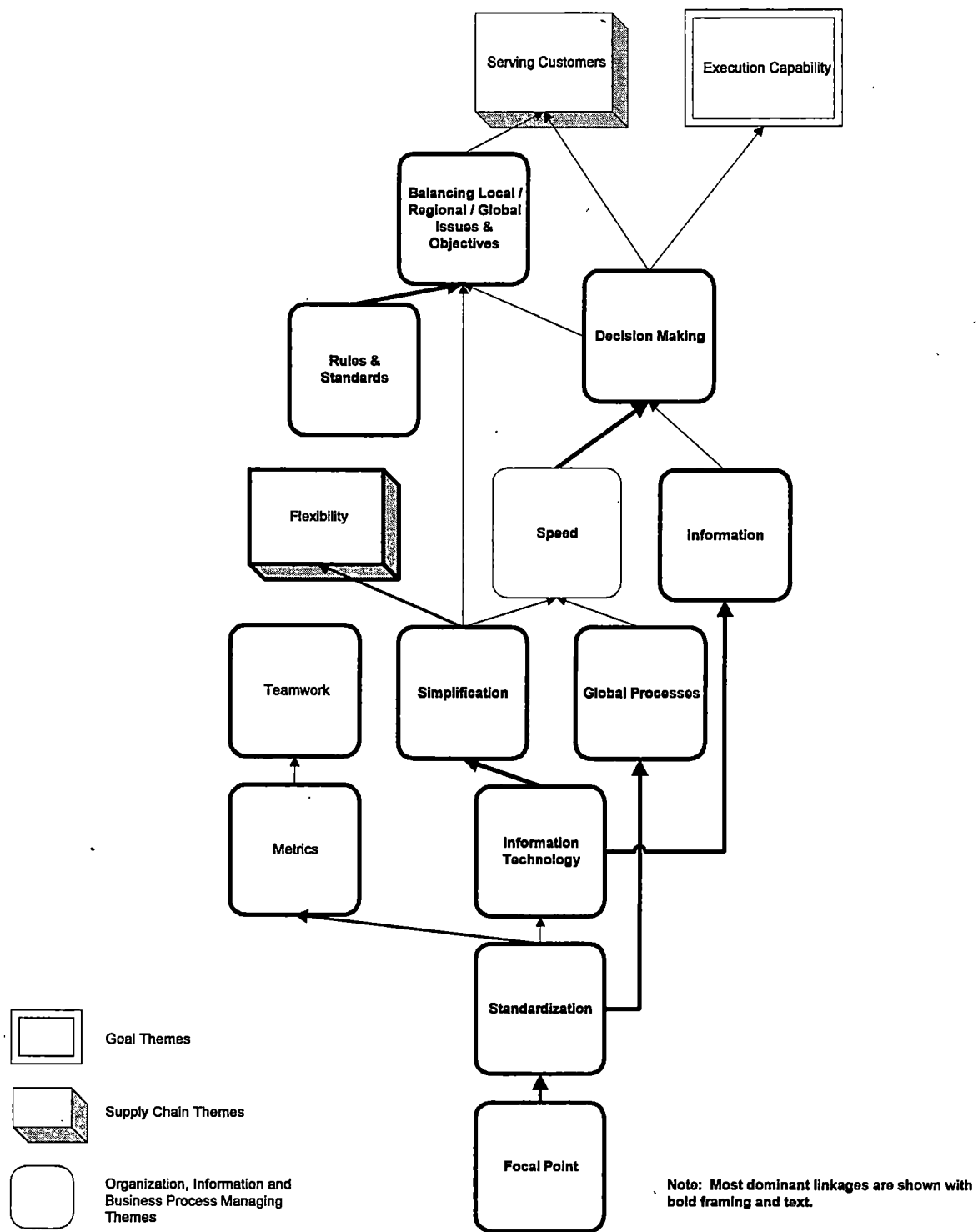


Figure A-8.7. Communications Technologies: Business Process Management Themes Hierarchical Value Map

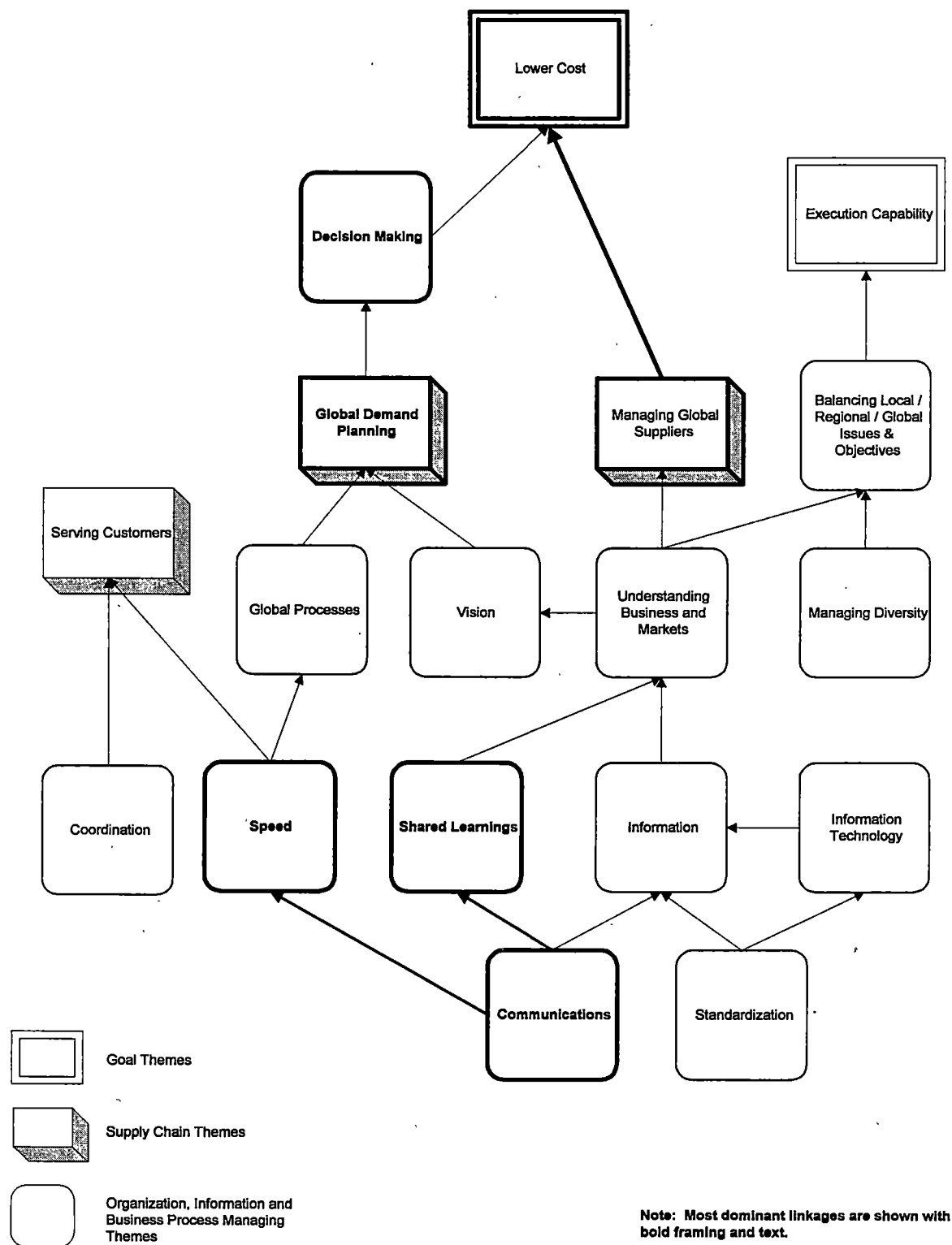


Figure A-8.8. Global Chemicals: Business Process Management Themes Hierarchical Value Map

VITA

Nancy W. Nix was born in Nashville, Tennessee, where she graduated from Glenclyff High School. As an undergraduate, she attended Salisbury State University, Salisbury, Maryland, where received her Bachelor of Science in Chemistry in May of 1980. After working for a number of years, she entered the Master's program in Business Administration at Temple University, Philadelphia, Pennsylvania, receiving her degree in August of 1994. In August of 1996, she entered the Doctoral program in the Department of Marketing, Logistics and Transportation at the University of Tennessee, Knoxville. The doctoral degree was received in December of 2001.

After completing her Bachelor of Science, she joined the DuPont Company, headquartered in Wilmington, Delaware, where her managerial experience spans multiple supply chain functions. After 15 years, she left the DuPont Company and joined Reliance Industries, Mumbai, India, where she served as an advisor for logistics planning and integration for a major expansion project.

Nancy is currently Director, Center for Supply and Value Chain Studies, at Texas Christian University in Fort Worth, Texas, where she is also a Teaching Professor in the Department of Marketing.