OUTSOURCING OF SUPPLY CHAIN PROCESSES: EVALUATING THE IMPACT OF CONGRUENCE BETWEEN OUTSOURCING DRIVERS AND COMPETITIVE PRIORITIES ON PERFORMANCE

A Dissertation
Presented to
The Academic Faculty

by

James R. Kroes

In Partial Fulfillment
of the Requirements for the Degree
Doctor of Philosophy in the
College of Management

Georgia Institute of Technology
August 2007

OUTSOURCING OF SUPPLY CHAIN PROCESSES: EVALUATING THE IMPACT OF ALIGNMENT BETWEEN OUTSOURCING DRIVERS AND COMPETITIVE PRIORITIES ON PERFORMANCE

Approved by:

Dr. Soumen Ghosh, Advisor
College of Management
Georgia Institute of Technology

Dr. Lawrence James
School of Psychology
Georgia Institute of Technology

Dr. Vinod Singhal
College of Management
Georgia Institute of Technology

Dr. Jeff Stratman
David Eccles School of Business
The University of Utah

Dr. Ravi Subramanian
College of Management
Georgia Institute of Technology

Date Approved: May 25, 2007

DEDICATION

I would be leaving out too many people if I were to dedicate this dissertation to anyone in particular. Instead, I want to dedicate this work to everyone that encouraged me to take this journey and to those who supported me over the past four years.

ACKNOWLEDGEMENTS

A tremendous number of people have provided me with guidance and assistance throughout my time as a doctoral student. I especially thank the staff, faculty, and my fellow students at Georgia Tech's College of Management for all of their assistance over the years.

I especially would like to acknowledge my advisor, Dr. Soumen Ghosh. Without his guidance, completing this dissertation would have been an even greater challenge.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

SUMMARY

The outsourcing of elements of supply chain processes is now an integral component of the operationalization of a firm's competitive business strategy. While the purported goal of outsourcing is usually to derive a competitive advantage in the marketplace, it is not clear whether the outsourcing decisions made by firms are always strategically aligned with their overall competitive strategy. To shed light on this important issue, this research study empirically examines the performance impact of the alignment (congruence) between a firm's competitive priorities (cost, flexibility, innovativeness, quality, and time) and the drivers of its outsourcing decisions. First, we develop and validate a survey instrument used to collect data for this study from manufacturing firms operating in the United States. Next, we use structural equation modeling to examine the impact of alignment between individual competitive priorities and related groups of outsourcing drivers. This analysis finds a significant positive relationship between outsourcing alignment and performance for a number of competitive priorities. Finally, we use cluster analysis to develop a taxonomy of manufacturing strategies which are tested to determine the relationship between the alignment of outsourcing decisions and performance. The taxonomic investigation identifies three unique clusters of firms based on their competitive priorities and then determines alignment between each cluster strategy and outsourcing to be significantly associated with better performance. To the best of our knowledge, there are no studies in the literature that address the issue of strategic congruence between the outsourcing drivers and competitive priorities of a firm, and the impact of such congruence on firm performance.

CHAPTER 1

INTRODUCTION

It is evident that the outsourcing of activities traditionally performed internally by firms to third party partners has become increasingly important in recent years. While in the past outsourcing was primarily relegated to the procurement of non-core components and services, today the outsourcing trend has expanded to include virtually every activity of a firm, including core and non-core components, business processes, information technology processes, manufacturing and distribution activities, and customer support activities (Chamberland, 2003; Gottfredson, Puryear, and Phillips, 2005; Holcomb and Hitt, 2007; Insinga and Werle, 2000; Kakabadse and Kakabadse, 2000b; Niezen and Weller, 2006; Venkatraman, 2004). Today's hyper-competitive environment, characterized by constant change, market unpredictability, and the pressure to reduce costs and cycle times, coupled with the globalization trend, has provided further impetus to the growth of outsourcing (D'Aveni, Canger, and Doyle, 1995).

It is also evident that manufacturing firms are now outsourcing functions and processes across the supply chain, including research and design, product development, product component manufacturing, product final assembly and distribution and logistics functions (Adler, 2003; Chamberland, 2003; Gottfredson et al., 2005; Heikkila and Cordon, 2002; Kirk, 2001; Niezen and Weller, 2006; Nohria, 2005; Orr, 2001; Palvia, 2003; Quinn, 1999; Ross, Dalsace, and Anderson, 2005; Willcocks, Hindle, Feeny, and Lacity, 2004). The growth of outsourcing has led outsourcing strategies to become an increasingly important component of firm success (Gottfredson et al., 2005; Kakabadse and Kakabadse, 2000a; Kakabadse and Kakabadse, 2000b; Talluri and

Narasimhan, 2004). While the purported goal of outsourcing in supply chains is to derive a competitive advantage, it is not clear whether the outsourcing decisions of firms are always strategically aligned with their overall competitive strategy.

The numerous benefits of outsourcing are well established. The popular business press is replete with examples of manufacturing firms that have been successful in harvesting the benefits of outsourcing by reducing costs, improving speed and responsiveness, reducing cycle times, improving innovativeness and quality, increasing flexibility and agility, and improving overall competitiveness (Chamberland, 2003; Chan and Pollard, 2003; Garaventa and Tellefsen, 2001; Kakabadse and Kakabadse, 2000a; Sislian and Satir, 2000; Venkatraman, 2004). Clearly, there are important economic and competitive benefits from this ever-increasing outsourcing trend; however, important debate continues in the practitioner and the academic communities on whether organizations are outsourcing functions without adequately conducting a strategic analysis of the long-term competitive impact of their outsourcing decisions (Bettis, Bradley, and Hamel, 1992; Garaventa and Tellefsen, 2001; Hamm, 2004).

Past research strongly advocates that to realize the potential for improved competitiveness, outsourcing decisions should be strategic and made in congruence with firm strategies (Chamberland, 2003; Gottfredson et al., 2005; Insinga and Werle, 2000; Merrifield, 2006). This requires that the factors driving outsourcing to be in alignment or congruence with the strategic goals and competitive priorities of the firm. The competitive priorities of a firm are the direct manifestation of the firm’s competitive capabilities and competencies, and are thus generally regarded as the firm’s manifesto for operations (Ward, McCreery, Ritzman, and Sharma, 1998). It is well established in the recent operations management literature that a firm’s competitive priorities can be defined along the dimensions of cost, quality, time, flexibility, and innovativeness (Boyer and Lewis, 2002; Krajewski and Ritzman, 1999; Skinner, 1966, 1974; Ward et al., 1998; Watts, Kim, and Hahn, 1992).

Interestingly, the operations literature is devoid of any research study, empirical or analytical, that addresses the vital research questions related to congruence (alignment, fit, agreement, or match) between a firm's outsourcing drivers and its competitive priorities. While a large body of existing anecdotal and case based literature is available to help guide decision makers on outsourcing decisions, no comprehensive empirically-based research studies exist in the literature that relate or link the alignment between firms' outsourcing drivers and their competitive priorities with key indicators of firm performance. Consequently, the key objectives of this paper are to evaluate the degree of congruence between a firm's outsourcing drivers and its competitive priorities, and assess the impact of congruence on both supply chain performance and business performance. This study utilizes survey based empirical data collected from manufacturing business units operating in the United States to address these research objectives.

The remainder of this paper is organized as follows. Chapter 2 presents the theoretical development and scale validation related to this study. The theoretical development frames the motivation and boundaries of this analysis. The scale development process refines existing scales that assess a firm's competitive priorities and performance and develops a new scale that measures a firms outsourcing drivers. An analysis of the performance impact of alignment using a "fit as moderation" approach is presented in Chapter 3. Fit as moderation is assessed using a structural equation modeling approach that considers the interactions between a firm's competitive priorities and their outsourcing drivers. The inclusion of the interactions in the model studied in

Chapter 3 allows for the measurement of the performance impact of the alignment between a competitive priority and its related outsourcing drivers. Chapter 4 investigates the impact of alignment using a taxonomic approach. Alignment is assessed in this chapter by using cluster analysis to create groups of firms with similar manufacturing strategy configurations which are then tested to evaluate the role of alignment across an entire strategy. The Chapter 5 of this dissertation summarizes the key findings, implications, and future research directions.

CHAPTER 2

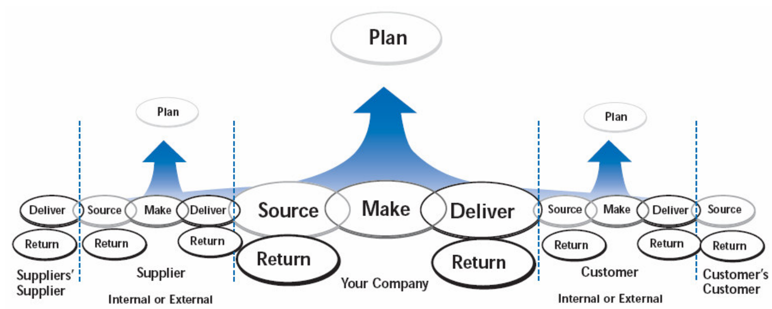
THEORETICAL DEVELOPMENT AND SCALE VALIDATION

2.1 Theoretical Development

Outsourcing decisions require a firm to determine which activities they should vertically integrate and perform using internal resources ("insource") and which activities they should procure from a third party supplier ("outsource") (Stuckey & White 1993). Outsourcing has become more important in today's increasingly competitive manufacturing environment (Chase, Jacobs, and Aquilano, 2004; Kakabadse and Kakabadse, 2003; Lankford and Parsa, 1999; Talluri and Narasimhan, 2004). The growth in the importance of outsourcing can be attributed to the ability of outsourcing programs to create or protect competitive advantages for a firm (Narasimhan and Das, 1999; Venkatesan, 1992). This growth in importance has transformed outsourcing from a tactical procurement exercise to a strategic component of a business strategy (Kakabadse and Kakabadse, 2003). The strategic benefits and competitive advantages generated by a well-executed outsourcing plan can provide numerous competitive benefits, including improved quality, lower costs, increased flexibility, and superior product designs (Ettlie and Sethuraman, 2002). In light of the increasingly important strategic nature of outsourcing across supply chains, this research effort is designed to examine if higher congruence between the drivers of supply chain process outsourcing and the operations strategy of a firm is significantly linked to improved supply chain and business performance.

2.1.1 Background

The characterization of the supply chain in this study is based on an extension of the Supply-Chain Operations Reference (SCOR) Model, shown in Figure 2.1 (Supply Chain Council, 2005). The SCOR model is widely used in practice and categorizes supply chain activities into five *processes*: Plan, Source, Make, Deliver, and Return. The activities within each supply chain process are referred to by SCOR as *process elements*. This study examines the outsourcing of process elements of a manufacturer's Source, Make, and Deliver processes. The *Source* process in the SCOR model refers to the sourcing, procurement, and internal fabrication of product components and services. The *Make* process refers to the final assembly of finished products, while the *Deliver* process elements include a manufacturer's distribution and logistics activities. In addition to these key supply chain processes implemented in SCOR, we adopt the broader view of a firm's supply chain by also including a firm's product development process as being an upstream component of its supply chain. Thus, based on the SCOR model, we embrace the process-based view of an organization's supply chain, consisting of the four key processes – product development, component manufacturing (Source), final assembly (Make), and distribution / logistics (Deliver).



SCOR Process	Definitions
Plan	Processes that balance aggregate demand and supply to develop a course of action which best meets sourcing, production and delivery requirements
Source	Processes that procure goods and services to meet planned or actual demand
Make	Processes that transform product to a finished state to meet planned or actual demand
Deliver	Processes that provide finished goods and services to meet planned or actual demand, typically including order management, transportation management, and distribution management
Return	Processes associated with returning or receiving returned products for any reason. These processes extend into post-delivery customer support

Source: Supply Chain Council, 2005.

Figure 2.1: Supply-Chain Operations Reference (SCOR) Process Model

Existing research in the outsourcing literature primarily addresses issues related to supplier selection, supplier management, supplier relationships, procurement strategy, outsourcing risks and benefits, etc. (Anderson and Katz, 1998; Bozarth, Handfield, and Das, 1998; Chamberland, 2003; Embleton and Wright, 1998). To the best of our knowledge, there are no studies in the literature that address this important issue of strategic congruence between the outsourcing drivers and competitive priorities of a firm and the impact of such congruence on firm performance.

2.1.2 Competitive Business Strategy and Competitive Priorities

The role that firm's business or competitive strategy plays in determining the firm's functional manufacturing and supply chain management strategies has been the subject of a considerable body of previous research (Devaraj, Hollingworth, and Schroeder, 2004; Kakabadse and Kakabadse, 2000a; Kathuria, 2000; Kathuria and

Porth, 2003; Koufteros, Vonderembse, and Doll, 2002; Miller and Roth, 1994; Narasimhan and Das, 1999; Skinner, 1966, 1969, 1974; Vickery, 1991; Vickery, Droge, and Markland, 1997; Ward et al., 1998). Competitive strategies usually drive a firm to compete as cost leader, differentiator, or as a focused provider (Porter, 1980). In manufacturing firms, the competitive business strategy is translated into competitive priorities and executed or operationalized through operational action plans (Hayes and Schmenner, 1978; Hayes and Wheelwright, 1984; Koufteros et al., 2002). Competitive priorities are the strategic business objectives and goals of the manufacturing organization (Koufteros et al., 2002). In the manufacturing environment, there are five traditionally accepted competitive priorities: cost, time, innovativeness, quality, and flexibility (Boyer and Lewis, 2002; Krajewski and Ritzman, 1999; Leong, Snyder, and Ward, 1990; Safizadeh, Ritzman, Sharma, and Wood, 1996; Skinner, 1974; Ward et al., 1998). The determination of the competitive priorities in a firm can be related to a firm's core competencies in two ways. First, a firm's competitive priorities may lead to the development of a supporting set of competencies and capabilities (Koufteros et al., 2002). Similarly, a firm may possess core competencies and capabilities that play a role in determining which priorities a firm chooses to focus on (Krajewski and Ritzman, 1999).

When determining its competitive priorities, a firm decides on the amount of time and resources that it invests in the various areas of its operations across the five competitive priority dimensions (Boyer and Lewis, 2002). This decision results in a trade-off strategy where a firm ideally focuses more resources on the activities related to its competitive priorities and fewer resources on non-priority activities (Boyer and Lewis, 2002; Kathuria, 2000).

The competitive priority scales adapted for use in this study measure the emphasis that a business unit places on each of the five competitive priorities when positioning the its primary product. The importance given to each competitive priority is measured independently of the other priorities, which allows us to assess the overall strategy, including strategic trade-offs adopted by a firm.

Choosing cost as a competitive priority drives a firm to produce its products at a low cost and offer them for sale at a low price (Krajewski and Ritzman, 1999). Virtually every manufacturing organization is concerned with the cost of its goods and services; however not all firms choose cost as the primary dimension on which they compete. Firms that do view cost as a competitive priority often make trade-offs and sacrifice performance related the other competitive priorities (Boyer and Lewis, 2002). These sacrifices often are worth the trade-offs, as lower product prices can lead to increases in sales volume which can increase profits due to economies of scale (Koufteros et al., 2002). To compete on a cost basis, firms must focus on reducing overall costs across their supply chain in an effort to reduce the cost structure of their products (Koufteros et al., 2002; Krajewski and Ritzman, 1999; Safizadeh, Ritzman, and Mallick, 2000; Safizadeh et al., 1996; Shin, Collier, and Wilson, 2000; Vickery et al., 1997). In manufacturing specifically, a cost focus can impact a number of areas including direct production costs, capacity utilization, market expansion, productivity, and inventory levels (Safizadeh et al., 2000; Ward et al., 1998).

Flexibility allows a firm to react to the uncertainties and unpredictability inherent in the manufacturing industry (Boyer and Lewis, 2002; Gerwin, 1987). The ability to react to unanticipated events more quickly than competitors can result in a competitive advantage for a manufacturing firm (Vickery et al., 1997). When focusing on flexibility as a competitive priority, most firms emphasize volume flexibility and a broad product line

(Boyer and Lewis, 2002; Safizadeh et al., 1996; Ward et al., 1998). Volume flexibility permits a firm to respond rapidly to variations in customer demand (Kathuria, 2000; Safizadeh et al., 2000; Safizadeh et al., 1996) and a broad product line allows a firm to offer a mix of products that meet the unique requirements of its various customers (Boyer and Lewis, 2002; Kathuria, 2000; Safizadeh et al., 2000; Safizadeh et al., 1996; Shin et al., 2000).

Innovativeness refers to a firm's ability to introduce new products that employ new technologies and the ability to make design improvements to existing products (Capon, Farley, Lehmann, and Hulbert, 1992; Safizadeh et al., 2000; Safizadeh et al., 1996). A firm that focuses on innovativeness may be the first to market with new products and have a number of products in the early stages of the product life cycle (Capon et al., 1992). Customers often consider innovative new products to be superior to existing products, which may allow a firm to gain an advantage by increasing their market share (Gjerde, Slotnick, and Sobel, 2002; Govindarajan and Kopalle, 2006; Lau, 2002; Moore, 2002). Previous research also finds a linkage between high levels of innovativeness and profitability (Capon et al., 1992).

Manufacturing firms that choose quality as a competitive priority focus on providing products that conform to specifications while outperforming competitors' products (Christiansen, Berry, Bruun, and Ward, 2003). Conformance quality refers to a product's capability to meet the design specifications required by the customer (Krajewski and Ritzman, 1999; Shin et al., 2000; Ward et al., 1998). Performance quality refers to a product's ability to perform its function extremely well compared to similar products (Krajewski and Ritzman, 1999; Safizadeh et al., 2000; Safizadeh et al., 1996; Shin et al., 2000). The ability to deliver high-quality products with superior capabilities, features, reliability, safety, or performance allows firms emphasizing quality as a priority to achieve a competitive advantage over firms offering lower quality products (Koufteros et al., 2002; Safizadeh et al., 2000; Ward et al., 1998).

Organizations that choose time as a competitive priority focus on rapid product development, delivery speed, and the on-time delivery of products (Frohlich and Dixon, 2001). Delivery speed refers to the ability to deliver a product to a customer quickly with the shortest lead time possible. On-time delivery means that a product is delivered to a customer when it was promised to be delivered (Krajewski and Ritzman, 1999). Competing on a time basis can lead to a competitive advantage when customers that face time constraints choose to purchase products that can be delivered in a timelier fashion than products known to be of higher quality or lower cost (Ward et al., 1998). Timeliness can be affected by focusing efforts on reducing development and production cycle times (Krajewski and Ritzman, 1999; Shin et al., 2000; Ward et al., 1998), reducing setup and changeover times, and reducing lead times (Boyer and Lewis, 2002).

2.1.3 Outsourcing Drivers

Consistent with the existing literature, we refer to the motivation, objectives, and goals of a firm's outsourcing effort related to its supply chain processes and activities as the firm's supply chain *outsourcing drivers* (Fisher, Ramdas, and Ulrich, 1999; Heikkila and Cordon, 2002; Kakabadse and Kakabadse, 2000b). Outsourcing drivers are the direct outcome of the operationalization of a firm's competitive priorities into action plans. The scales developed for this study measure the importance or emphasis that a business unit places on the outsourcing drivers when making decisions of whether to insource or outsource supply chain processes (elements, activities).

Existing theory identifies the role that outsourcing can play in developing a competitive advantage for a firm. Three views of competitive advantage explain the role that outsourcing can play in increasing firm competitiveness; they are transaction cost economics, the resource-based view, and the knowledge-based view.

Transaction cost economics (TCE) posit that firms adopt governance structures which minimize the transaction costs (Williamson, 1975, 1985). In an outsourcing context, TCE predicts that firms will make an outsourcing decision when outsourcing results in a reduction in firm size that leads to an overall reduction in the required transaction costs (Aubert, Rivard, and Patry, 2004; Holcomb and Hitt, 2007; Kern and Willcocks, 2002; Murray and Kotabe, 1999; Schniederjans, Schniederjans, and Schniederjans, 2005). Although outsourcing may generate additional costs associated with the oversight of the relationship with a third party vendor, the principles of TCE hold true as long as the outsourcing relationship results in lower total production and transaction costs (Leiblein, 2003).

The *resource-based* view states that unique firm resources such as capital assets, capabilities, and processes enable a firm to execute strategies which can lead to efficiency and effectiveness improvements (Barney, 1991). Resources that are valuable, rare, imperfectly imitable, or without an equivalent substitute can provide a competitive advantage for a firm. From a *resource-based* viewpoint, an outsourcing decision can be explained as a choice that a firm makes between using internal or external resources to complete a task in order to gain a competitive advantage (Holcomb and Hitt, 2007; Steensma and Corley, 2000).

The *knowledge-based* view posits that a core capability is a knowledge set that distinguishes one group from another and provides a competitive advantage (Leonard-Barton, 1992a). The knowledge set may take the form of employee knowledge or skills, technical systems, managerial systems, or norms and values. By examining outsourcing through a *knowledge-based* lens, we see that an outsourcing decision attempts to identify the organization, whether internal or external, that can provide a knowledge set that generates a competitive advantage for a firm (Capron and Mitchell, 2004).

A common thread between TCE, the *knowledge-based* view and the *resource-based* view that has been widely applied to outsourcing research is that firms should attempt to exploit those activities which can provide a firm with a competitive advantage. Firms should maintain activities in-house if the internal resources or knowledge sets provide a core capability that generates a competitive advantage and outsource those activities that do not provide an advantage (Chamberland, 2003; Kakabadse and Kakabadse, 2003; Krizner, 2000; Venkatesan, 1992). In other words, activities should be insourced if a firm can perform them in a way that allows them to be positively distinguished from competitors (Insinga and Werle, 2000). Outsourcing should occur when a supplier can provide a firm with a comparative advantage (compared to the internal capability to complete the activity) due to a lower cost structure or performance advantage (Venkatesan, 1992). This framework for outsourcing decisions is generally accepted in the literature and industry; however, the theory does not address how a firm should link its outsourcing decisions to its business strategies. Our study does not dispute the effectiveness of the generally accepted framework. Rather, we extend previous outsourcing strategy research by examining the role that the congruence between the outsourcing drivers and competitive priorities plays in improving firm performance.

Outsourcing decisions are motivated by a variety of factors (drivers) that may be strategic (e.g., cost competitiveness) as well as tactical (e.g., meet conformance quality requirements). A thorough literature review of existing research was conducted to identify the most important outsourcing drivers employed by manufacturing organizations

(Benjaafar, Elahi, and Donohue, 2007; Bozarth et al., 1998; Choi and Hartley, 1996; Frohlich and Dixon, 2001; Gottfredson et al., 2005; Insinga and Werle, 2000; Kakabadse and Kakabadse, 2000a; Koh and Venkatraman, 1991; Lee, 2004; Leonard-Barton, 1992b; Loh and Venkatraman, 1992; McFarlan and Nolan, 1995; Min and Galle, 1991; Narasimhan and Das, 1999; Smith, Mitra, and Narasimhan, 1998; Weber, Current, and Benton, 1991). We identified 16 distinct, common outsourcing drivers from a careful review of the relevant academic and practitioner literature. Additionally, three outsourcing drivers were suggested by industry experts during the Q-Sort exercise, thus resulting in a total of 19 outsourcing drivers that are included in this study. These 19 drivers represent the most commonly cited motivators of outsourcing decisions; however they do not represent a comprehensive inventory of every possible outsourcing driver.

To evaluate the congruence or alignment between a firm's competitive priorities and the outsourcing drivers of its supply chain processes, we mapped the 19 outsourcing drivers to the competitive priority with which each driver is most related. This process results in five outsourcing driver groups; each one of contains the outsourcing drivers related to a single competitive priority. Theoretical grounding of this driver categorization was established by using the literature to identify the specific competitive priority with which each of the drivers is primarily associated. Table 2.1 shows the outsourcing driver groupings, which are categorized according to the competitive priorities that are the most affected by them, and the relevant literature that theoretically supports the competitive priority categorization of each driver. The outsourcing driver groupings are used during the analysis phase of this study to measure the emphasis given to each of the five competitive priorities by a firm making an outsourcing decision.

Table 2.1: Categorization of Outsourcing Drivers

	Source
Cost Related Drivers	
Allow resources to focus on core competency - low cost	(Gottfredson, Puryear, and Phillips, 2005; Leonard-Barton, 1992)
Increase volume through new market penetration	(Bozarth, Handfield, and Das, 1998; Min and Galle, 1991)
Lower total costs	(Bozarth et al., 1998; Insinga and Werle, 2000; Kakabadse and Kakabadse, 2000; Smith, Mitra, and Narasimhan, 1998;
Reduce logistics costs	Q-Sort
Reduce regulatory and legal costs	Q-Sort
Flexibility Related Drivers	
Improve process responsiveness	(Narasimhan and Das, 1999; Choi and Hartley, 1996; Weber, Current, and Benton, 1991)
Increase supply chain flexibility	(Lee, 2004)
Increase volume capability	(Loh and Venkatraman, 1992)
Multiple sourcing for uncertainty preparedness	Q-Sort
Allow resources to focus on core competency - flexibility	(Gottfredson et al., 2005; Leonard-Barton, 1992)
Innovativeness Related Drivers	
Access to specific labor and/or technology expertise	(Bozarth et al., 1998; Loh and Venkatraman, 1992; McFarlan and Nolan, 1995; Weber et al., 1991)
Allow resources to focus on core competency -	(Gottfredson et al., 2005; Leonard-Barton, 1992)
Gain access to new technology	(Koh and Venkatraman, 1991; Bozarth et al., 1998; Loh and Venkatraman, 1992; Smith et al., 1998; McFarlan and Nolan,
Quality Related Drivers	
Allow resources to focus on core competency - quality	(Gottfredson et al., 2005; Leonard-Barton, 1992)
Improve conformance quality	(Bozarth et al., 1998; Loh and Venkatraman, 1992; McFarlan and Nolan, 1995; Frohlich and Dixon, 2001)
Improve product performance design quality	(Bozarth et al., 1998; Loh and Venkatraman, 1992; McFarlan and Nolan, 1995; Frohlich and Dixon, 2001)
Time Related Drivers	
Allow resources to focus on core competency - time	(Gottfredson et al., 2005; Leonard-Barton, 1992)
Improve process capability and cycle times	(Weber et al., 1991)
Improve process lead times	(Narasimhan and Das, 1999; Choi and Hartley, 1996; Weber et al., 1991)

Industry experts have previously identified cost savings as the leading driver of outsourcing (Casale, 2004; Goldsmith, 2003; Schniederjans et al., 2005). Outsourcing often improves cost competitiveness because a firm can eliminate unproductive assets, reduce capital spending, and partner with a firm that can perform an activity at a lower cost. Cost related outsourcing drivers include the selection of a partner that offers lower total, logistics, regulatory, and/or legal costs to perform an activity. Firms may also be driven to select a partner that allows access to a new market, thus increasing sales volume which leads to economies of scale.

Firms that focus on flexibility when making outsourcing decisions are motivated to effectively respond to changing customer requirements (Frohlich and Dixon, 2001). Changing requirements may take the form of demand fluctuations or changes in the required product characteristics (Schniederjans et al., 2005). Outsourcing drivers that support flexibility include a desire to increase process responsiveness and the ability to change production volumes and supply chain activities in response to changing market demands (Choi and Hartley, 1996; Lee, 2002; Loh and Venkatraman, 1992; Narasimhan and Das, 1999; Weber et al., 1991). Outsourcing an activity to multiple vendors can improve a firm's preparedness to react flexibly to the uncertainty of the manufacturing environment.

Firms that emphasize innovativeness when making outsourcing decisions focus on rapidly delivering products featuring new technologies and novel features (Safizadeh et al., 1996). Outsourcing can improve innovativeness by allowing a firm to access skills and expertise not available in-house (Hoecht and Trott, 2006; Schniederjans et al., 2005). Similarly, firms may consider insourcing activities if it allows them to leverage unique skills and expertise not available to competitors. To accomplish this goal, outsourcing drivers related to innovativeness focus on the selection of sources that provide access to new technologies and expertise related to new technologies (Bozarth et al., 1998; Gottfredson et al., 2005; Leonard-Barton, 1992a; Loh and Venkatraman, 1992; McFarlan and Nolan, 1995; Weber et al., 1991).

Focusing on quality when making outsourcing decisions requires a firm to consider both the conformance and performance quality of products (Bozarth et al., 1998; Frohlich and Dixon, 2001; Gottfredson et al., 2005; Leonard-Barton, 1992a; Loh and Venkatraman, 1992; McFarlan and Nolan, 1995). The outsourcing of activities may be motivated by the availability of a vendor with superior expertise that can improve the conformance and/or performance of an activity for a firm (Schniederjans et al., 2005). A firm with superior in-house skill sets may be driven to insource an activity if its ability to perform an activity in a higher quality manner leads to an advantage over competitors.

A focus on time when making outsourcing decisions implies that a firm is competing on the ability to perform activities more quickly or speedily with better on-time performance (Frohlich and Dixon, 2001). To improve product delivery speed and the ability to develop and deliver products on-time, a firm is driven to choose sources that can conduct activities with less lead time compared to other potential sources (Narasimhan and Das, 1999; Weber et al., 1991). A firm may choose a source that offers comparatively faster process capability and reduced cycle times (Weber et al., 1991).

2.2 Scale Development and Validation

We employed a two stage approach to develop and validate the scales used in this research effort (Moore and Benbasat, 1991). In the first stage, we leveraged existing research efforts and input from industry experts to develop the constructs and related items. In the second stage, we utilized a survey based approach to collect empirical data which was used to refine and validate our scales.

2.2.1 Scale Development

The procedure utilized in this study is based on methodologies developed and employed in previous scale development efforts found in the literature (Churchill, 1979; Moore and Benbasat, 1991; Stratman and Roth, 2002). The research goals of this study require the use of several valid scales that measure the distinct characteristics related to the competitive priorities, outsourcing of activities, and performance measures across a manufacturing organization's supply chain. Specifically, we developed a scale that assess the importance given to the five competitive priorities when positioning the primary product in the organization, scales to determine the importance given to the drivers of outsourcing decisions relating to the same primary product in each of an organization's four supply chain areas, and scales to evaluate the supply chain and business performance of an organization relative to its competitors.

2.2.1.1 Construct and item specification

The constructs and items used in this study are theoretically grounded using the current literature. Appendix A details the constructs, their associated items, and the item sources for each of the scales. The competitive priority scales used in this study are an extension of competitive priority scales found in the literature (Boyer and Lewis, 2002; Díaz, Gil, and Machuca, 2005; Kathuria, 2000; Koufteros et al., 2002; Krajewski and Ritzman, 1999; Safizadeh et al., 2000; Safizadeh et al., 1996; Shin et al., 2000; Vickery et al., 1997; Ward et al., 1998). These scales were modified to include a construct to assess the importance given to innovativeness as a competitive priority within a firm. The constructs evaluating the importance given to the outsourcing drivers in each supply chain area were newly developed for this study. They are based on the existing outsourcing literature as well as feedback from expert judges that participated in our Q-Sort activity. Four sets of items were used to evaluate the importance given to outsourcing drivers in four distinct areas of the supply chain considered in this study: product development, component manufacturing, final assembly, and distribution / logistics. In this study, the relationship between competitive priorities and outsourcing drivers is examined across the entire supply chain. Therefore the responses from each supply chain area were aggregated to provide a single assessment of the emphasis given to the outsourcing drivers across the entire supply chain. (This process is described in detail in Section 2.2.2.1). The constructs used to measure supply chain and business performance in this study are adapted from several performance measurement scales found in the literature (Hendricks and Singhal, 2005; Swafford, Ghosh, and Murthy, 2006; Tan, Kannan, Handfield, and Ghosh, 1999).

2.2.1.2 Q-Sort Procedure

A Q-Sort procedure employing expert judges was used to pre-test the validity and reliability of the modified competitive priority and newly developed outsourcing driver scales (Moore and Benbasat, 1991). Two sorting rounds were conducted using 14 individual judges with practical working experience managing activities in manufacturing supply chains. The sorting process was performed for the competitive priority and outsourcing driver scales. In each sorting round, the judges were given detailed construct definitions and a list of items. The judges were then asked to match each item with one of the constructs. Judges were also permitted to select "Not Applicable" if they felt than item did not match to one of the constructs. Furthermore, judges were asked to provide suggestions for additional items to include in the scales.

Eight judges completed the first round sorting exercise for both sets of scales. The content validity of the proposed scales was evaluated after the first sorting round by examining the item placement scores. Constructs with item placement scores greater than 70% are considered to exhibit acceptable content validity (Moore and Benbasat, 1991). Constructs with item placement scores less than 70% were closely examined and items were either added or modified in an attempt to improve the placement ratio.

In the final round, judges again completed a sorting exercise for the competitive priority and outsourcing driver scales. All of the item placement scores for both scales exceeded the recommended level of 70%. These results indicated that the proposed scales possessed sufficient content validity to proceed with the full scale survey.

The reliability of the proposed scales was assessed by measuring the inter-judge agreement during the final sorting round by evaluating the Perreault and Leigh (1989) inter-judge agreement statistic (which measures the level of agreement above that which would be expected by chance.) A statistic value greater than 0.65 is considered to be acceptable (Perreault and Leigh, 1989). The scales had a minimum judge-pair Perreault and Leigh score of 0.77 and an average of 0.82.

2.2.1.3 Survey Method

We used an online survey method for data collection. The website was designed using the internet based survey methodology developed by Dillman (2000). Survey respondents were asked questions to evaluate the importance give to competitive priorities relative to the primary product manufactured by their business unit. The respondents were also surveyed to measure the emphasis placed on the outsourcing drivers in the product development, component manufacturing, final assembly, and distribution / logistics areas when making outsourcing decisions related to the same primary product. The supply chain and business performance in the respondent's organization was measured relative to the competitors in their industry. All of the questions were answered using a five-point Likert scale. The survey questions and items are detailed in Appendix A.

The preliminary sample frame for this study consisted of a list of members of a professional organization of supply chain executives. From this membership list, we identified 1,793 supply chain managers and executives working at manufacturing business units located in the United States. Letters requesting participation in the study were mailed to these supply chain professionals. The letter included a description of the research project and a link to the web site hosting the online survey. Respondents were offered the opportunity to receive a benchmark report comparing their responses with those of the other respondents as an incentive to increase participation.

Detailed response rate information is provided in Panel A of Table 2.2. To improve the response rate, the initial letters were followed up by a round of reminder postcard mailings followed by two rounds of email reminders (Dillman, 2000). 469 of the postal mailings and email messages were returned due to incorrect or outdated contact information, which reduced our valid sample frame to 1,324 potential respondents. We received a total of 291 survey responses, resulting in an overall response rate of 22%. Of these responses, 58 were not fully completed and discarded, thereby resulting in 233 usable responses. This resulted in an effective response rate of 18%.

2.2.1.4 Non-Response Bias

We use two methodologies to examine non-response bias in our sample. First, we compare the first 30 responses to our survey with the last 30 responses to our survey. Using this method, the last 30 responses are considered to be a proxy for the non-responders (Armstrong and Overton, 1977). The responses to our survey were collected over a three month time period. We use a t-test to examine for significant differences between the means of six of the descriptive statistics collected in our survey. The results of the t-tests are reported in Panel B of Table 2.2. All of the tests conclude that there are no significant differences between the first 30 and last 30 responses (p-value > 0.15). These results support a lack of a non-response bias in our sample.

The second method to examine for non-response bias compares financial data for publicly traded firms in our sample with data for the publicly traded firms in our sample frame. We used data retrieved from Compustat financial database to compare the 117 publicly traded firms in our sample of responses with the 442 public firms in our sample frame. A t-test did not find any significant differences (p-value > 0.10) between the sample and sample frame data for the 2004 financial data consisting of total asset level, inventory values, long term debt, and net value of plant, property, and equipment. Panel C of Table 2.2 reports the results of these tests. These findings further support the absence of a non-response bias in our sample.

Table 2.2: Non-response Bias Evaluation

Panel A - Response Rate	n	Response Rate
Sample Frame Size	1793	
Returned Messages	469	
Valid Sample Frame Size	1324	
Responses Received	291	22%
Usable Responses Received	233	18%

Panel B - Comparison of Early and Late Responses

	Respondent's Level within his / her organization.	2005 Business Unit Sales Volume (Self Reported)	# of Employees (Self Reported)	Product Development % of activities outsourced	Final Assembly % of activities outsourced	Distribution / Logistics % of activities outsourced
First 30 Responses - Average	3.80	4.10	3.87	1.10	1.80	2.73
Last 30 Responses - Average	3.67	4.80	3.57	1.17	2.20	2.40
t-test of differences between the means (p-value)	0.64	0.18	0.58	0.66	0.29	0.40

Panel C - Comparison of Metrics - Publicly Traded Firms (Sample frame n=442, Responses n=117)

	2004 Assets - Total (MM$)	2004 Inventories - Total (MM$)	2004 Long-Term Debt - Total (MM$)	2004 Plant, Property, & Equipment - Net (MM$)
Responding Companies - Average	$22,228	$3,722	$5,316	$10,937
Full Sample Frame - Average	$17,513	$3,705	$4,101	$8,480
t-test of differences between the means (p-value)	0.18	0.50	0.17	0.17

2.2.1.5 Sample Characteristics

Table 2.3 contains descriptive information about the survey respondents. An examination of this data shows that the organizations included in our study represent a diverse set of organizations. The organizations were classified into industry groupings representing the first two digits of the SIC code for each organization. About 50% of the organizations operate in the "Miscellaneous manufacturing" industry, 20% operate in the "Electronic and other electrical equipment and components" industry, and the remaining 30% are spread throughout the remaining seven industry groupings. The median organization in our sample reports an annual sales volume ranging between $251 million and $500 million and a number of employees in the 501 to 1000 person range.

Table 2.3: Profile of Survey Respondents

Metric	Number	Percentage
Industry Groupings		
Apparel and other finished products made from fabric	7	3.0%
Furniture and fixtures	5	2.1%
Rubber and miscellaneous plastic products	13	5.6%
Fabricated metal products	12	5.2%
Industrial and commercial machinery and computer equipment	11	4.7%
Electronic and other electrical equipment and components	46	19.7%
Transportation equipment	10	4.3%
Measuring, analyzing, and controlling instruments	5	2.1%
Miscellaneous manufacturing	117	50.2%
Not Reported	7	3.0%
Sales Volume ($US)		
Less than $50 million	11	4.7%
$50 to $100 million	18	7.7%
$101 to $250 million	25	10.7%
$251 to $500 million	32	13.7%
$501 million to $1 billion	26	11.2%
Over $1 billion	121	51.9%
Number of Employees		
Less than 200	36	15.5%
201 to 500	45	19.3%
501 to 1000	28	12.0%
1001 to 1500	23	9.9%
1501 to 2500	23	9.9%
Over 2500	71	30.5%
Not Reported	7	3.0%
Respondent Title		
Supply Chain Specialist	13	5.6%
Supply Chain Team Leader	4	1.7%
Supply Chain Manager	73	31.3%
Supply Chain Director	62	26.6%
Supply Chain Executive / VP	44	18.9%
Other	5	2.1%

To improve data accuracy, it is important to target key informants with knowledge relevant to the issue of interest when conducting a study based on the input of a single respondent at each organization of interest (Huber and Power, 1985). We were successfully able to target key informants in this study as more than 75% of the respondents reported their position as Supply Chain Manager, Supply Chain Director, or Supply Chain Executive / VP.

37 of the respondents indicated that they do not outsource activities in any area of their supply chains. These respondents were dropped from the investigation resulting in a final sample of 196 firms used to analyze the impact of outsourcing congruence.

2.2.2 Empirical Scale Validation

The items and constructs used for this study have been developed using the theory building approach based on the current literature, along with input from industry experts; therefore we use a confirmatory factor analysis (CFA) approach to validate our scales rather than an exploratory approach (Ahire and Devaraj, 2001; Hatcher, 1994; Malhotra and Grover, 1998; Shah and Goldstein, 2006).

2.2.2.1 Final Measurement Models

The competitive priority measures used in this study assess the strategic importance that an organization places on cost, flexibility, innovativeness, quality, and time. These competitive priorities represent a firm's strategy and are measured in regards to the primary product line produced by the manufacturing business unit. The cost measures evaluate the degree to which organizations are committed to competing by offering lower priced products compared to their competitors. The importance of cost is evaluated by items that measure the importance a firm places on improving utilization and productivity, reducing inventory costs, and lowering manufacturing costs. The flexibility measures appraise the level of importance that an organization places on the ability to rapidly respond to variations in customer demands. The variations in customer demand considered by the flexibility measures take the form of both volume and product mix changes. The innovativeness construct measures an organization's commitment to the rapid introduction of products that employ new technology and features. The importance of innovativeness as a competitive priority is quantified by items measuring the level to which a firm chooses to compete by offering products that use advanced technologies and / or features to differentiate themselves from their competition. An organization that competes on quality offers products that meet customers' design specifications and perform their functions extremely well compared to similar products. The items that measure the importance of quality as a competitive priority assess the emphasis given to conformance quality, performance quality, product reliability, and resolution of customer inquiries. The time construct measures an organizations desire to deliver products to customers on-time with shorter lead times compared to their competitors. To gauge the importance of time in an organization, the items in this construct measure the emphasis that an organization places on reducing production lead times, product development cycle times, and production setup and changeover times.

The outsourcing driver constructs measure the emphasis given to a variety of factors an organization considers when making a decision of whether or not to outsource a supply chain activity related to the primary product line. These measures independently evaluate the outsourcing drivers in each of the four supply chain areas included in this study: product development, component manufacturing, final product assembly, and distribution / logistics. The set of drivers is applicable to each of the four supply chain areas; therefore the same set of items is assessed in each area. Although data was collected individually for each supply chain area, the analysis presented in this study examines the aggregate supply chain. The area specific outsourcing data will support a future extension of this research.

The individual outsourcing driver measurement models were developed by grouping the items together based on the competitive priority with which the item is most closely associated. The cost related items measure the emphasis given by an organization to drivers outsourcing that result in lower total costs, increased economies of scale, lower legal costs, and lower logistics costs. Flexibility related outsourcing driver items assess the emphasis placed by an organization considering outsourcing to improved process responsiveness, increased supply chain flexibility, increased volume capability, and preparedness to react to market uncertainties. Innovativeness outsourcing driver items measure the emphasis an organization places on gaining access to new technology and expertise. The time related outsourcing driver items measure the importance placed on improved lead times and cycle times by an organization.

The performance scales included in this study assess the levels of supply chain and business performance in an organization. The performance items are measured relative to an organization's competitors. The supply chain performance items represent a broad range of supply chain characteristics including cycle times, delivery accuracy, delivery timeliness, and return costs. When measured in aggregate, these measures provide an indication of the level of supply chain performance across an organization. The business performance items measure firms' profit margins, return on sales, return on assets, and sales over assets performance relative to their competitors. The measures represent key financial indicators that differentiate the level of business performance within the organizations in our study.

2.2.2.2 Content Validity

Content validity represents the degree to which the measurement instrument represents the underlying theoretical concept of interest (Churchill, 1979; Pedhazur and Schmelkin, 1991). When developing scales, content validity is assured by the use of existing literature and knowledgeable experts (Ahire and Devaraj, 2001). Our scale development process leveraged both of these knowledge sources to ensure the content validity of our scales.

2.2.2.3 Confirmatory Factor Analysis of the Measurement Models

We used confirmatory factor analysis to examine the individual measurement models to assess the unidimensionality, reliability, and convergent and discriminant validity for each of the constructs in our scales (Papke-Shields, Malhotra, and Grover, 2002). The confirmatory factor analysis follows methods commonly used in operations scale development literature (Ahire and Devaraj, 2001; Byrne, 1994; Shook, Ketchen, Hult, and Kacmar, 2004; Stratman and Roth, 2002; Swafford et al., 2006). Single order measurement models were created for each competitive priority and performance construct. Since we aggregate the outsourcing driver scores from the four individual supply chain areas to the overall supply chain level in this study, it was necessary to create second order measurement models for each of the five sets of outsourcing drivers corresponding to the five competitive priorities. For each of these sets, the loadings produced during the confirmatory factor analysis of the outsourcing driver measurement models were used to create composite variables representing the overall emphasis given to the drivers across the entire supply chain.

All of the measurement models were examined by fixing the factor variance to 1.0 and then the sign and significance of the estimated parameters was examined (Byrne, 1994). Items with non-significant path loadings (p-value > 0.05) were dropped from our models as long as the content validity was not compromised. (Dropped items are included in the detailed scale description presented in Appendix A). In five cases, where theoretically justified, the error terms of the constructs were allowed to covary. Fit statistics for the individual measurement models are reported in Table 2.4. Path loadings and their significance as well as descriptive statistics are included in Appendix A and the measurement model diagrams are presented in Appendix B. All of the path loadings in the measurement models are significant with p-values < 0.05.

Table 2.4: Measurement Models Confirmatory Factor Analysis Results

Individual Measurement Models	# of Items	n	X^2	$p(X^2)$	NFI	NNFI	CFI	IFI	Composite Reliability	Cronbach's Alpha	First Dimension % of Variance	First Dimension Eigenvalue	Second Dimension Eigenvalue
Cost Competitive Priority	4	196	1.96	0.16	0.99	0.98	1.00	1.00	0.81	0.82	63.4%	2.54	0.62
Flexibility Competitive Priority	5	196	6.72	0.15	0.98	0.97	0.99	0.99	0.75	0.75	51.3%	2.57	0.91
Innovativeness Competitive Priority	5	196	2.50	0.78	0.99	1.02	1.00	1.01	0.79	0.78	54.1%	2.71	0.77
Quality Competitive Priority	5	196	0.96	0.81	1.00	1.02	1.00	1.01	0.84	0.77	53.6%	2.68	0.92
Time Competitive Priority	5	196	7.70	0.10	0.99	0.98	0.99	0.99	0.86	0.86	64.7%	3.23	0.76
Cost Outsourcing Drivers	20	196	285.93	0.00	0.90	0.92	0.94	0.94	0.95	0.94	79.3%	3.17	0.36
Flexibility Outsourcing Drivers	20	196	259.49	0.00	0.88	0.91	0.94	0.94	0.94	0.91	69.9%	2.80	0.55
Innovativeness Outsourcing Drivers	12	196	65.95	0.00	0.94	0.94	0.97	0.97	0.93	0.81	51.3%	2.05	0.81
Quality Outsourcing Drivers	12	196	84.13	0.00	0.93	0.93	0.96	0.96	0.87	0.86	57.7%	2.31	0.72
Time Outsourcing Drivers	12	196	68.29	0.00	0.94	0.94	0.97	0.97	0.95	0.83	49.2%	1.97	0.78
Supply Chain Performance	5	196	4.35	0.50	0.99	1.01	1.00	1.00	0.81	0.81	56.4%	2.82	0.69
Business Performance	4	196	6.27	0.04	0.99	0.97	0.99	0.99	0.90	0.90	76.7%	3.07	0.36

2.2.2.4 Unidimensionality

Unidimensionality refers to constructs whose items measure a single underlying concept (Gerbing and Anderson, 1988). We used both a confirmatory and an exploratory approach to assess the unidimensionality of this study's scales.

The confirmatory factor analysis fit statistics are used to asses the unidimensionality of the scales (Table 2.4) (Hatcher, 1994). Specifically, we examined the normed fit index (NFI), the non-normed fit index (NNFI), the comparative fit index (CFI), and Bollen's index (IFI) of our measurement models to test for unidimensionality. All of the fit statistics for the measurement models for the factors in our scales, with the exception of the NFI for flexibility related outsourcing drivers, have values greater than 0.90, which is a strong indication of unidimensionality in our scales (Bollen, 1989; Hatcher, 1994).

Unidimensionality was also assessed by performing an exploratory factor analysis (EFA) and examining the eigenvalues and variance explained for the resulting factors (Rencher, 1995). Factors with eigenvalues greater than 1.0 for the first dimension and less than 1.0 for the second factor indicate that a construct's items exhibit unidimensionality. The eigenvalues for the first and second dimensions for each of the constructs meet these criteria (Table 2.4). Another indication of unidimensionality is first dimensions that explain more than 50% of the variance for a factor; all of the models except for the time outsourcing drivers exceed this criterion. In the case of the time outsourcing drivers, the first factor explains 49% of the variance which is only slightly below the suggested 50% level. Despite this, we concluded that that this factor is unidimensional since it passes all of the other tests we conducted.

While the NFI for the flexibility measurement model is below the recommended criteria, the other three fit indices have values above 0.90 which is an indication of unidimensionality. Additionally, we find that this factor passes the EFA test of unidimensionality, which provides strong support that unidimensionality holds for this factor.

2.2.2.5 Reliability

Reliability refers to the consistency and repeatability of the measurements made by a construct (O'Leary-Kelly and Vokurka, 1998). Reliability was assessed by examining the Cronbach's alpha as well as the composite reliabilities for each of the constructs in our scales. A Cronbach's alpha of 0.70 or greater (Nunnally, 1978) and a composite reliability of 0.70 or greater (Shook et al., 2004) for each construct indicates an acceptable level of reliability. All of the factors in our scales have both Cronbach's alpha and composite reliabilities greater than 0.70 (Table 2.4).

2.2.2.6 Convergent Validity

Convergent validity for a scale is exhibited if alternative approaches to measuring a construct produce similar results (Campbell and Fiske, 1959). In this study, we gathered the data using a single survey instrument, making the evaluation of convergent validity using traditional methods impossible (Ahire and Devaraj, 2001; Shah and Goldstein, 2006). However, the high reliabilities found in both our judge-based pre-sort exercise and our full survey processes serve as an indication that our scales display convergent validity.

Convergent validity is also a measure how well the items in a construct relate to the other items in that construct and the common concept of interest (Krause, Scannell, and Calantone, 2000). This definition of convergent validity is satisfied when the factor loadings for all of the items in the constructs are significant. In our study, all of the factor loadings are significant (p-value < 0.05) with signs in the expected direction, which indicates convergent validity in our scales.

2.2.2.7 Discriminant Validity

Discriminant validity refers to the degree to which a construct does not relate to other constructs in a scale (Campbell and Fiske, 1959; Pedhazur and Schmelkin, 1991). Discriminant validity was tested using the pairwise chi-square comparison method proposed by Byrne (1994). Using this procedure, each possible pair of constructs in a scale is tested. First, a confirmatory factor analysis is performed on an unconstrained measurement model in which all of the constructs are allowed to freely correlate with each other. Next, a confirmatory factor analysis is run on a constrained model in which the correlation between a pair of constructs is fixed to 1.0. The chi-square difference for a pair of constructs is computed by subtracting the chi-square value of the unconstrained model from the chi-square value of the constrained model. A significant chi-square difference (for one degree of freedom) indicates that the constructs are unique and unrelated. This test is repeated for every possible pairing of constructs included in the final structural equation model. The pairwise chi-square test results are reported in Table 2.5. All of the construct pairs in our model have significant chi-square differences (p-value < 0.01).

Table 2.5: Measurement Model Pairwise Chi-square Test Results

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 Cost Competitive Priority	x															
2 Flexibility Competitive Priority	32.7 (0.000)	x														
3 Innovativeness Competitive Priority	41.5 (0.000)	16.6 0.000	x													
4 Quality Competitive Priority	21.8 (0.000)	(18.500) (0.000)	20.3 (0.000)	x												
5 Time Competitive Priority	17.0 (0.000)	19.5 (0.000)	17.9 (0.000)	18.7 (0.000)	x											
6 Cost Outsourcing Drivers	21.3 (0.000)	19.2 (0.000)	32.5 (0.000)	19.3 (0.000)	26.5 (0.000)	x										
7 Flexibility Outsourcing Drivers	19.4 (0.000)	21.4 (0.000)	27.0 (0.000)	16.1 (0.000)	21.9 (0.000)	10.1 (0.001)	x									
8 Innovativeness Outsourcing Drivers	45.3 (0.000)	31.0 (0.000)	28.8 (0.000)	33.4 (0.000)	33.0 (0.000)	17.6 (0.000)	12.4 (0.000)	x								
9 Quality Outsourcing Drivers	37.6 (0.000)	36.7 (0.000)	32.0 (0.000)	20.2 (0.000)	35.4 (0.000)	7.5 (0.006)	16.1 (0.000)	13.8 (0.000)	x							
10 Time Outsourcing Drivers	33.3 (0.000)	43.8 (0.000)	30.0 (0.000)	31.2 (0.000)	36.0 (0.000)	10.4 (0.001)	13.8 (0.000)	18.1 (0.000)	7.0 (0.008)	x						
11 Cost Interaction Factor	71.9 (0.000)	42.5 (0.000)	31.3 (0.000)	39.7 (0.000)	38.8 (0.000)	30.9 (0.000)	27.6 (0.000)	28.2 (0.000)	22.7 (0.000)	28.3 (0.000)	x					
12 Flexibility Interaction Factor	35.4 (0.000)	120. (0.000)	44.4 (0.000)	59.5 (0.000)	37.4 (0.000)	54.6 (0.000)	44.8 (0.000)	36.7 (0.000)	31.3 (0.000)	35.3 (0.000)	9.5 (0.002)	x				
13 Innovativeness Interaction Factor	24.0 (0.000)	46.7 (0.000)	41.7 (0.000)	37.9 (0.000)	43.0 (0.000)	30.7 (0.000)	31.5 (0.000)	75.4 (0.000)	21.5 (0.000)	28.8 (0.000)	9.5 (0.002)	7.2 (0.007)	x			
14 Quality Interaction Factor	51.9 (0.000)	53.8 (0.000)	53.8 (0.000)	89.3 (0.000)	55.1 (0.000)	44.1 (0.000)	42.5 (0.000)	47.4 (0.000)	31.3 (0.000)	48.3 (0.000)	15.1 (0.000)	6.9 (0.009)	8.0 (0.005)	x		
15 Time Interaction Factor	37.0 (0.000)	61.7 (0.000)	40.2 (0.000)	47.2 (0.000)	47.2 (0.000)	33.6 (0.000)	28.0 (0.000)	46.9 (0.000)	36.8 (0.000)	38.9 (0.000)	11.9 (0.001)	7.5 (0.006)	13.4 (0.000)	14.0 (0.000)	x	
16 Supply Chain Performance	51.4 (0.000)	19.7 (0.000)	25.7 (0.000)	27.7 (0.000)	32.8 (0.000)	20.2 (0.000)	20.4 (0.000)	33.4 (0.000)	14.2 (0.000)	31.4 (0.000)	15.4 (0.000)	49.8 (0.000)	16.1 (0.000)	20.3 (0.000)	28.9 (0.000)	x
17 Business Performance	54.3 (0.000)	44.4 (0.000)	43.8 (0.000)	37.2 (0.000)	50.9 (0.000)	31.6 (0.000)	36.7 (0.000)	64.5 (0.000)	34.0 (0.000)	45.7 (0.000)	23.5 (0.000)	49.1 (0.000)	10.9 (0.001)	22.7 (0.000)	34.7 (0.000)	21.6 (0.000)

Chi-Square difference is reported for each pairing below which the significance of the Chi-Square difference is reported in parentheses.

2.2.2.8 Common Method and Social Desirability Biases

Common method bias refers to measurement error resulting from variance due to the measurement method utilized (Podasakoff, MacKenzie, Lee, and Podsakoff, 2003). Harman's Single Factor Test is employed to examine for common method bias. This test is conducted by loading all items in a study into an exploratory factor analysis and examining the unrotated factor solution (Podasakoff et al., 2003). If the items load on a single factor, common method bias may be present. Using this approach, an exploratory factor analysis of the items in our study found that the items load into six separate factors each with an eigenvalues greater than 1.0, which is a strong indication that common method bias is not present in our sample.

The validity of self reported performance measures is a common concern in studies using data collected from a single survey respondent (Buckley, Cote, and Comstock, 1990; Malhotra, Kim, and Patil, 2006). The validity of a participant's responses to performance related questions can be influenced by a social desirability to position his or her organization in a positive light (Ganster, Hennessey, and Luthans, 1983). Following the approach suggested by Malhotra, Kim, and Patil (2006), two marker variable items were included in our survey instrument to test of the validity of the self reported performance measures. These marker items asked the respondents representing publicly traded firms to assess their firm's return on assets (ROA) and return on sales (ROS) performance at the firm level relative to the competitors in their industry. ROA and ROS were measured on a five point Likert scale with '1' representing "much worse than competitors" and '5' representing "much better than competitors". To test validity of the self reported measures, twenty portfolios were created using publicly reported data from the Compustat financial database to allow a comparison with large and small firms within each of the ten two-digit SIC codes represented by the firms in our study. For each SIC code, the first portfolio represents all publicly traded firms with that specific two-digit SIC code and a total asset levels below the median level for that SIC code. The other portfolio represents all firms above the median total asset level for that two-digit SIC code. Next, the objective ROA and ROS values for each of the publicly traded firms in our study were retrieved from Compustat and compared to the median ROA and ROS values of the appropriate industry and size portfolio. Finally, the correlation between the objective ROA and ROS data relative to the portfolio median and the self reported ROA and ROS data (assessed relative to their competitors) was computed. This analysis found significant correlations between the self reported and actual ROA and ROS values of 0.40 (p-value < 0.01) and 0.27 (p-value < 0.05)

respectively. The results provide a strong indication that the self reported performance measures are not biased by social desirability effects and valid for use in this study.

2.3 Summary

In this chapter, we leveraged the existing body of outsourcing related research found in the literature to develop the theoretical foundations of our study. We show that the previous literature makes a clear case for the importance of strategic alignment for firm's making decisions to outsource processes and activities. This chapter also describes the data collection and scale development procedures undertaken for this study. The data for this study was drawn from the survey responses of supply chain professionals working at firms operating within the United Stated. The scales used in this study to assess a firm's competitive priorities, outsourcing drivers, and supply chain and business performance were adapted from existing measures found in the current literature.

CHAPTER 3

THE IMPACT OF OUTSOURCING CONGRUENCE ON SUPPLY CHAIN AND BUSINESS PERFORMANCE

3.1 The Role of Strategic Congruence

3.1.1 Strategic Fit

In his seminal 1969 paper, Skinner asserts that operational decisions should be made in alignment with a firm's business strategy. The congruence (fit, alignment, agreement, match) between the operations strategy and operational activities of a firm has been widely examined in the operations literature since the publication of Skinner's work (Boyer and McDermott, 1999; Bozarth and McDermott, 1998; Brown and Blackmon, 2005; da Silveira, 2005; Devaraj et al., 2004; Frohlich and Dixon, 2001; Hayes and Wheelwright, 1979; Lagace and Bourgault, 2003; Miller, 1992; Miller and Roth, 1994; Narasimhan and Carter, 1998; Safizadeh et al., 1996; Skinner, 1966, 1969, 1974; Tarigan, 2005; Venkatraman and Prescott, 1990; Watts et al., 1992; Wheelwright and Bowen, 1996). More recently, Boyer and McDermott (1999) state that an operations strategy "closely resembles a compass" that should guide an organization's activities. Similarly, in developing the product-process matrix, Hayes and Wheelwright (1979) argue that manufacturing processes should be developed in alignment with the product plans and competitive priorities of a firm.

Empirical research has also confirmed that the degree of fit between a firm's strategies and operational activities are positively related to business performance. Recently, Devaraj, Hollingworth and Schroeder (2004) found that the fit between generic manufacturing strategies and manufacturing objectives is positively related to plant performance. In other studies, Tarigan (2005) found better alignment between general managers and manufacturing managers to be related to higher business performance, whereas da Silveira (2005) found that a lack of strategic alignment is related to lower market share. Throughout the literature, there have been calls for additional empirical research into role that the alignment between manufacturing strategies and operational actions plays in an organization (Bozarth and McDermott, 1998; Kathuria and Porth, 2003; Venkatraman, 1989).

3.1.2 Assessing Strategic Fit

Evaluating the impact of fit in a manufacturing organization is an intricate task complicated by the interdependencies that exist between the wide assortment of possible process configurations (Bozarth and McDermott, 1998). Understanding the impact of fit is further complicated by the existence of multiple effective strategies that a firm may adopt to achieve their goals (Doty, Glick, and Huber, 1993; Katz and Khan, 1978). To investigate alignment, it is first necessary to identify the type of fit that appropriately explains the relationship of interest. Venkatraman (1989) proposes that six individual types of fit may exist in an organization: moderation, mediation, matching, gestalts, profile deviation, and covariation.

Fit as moderation implies that the impact of a predictor variable on a dependent variable is influenced by an interaction between the predictor and an additional variable, designated as the moderator (Venkatraman, 1989).

To evaluate fit using gestalts, taxonomies of strategies are formed by grouping firms into clusters with common attributes and then the role of fit within each group is tested (Venkatraman, 1989). Two widely-cited previous manufacturing studies have examined taxonomies of strategies related to competitive capability choices (Frohlich and Dixon, 2001; Miller and Roth, 1994). The taxonomies created in these studies differentiated firms by the level of emphasis give to capabilities related to price, flexibility, quality, delivery, and service.

Mediation implies that an antecedent variable intervenes in the relationship between an independent and dependent variable. The mediation perspective is not suited to this study as we do not predict that a firm's competitive priorities intervene with the effects of outsourcing drivers on performance but rather we are examining the alignment between the two factors.

The matching approach to evaluating fit implies that two variables of interest are related theoretically without concern for the level of an additional criterion variable. Therefore assessing fit as matching would prevent us from analyzing the performance impacts of the relationship between competitive priorities and outsourcing drivers.

Assessing fit using profile deviation determines the impact of the distance between an observed set of characteristics with a theoretically defined set of characteristics on a dependent variable. This approach is inappropriate for this investigation since theory does not predict defined profiles to which we can compare our observations.

Fit as covariation entails that there is internal consistency between a set of related variables. A fit as covariation approach is not appropriate for this study as this approach is based on a prediction of internal consistency between a set of related variables, which is not the case in this study.

From a theoretical perspective, fit as moderation and gestalts best explain the impact of outsourcing congruence. This study will address outsourcing congruence from a moderation perspective while the role of gestalts is addressed in Chapter 4 of this paper. In this study, we test the impact of outsourcing congruence by examining the effect that the emphasis placed on a related set of outsourcing drivers, moderated by the emphasis given to the associated competitive priority, has on the business and supply chain performance levels of a business unit. These tests will be conducted using a structural equation modeling approach developed by Mathieu, Tannenbaum, & Salas (1992) that analyzes the impact of interactions between constructs. In Chapter 4, we examine the impact of fit using gestalts, which permits the impact of outsourcing congruence across an entire strategy to be examined. Similar to the approach set out by Miller and Roth (1994), we will develop taxonomies of competitive priority strategies for our firms. The impact of outsourcing congruence will be tested with respect to the characteristics of each cluster.

This study extends the important theme of investigating the impact of alignment or congruence between the strategic priorities and operational actions (operationalization of the strategic priorities) of a firm as a predictor of organizational performance. To the best of our knowledge, the impact of the congruence between a firm's outsourcing drivers and its competitive priorities on firm performance has not been addressed in the literature. The objective of this research study is to address this gap in the current literature.

3.2 Research Framework and Hypotheses

We define supply chain outsourcing congruence as the level of agreement or alignment between the competitive priorities on which a firm chooses to compete and the drivers of its supply chain outsourcing decisions. A conceptual research model depicting the key relationships hypothesized in this study is presented in Figure 3.1. Our model assesses the strategic importance an organization places on each of the five competitive priorities that define a firm's operational strategy: Cost, Flexibility, Innovativeness, Quality, and Time. Correspondingly, the model weighs the emphasis placed on the various outsourcing drivers groupings (detailed in Table 2.1) related to these competitive priorities. The alignment between the emphasis given to each outsourcing driver set and the importance placed on the respective competitive priority is assessed to determine the level of outsourcing congruence in an organization's supply chain. The model then evaluates the relationship between the level of outsourcing congruence and the business and supply chain performance of the organization.

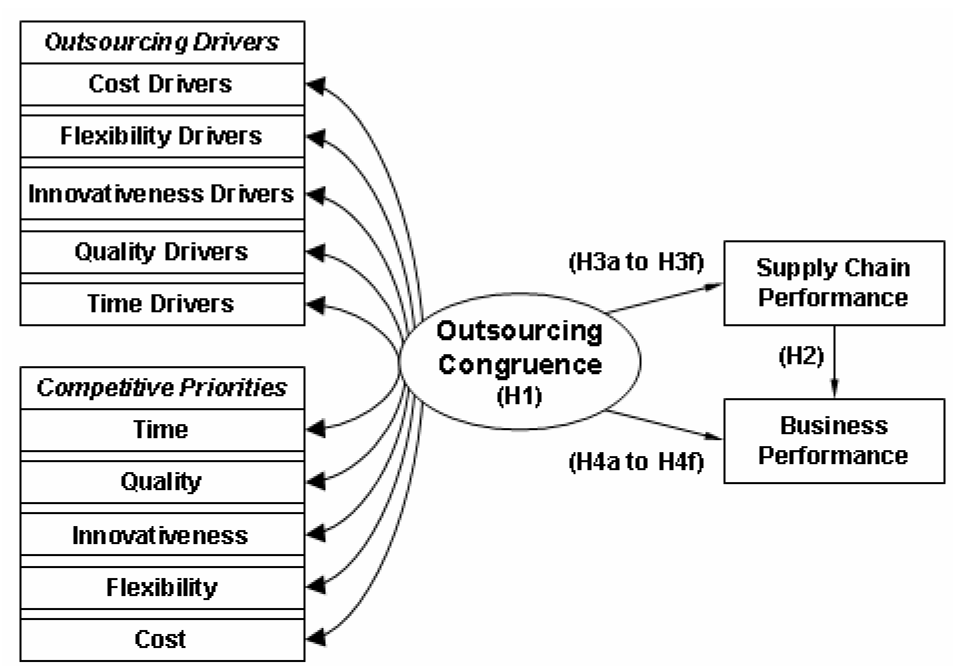


Figure 3.1: Conceptual Research Model

The importance of alignment between competitive strategies and operational actions is well documented in the current literature (Devaraj et al., 2004; Doty et al., 1993; Venkatraman, 1989; Venkatraman and Prescott, 1990). Much of the research has been tailored to communicating the concepts of alignment to industry practitioners (Chesley and Wenger, 1999; Goold and Campbell, 2002; Hamel and Prahalad, 2005;

Miles, Coleman, and Creed, 1995; Talbert, 2002). Evidence of the widespread adoption of alignment as a strategic lever by practitioners leads us to believe that a high level of congruence between the outsourcing drivers and competitive priorities should exist in practice. Based on this, we propose the following hypothesis:

> **Hypothesis 1:** *The drivers influencing the outsourcing of a firm's supply chain processes (activities) are aligned with the firm's competitive priorities.*

The ability of a firm's supply chain performance to impact its business performance has increased in recent years (Holcomb, 1994). A positive relationship between supply chain and business performance has been found in a number of recent empirical studies in the literature (Kannan and Tan, 2002, 2005; Tracey, Lim, and Vonderembse, 2005). In line with previous research, we predict that the supply chain performance levels measured in our study will be positively associated with the levels of business performance:

> **Hypothesis 2:** *A firm's level of business performance will be positively associated with its level of supply chain performance.*

Previous empirical research indicates that strategic alignment is associated with improved performance in an organization (da Silveira, 2005; Jonsson and Mattsson, 2003; Kathuria and Porth, 2003; Ketokivi and Schroeder, 2004; Rhee and Mehra, 2006). Although we predict that the level of alignment is consistently high across our sample, we hypothesize that variations in the level of outsourcing congruence produce performance differentiation among firms. In line with previous studies, we believe that a high level of overall outsourcing congruence positively impacts performance.

Hypothesis 3a: *Higher levels of overall congruence (alignment) between the competitive priorities emphasized by a firm and its supply chain outsourcing drivers have a positive effect on the firm's supply chain performance.*

To test the impact of outsourcing congruence, we individually examine the role of alignment between each of the five competitive priorities and their related outsourcing drivers. We predict that outsourcing congruence across each of the five competitive priority dimensions is associated with better performance. Therefore, we propose the following hypotheses related to supply chain performance:

Hypothesis 3b: *A higher level of congruence (alignment) between the emphasis placed on cost as a competitive priority and the emphasis placed on cost related outsourcing drivers has a positive effect on the firm's supply chain performance.*

Hypothesis 3c: *A higher level of congruence (alignment) between the emphasis placed on flexibility as a competitive priority and the emphasis placed on flexibility related outsourcing drivers has a positive effect on the firm's supply chain performance.*

Hypothesis 3d: *A higher level of congruence (alignment) between the emphasis placed on innovativeness as a competitive priority and the emphasis placed on innovativeness related outsourcing drivers has a positive effect on the firm's supply chain performance.*

Hypothesis 3e: *A higher level of congruence (alignment) between the emphasis placed on quality as a competitive priority and the emphasis placed on quality related outsourcing drivers has a positive effect on the firm's supply chain performance.*

Hypothesis 3f: *A higher level of congruence (alignment) between the emphasis placed on time as a competitive priority and the emphasis placed on time related outsourcing drivers has a positive effect on the firm's supply chain performance.*

Our next set of hypotheses examines the impact of outsourcing congruence on business performance. First, we examine the overall effects of outsourcing congruence:

Hypothesis 4a: *Higher levels of overall congruence (alignment) between the competitive priorities emphasized by a firm and its supply chain outsourcing drivers have a positive effect on the firm's business performance.*

Again, we examine the impact of congruence between each of the five competitive priority dimensions and their related outsourcing drivers; however in these hypotheses we are examining the impact on business performance:

Hypothesis 4b: *A higher level of congruence (alignment) between the emphasis placed on cost as a competitive priority and the emphasis placed on cost related outsourcing drivers has a positive effect on the firm's business performance.*

Hypothesis 4c: *A higher level of congruence (alignment) between the emphasis placed on flexibility as a competitive priority and the emphasis placed on flexibility related outsourcing drivers has a positive effect on the firm's business performance.*

Hypothesis 4d: *A higher level of congruence (alignment) between the emphasis placed on innovativeness as a competitive priority and the emphasis placed on innovativeness related outsourcing drivers has a positive effect on the firm's business performance.*

Hypothesis 4e: *A higher level of congruence (alignment) between the emphasis placed on quality as a competitive priority and the emphasis placed on quality related outsourcing drivers has a positive effect on the firm's business performance.*

Hypothesis 4f: *A higher level of congruence (alignment) between the emphasis placed on time as a competitive priority and the emphasis placed on time related outsourcing drivers has a positive effect on the firm's business performance.*

3.3 Methodology

Structural equation modeling (SEM) was chosen for this analysis as it allows for multiple complex relationships to be investigated simultaneously. To test the impact of outsourcing congruence in a fit as moderation context (hypotheses 3a to 3e and 4a to

4e) the model analyzes the effect of the interactions between each of a business unit's competitive priorities and the drivers of its outsourcing decisions.

A number of methods for testing interactions have been developed for SEM analyses (Cortina, Chen, and Dunlap, 2001; Mathieu, Tannenbaum, and Salas, 1992); Of these methods, the method developed by Mathieu, Tannenbaum, & Salas (1992) was found to be most appropriate due to its ability to consider interactions at a factor level rather than at an item level. Using this method, two composite latent variables are used to create a third interaction variable which is then used to test the impact of the interaction effects. The method is expanded for our analysis to simultaneously investigate the five sets of interactions relating to each of the five competitive priorities and their associated outsourcing drivers.

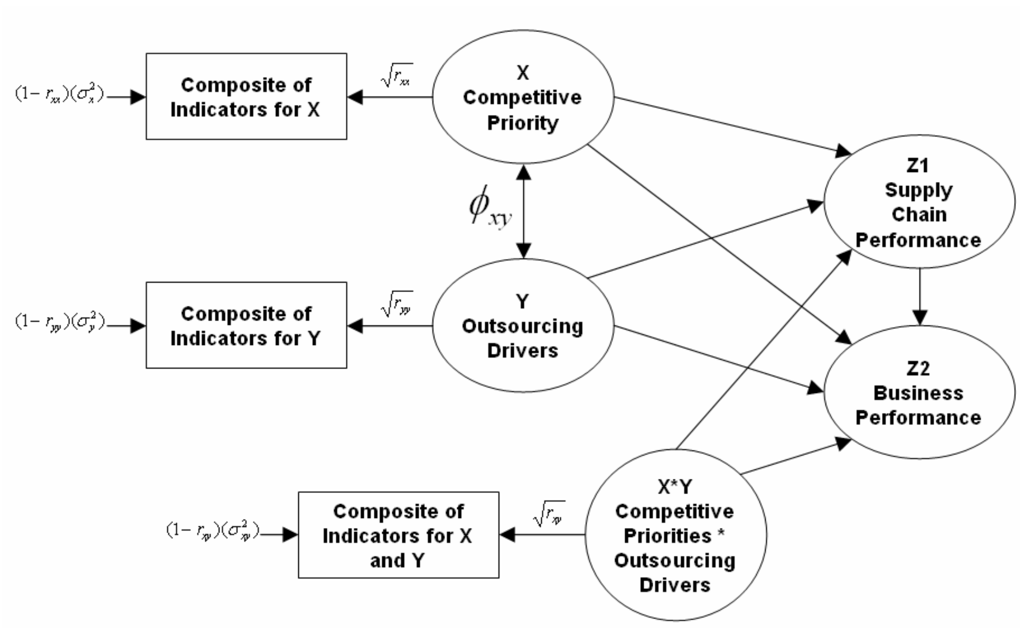


Figure 3.2: Conceptual Structural Equation Model with Interaction

A simplified representation of how this approach is used to test a single interaction is presented in Figure 3.2. This method requires the creation of composite variables for each of latent variables (in this case X representing the Competitive Priority emphasis and Y representing the Outsourcing Driver emphasis) by summing the indicators of that variable. Each composite variable is then centered and standardized. In the SEM analysis, the composite variables are treated as single indicator factors; therefore the loadings and error variances for the factors are computed prior to testing the models. The loading between a latent factor and its respective composite indicator variable is set equal to the square root of the reliability of the factor's measure measurement model (r_{xx} or r_{yy}) The error variance of each factor is set equal to the product of its variance and one minus its reliability (Jöreskog and Sorbom, 1993). A third latent interaction product variable is created by multiplying the two latent variables. The loading and error variance of the interaction term is calculated using the same procedure that was used for the other two composite variables. However, computation of the interaction product term's reliability requires that the model be tested without the interaction term to determine the correlation between the latent factors (r_{xy}). The reliability of the product term is calculated from this correlation and the reliabilities as follows (Bornstedt and Marwell, 1978):

$$r_{xy \cdot xy} = [(r_{xx} * r_{yy}) + r_{xy}^2]/(1 + r_{xy}^2)$$

The parameter estimation for the SEM model is conducted using maximum likelihood (ML) estimation. An issue with our analysis is that the variables in a model evaluated using ML estimation are assumed to be multivariate normal, however the interaction product term violates this assumption (Kenny and Judd, 1984). Although previous research suggests ML estimation to be robust despite normality violations (Bollen, 1989; Chou, Bentler, and Sattora, 1991; Sattora and Bentler, 1988), we conduct several test beyond those typically used in SEM analysis to ensure the validity of our results. Bollen (1989) specifically finds ML estimation to be robust if the latent errors in the model are multivariate normal and independent of the exogenous indicators. To test the normality of the latent errors, the distribution of the standardized residuals from the SEM analysis will be examined; a near normal distribution evinces the robustness of this method (Jöreskog and Yang, 1996). To test for effects due to a lack of independence between the exogenous indicators and the latent errors, we will also estimate the SEM model using the Sattora and Bentler (1988) robust estimator. The robust estimator was developed to evaluate models while correcting for non-normality in the data set (Sattora and Bentler, 1988). Similarity between the fit statistics produced by the ML estimation and those produced by the robust estimation provides and indication of independence between the exogenous indicators and the latent errors; which serves as an indicator of the suitability of the interaction approach (Hu, Bentler, and Kano, 1992).

The significance of the impact of outsourcing congruence on performance is determined by conducting a chi square test of the difference in fit between two versions of the full structural equation model; a model including the interaction is tested and compared with a version of model in which the interaction is removed. A significant chi square difference between the two models indicates that the interaction significantly impacts the criterion variable (Cortina et al., 2001). This procedure is analogous to the R^2 change test used in multiple regression to evaluate the significance of an interaction (Cohen, Cohen, West, and Aiken, 2003).

Further interpretation the interaction effects is accomplished through examination of interaction plots. Interaction plots are suited to this analysis as they allow for the impact of congruence to be evaluated over the entire range of emphasis of a competitive priority. The interactions are plotted using the standardized path loadings from the SEM model utilizing a modification of the interaction analysis procedure commonly used for multiple regression (Aiken and West, 1991). Each interaction plot represents the relationship outsourcing congruence and a single performance metric. Each plot contains two lines; one line represents a low level of emphasis (one standard deviation below the mean level of emphasis) on a set of outsourcing drivers related to a competitive priority and the other line represents a high level of emphasis on a set of drivers (one standard deviation above the mean level of emphasis.)

The model also allows for the evaluations of our first two hypotheses. To test the first prediction, we will examine the significance of the covariance path between each competitive priority latent variable and the latent variable representing the associated outsourcing drivers. The second hypothesis is evaluated by examining the significance of the path connecting supply chain performance latent variable with business performance latent variable.

3.4 Results

The full structural equation model for the relationship between outsourcing congruence and performance is shown in Figure 3.3. A multi-step process was used to evaluate the structural equation model (Kline, 1998). All analyses were conducted using Version 6.1 of Multivariate Software's EQS program. Fit statistics for the model evaluations are included in Table 3.1. The chi square statistics are presented for inspection, however their importance in evaluating the model fit is limited as the chi square tends to be almost always significant for sample sizes approaching 200 or greater (Hatcher, 1994).

The pure measurement model (in which all the latent factors are allowed to covary with each other) was tested first to determine if the overall model structure is appropriate before evaluating our hypotheses using the structural equation model (Mulaik, 1997). The fit indices showed that the model fits the data very well (NFI, NNFI, CFI, and IFI > 0.95) which permitted hypothesis testing with the structural equation model.

Table 3.1: Structural Equation Model Analysis Results

	Items	n	df	X^2	$p(X^2)$	NFI	NNFI	CFI	IFI
Full Measurement Model	17	196	1	0.03	0.87	1.00	1.00	1.00	1.00
Structural Equation Model (ML Estimation)	17	196	100	954.05	0.00	0.91	0.88	0.92	0.92
Structural Equation Model (Robust Estimation)	17	196	100	597.58	0.00	0.89	0.85	0.90	0.90

The full structural equation model was tested using both ML estimation and the Sattora and Bentler (1988) robust estimation methods. When using SEM, the sample size must be large enough to achieve a level of model power high enough to support hypothesis testing (MacCallum, Browne, and Sugawara, 1996). Our sample of 196 responses exceeds the minimum sample size of 178 recommended by MacCallum et al. (1996) to achieve a model power of at least 0.80 (for $\alpha = 0.05$). The goodness of fit statistics indicated an acceptable level of fit between the data and the model; three of the ML fit statistics (NFI, CFI, and IFI) exceed the recommended value of 0.90 while the fourth (NNFI = 0.88) is only slightly below the recommended level (Hu and Bentler, 1999). The standardized residuals exhibit a near normal distribution (Figure 3.4) and the robust fit statistic values are very similar to the ML fit statistics (Table 3.1). These results support the robustness of the SEM analysis despite the inclusion of the non-normal interaction terms in the model.

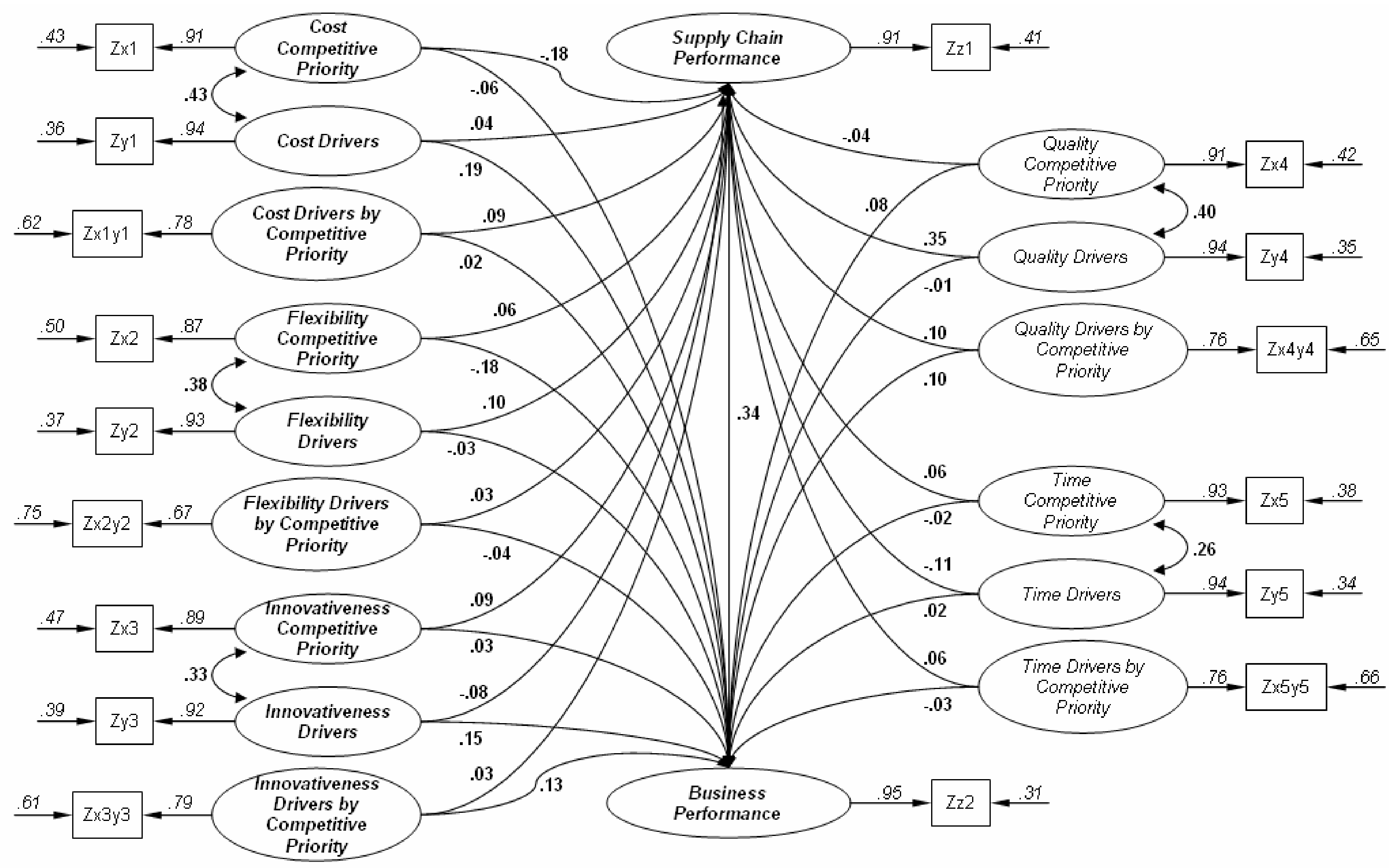


Figure 3.3: Full Structural Equation Model

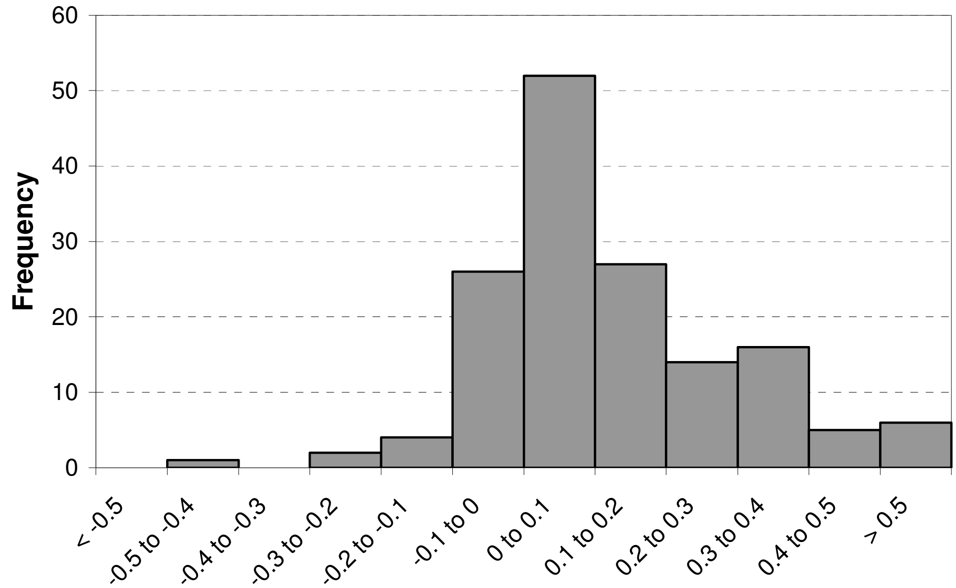


Figure 3.4: Distribution of Standardized Residuals

The loadings along the covariance paths between all five competitive priorities and their associated outsourcing drivers are all positive and significant at the 1% level (Table 3.2). These results provide strong support for the prediction that the outsourcing drivers emphasized by a firm are generally in alignment with their competitive priorities (H1).

Table 3.2: Covariance between Outsourcing Drivers and Competitive Priorities

Cost	0.401* (0.00)
Flexibility	0.358* (0.00)
Innovativeness	0.328* (0.00)
Quality	0.383* (0.00)
Time	0.252* (0.00)

We also find support for H2, the association between supply chain and business performance. The loading of the path between supply chain performance and business performance is positive and significant at the 1% level.

We tested six additional versions of the model to determine the significance of the impact of outsourcing congruence on performance. The results of these tests are presented in Table 3.3. First, we tested the model with all five interaction terms removed and found a significant chi square change compared with the full model. This evaluation determined that the overall impact of outsourcing congruence in our system is significant at the 0.01% level. Next, we tested the model five more times; where in each test we removed one interaction term related to a competitive priority. Compared to the full model, all five of these models have chi square differences significant at the 1% level. These results indicate that the interactions between each of the five competitive priorities and their associated outsourcing drivers, which represent the level of congruence between the two factors, significantly impact supply chain and business performance.

Table 3.3: Interaction Significance Tests

	Interaction Present		Interaction Removed		X^2	X^2 Difference
	X^2	DF	X^2	DF	Difference	p-value
All Interactions	954.1	100	672.4	40	281.6	0.000
Cost Interaction	954.1	100	918.0	86	36.0	0.001
Flexibility Interaction	954.1	100	864.5	86	89.5	0.000
Innovativeness Interaction	954.1	100	866.3	86	87.7	0.000
Quality Interaction	954.1	100	861.0	86	93.1	0.000
Time Interaction	954.1	100	713.3	86	240.8	0.000

The chi square difference tests indicate that outsourcing alignment significantly influences performance, however they do not reveal the direction of the relationships. An examination of the interaction plots reveals the nature and the direction of the relationships between performance and the outsourcing congruence.

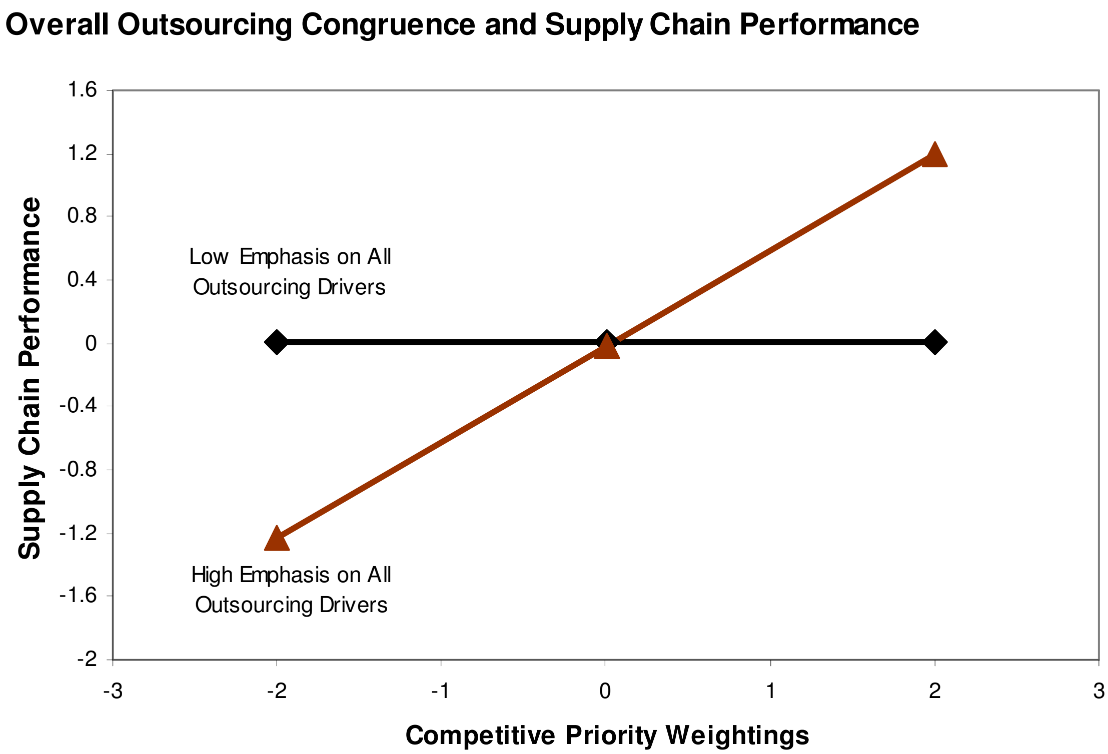
The overall impact of outsourcing congruence on supply chain and business performance is illustrated by the two interaction plots included in Figure 3.5. These two plots represent the combined effects of the five interactions between each of the competitive priorities and their associated outsourcing drivers. The plots show that when a low level of emphasis is given to all five competitive priorities, both performance metrics are lowest when the level of emphasis given to the related set of outsourcing drivers is in congruence and also low. Similarly, the plots show that when a high level of emphasis is given to all five competitive priorities, both performance metrics are higher when a high level of emphasis is give to the outsourcing drivers. These results provide support for both H3a, the positive relationship between overall outsourcing congruence and supply chain performance, and H4a, the positive relationship between overall outsourcing congruence and business performance.

Figure 3.6 depicts the supply chain and business performance impacts of outsourcing congruence with respect to cost. We find that when cost is not an emphasized competitive priority, supply chain performance is worst when the cost related outsourcing drivers are highly emphasized. In contrast, we find that there is little difference between the level of performance related to low and high emphasis on cost related outsourcing drivers when cost is an emphasized competitive priority. These results lead us to conclude that H3b is partially supported; specifically we find that cost outsourcing congruence is positively associated with better supply chain performance when cost is not a priority. However, congruence is not associated with a difference in supply chain performance when cost is a competitive priority.

The plot of the relationship between cost outsourcing congruence and business performance exhibits a similar relationship; however there is less of a performance differential when cost is not emphasized as a priority. We interpret these results as partial support for H4b in that cost outsourcing congruence is associated with higher levels of business performance only when cost is not emphasized as a competitive priority.

The relationships between outsourcing congruence and performance along the flexibility dimension are represented in Figure 3.7. From the first plot in this figure we see that there is a negligible difference between the supply chain performance levels associated with a low and high emphasis of the flexibility related outsourcing drivers when flexibility is not emphasized as a competitive priority. In contrast, when a firm chooses to emphasize flexibility as a competitive priority, outsourcing congruence is positively associated with higher levels of supply chain performance. These findings provide partial support for H3c.

Examination of the second plot in Figure 3.7 depicts the confounding relationship between flexibility outsourcing congruence and business performance. The plot shows there to be a positive relationship between outsourcing congruence and business performance when flexibility is not emphasized as a competitive priority. However, we find a negative relationship between flexibility outsourcing congruence and business performance when flexibility is emphasized as a competitive priority. The contradictory nature of these results leads us to reject H4c.



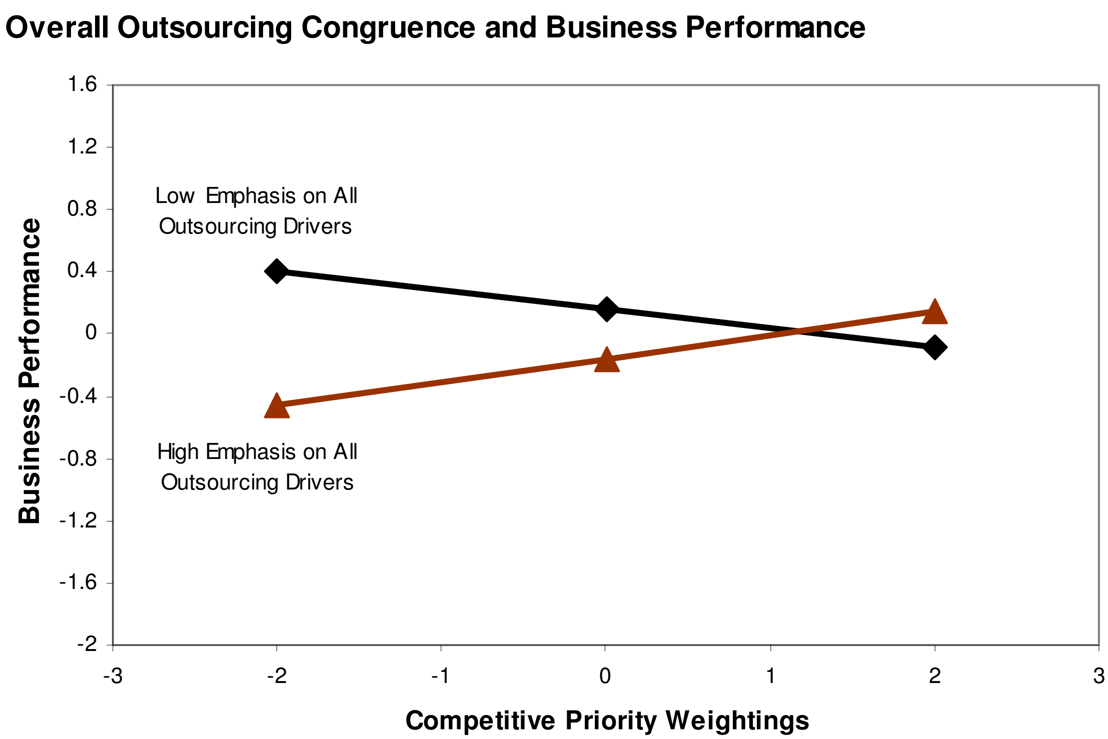
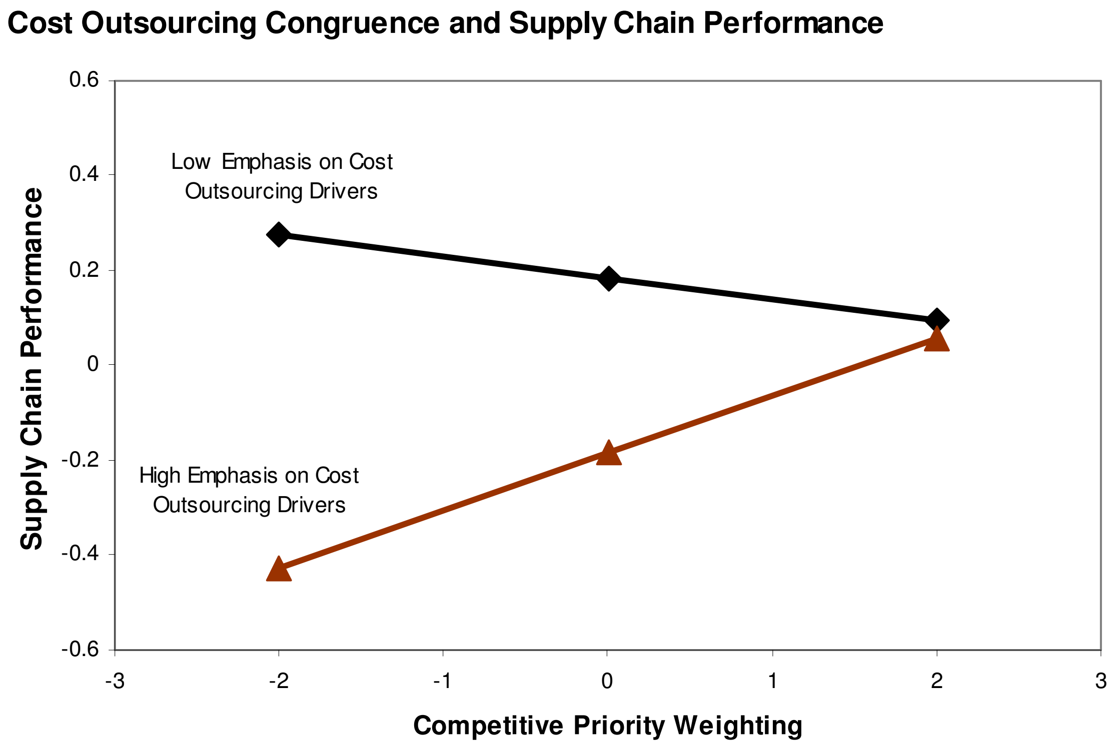


Figure 3.5: Overall Outsourcing Congruence and Performance



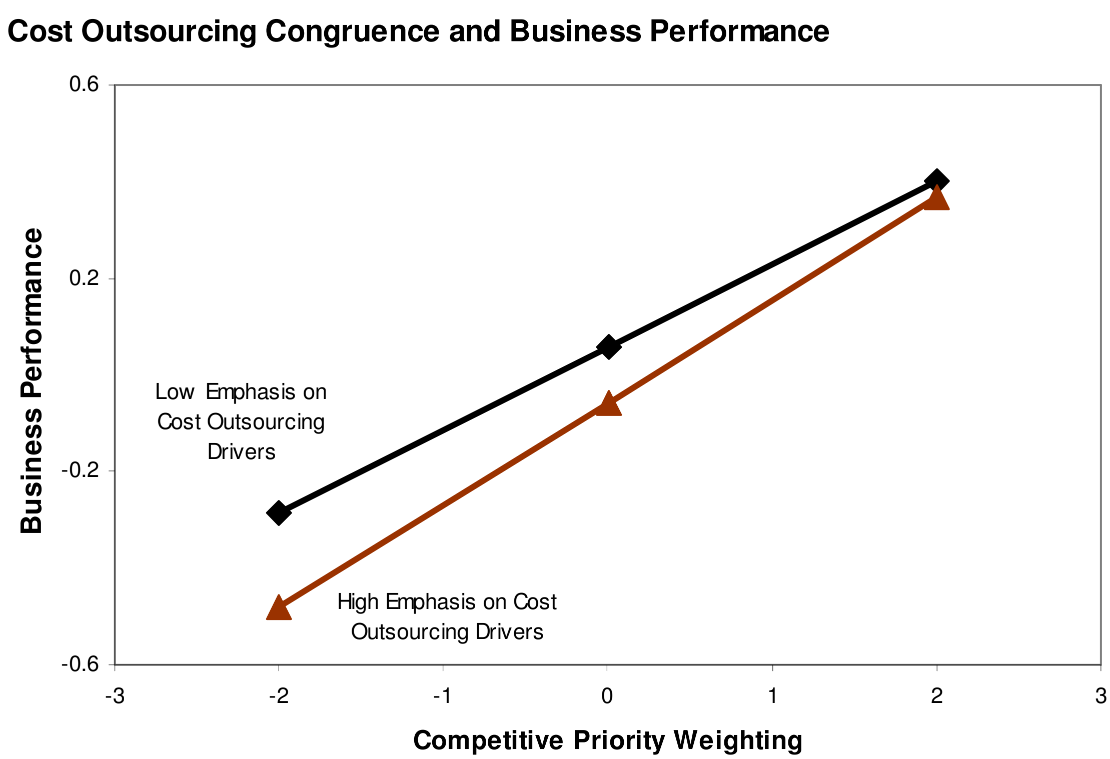
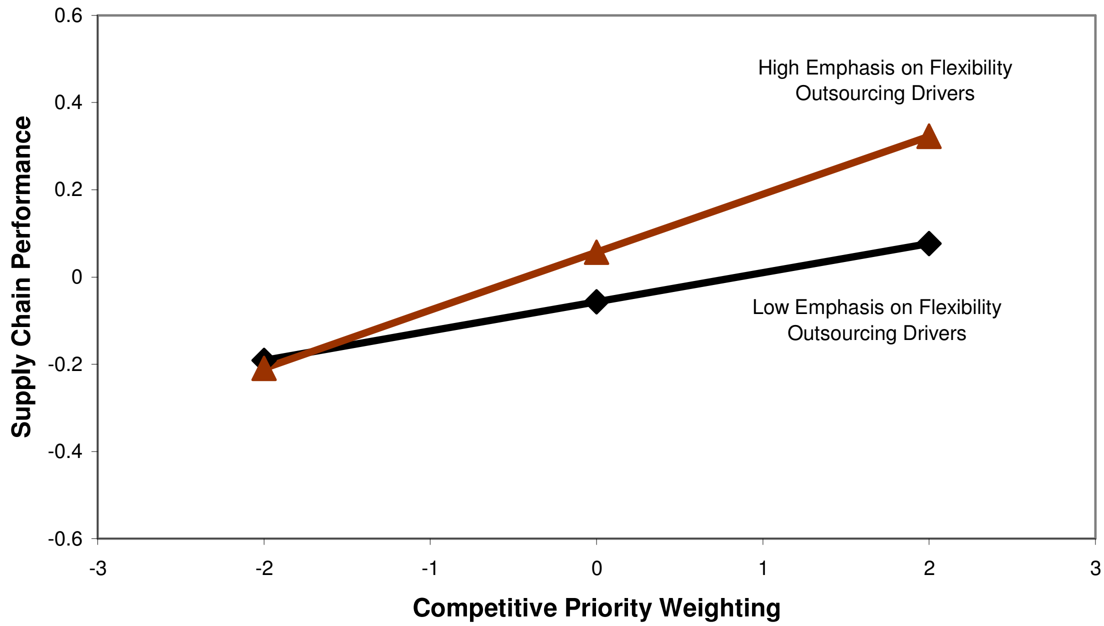


Figure 3.6: Cost Outsourcing Congruence and Performance

Flexibility Outsourcing Congruence and Supply Chain Performance



Flexibility Outsourcing Congruence and Business Performance

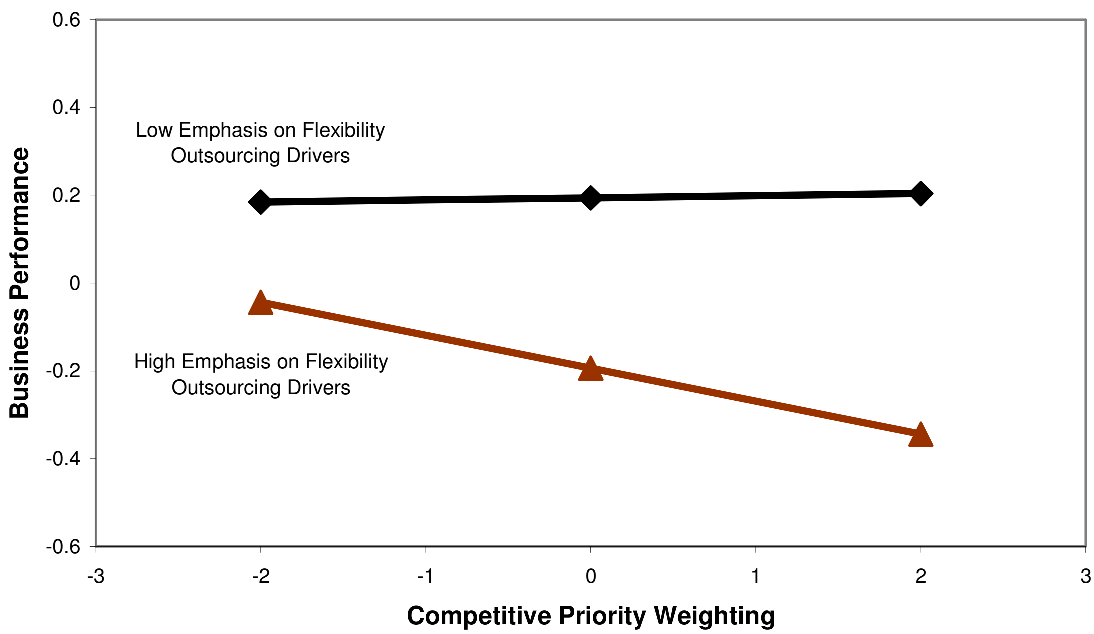
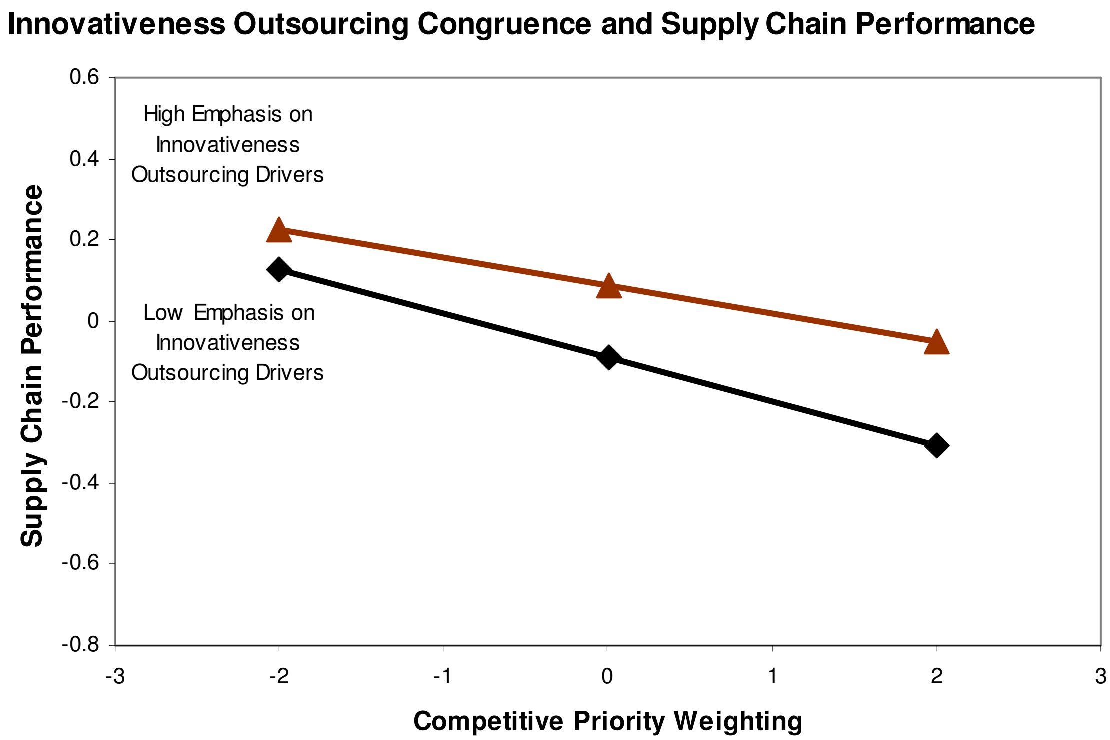


Figure 3.7: Flexibility Outsourcing Congruence and Performance

Figure 3.8 depicts the impact of innovativeness related outsourcing congruence on supply chain and business performance. The relationship between innovativeness outsourcing congruence and supply chain performance is not consistent across the range of emphasis for the competitive priority; when a firm chooses not to emphasize innovativeness as a competitive priority, they experience slightly higher levels of supply chain performance when they emphasize innovativeness related outsourcing drivers. However, there is a positive relationship between outsourcing congruence and supply chain performance when innovativeness is highly emphasized as a competitive priority. These findings lead us to conclude that H3d is only partially supported.

From the second plot in Figure 3.8, we find a positive relationship between business performance and innovativeness outsourcing congruence for both a low and a high level of emphasis on innovativeness as a competitive priority. These results indicate strong support for H4d.

The supply chain and business performance impacts of outsourcing congruence along the quality dimension are presented in Figure 3.9. The relationship between quality outsourcing congruence and performance is consistent in the two graphs. Outsourcing congruence is positively associated with supply chain and business performance for both a low level and a high level of emphasis on quality as a competitive priority. These findings provide strong support for both H3e and H4e.



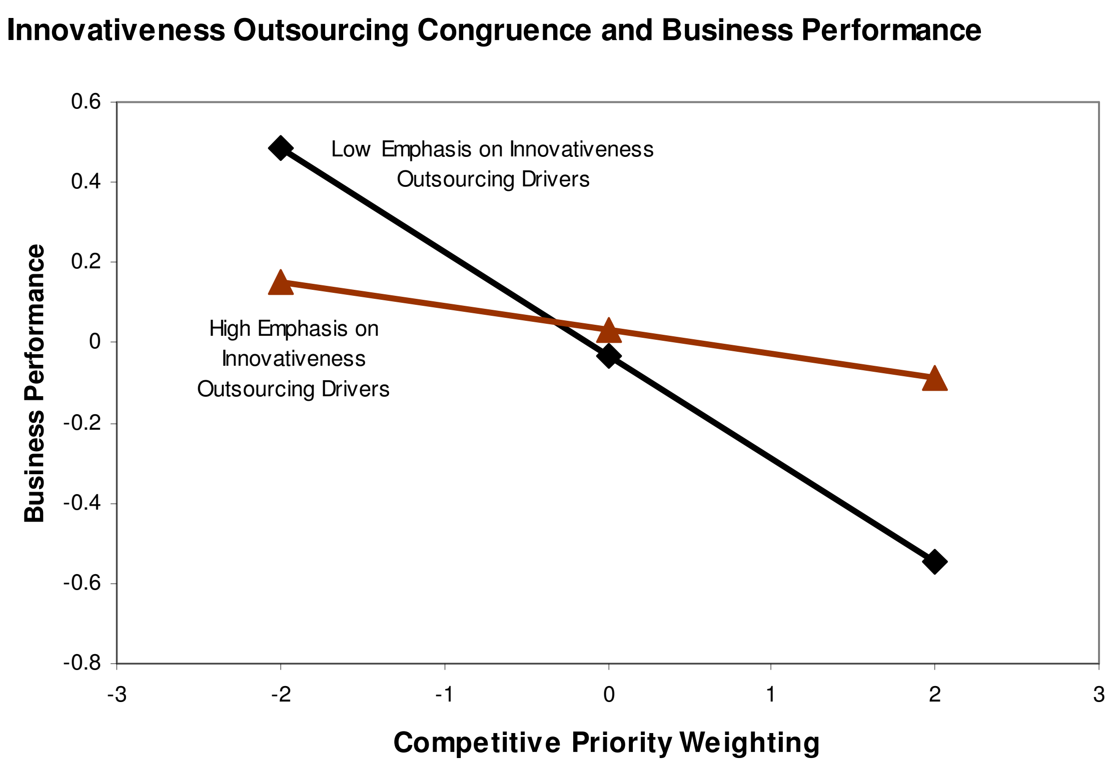
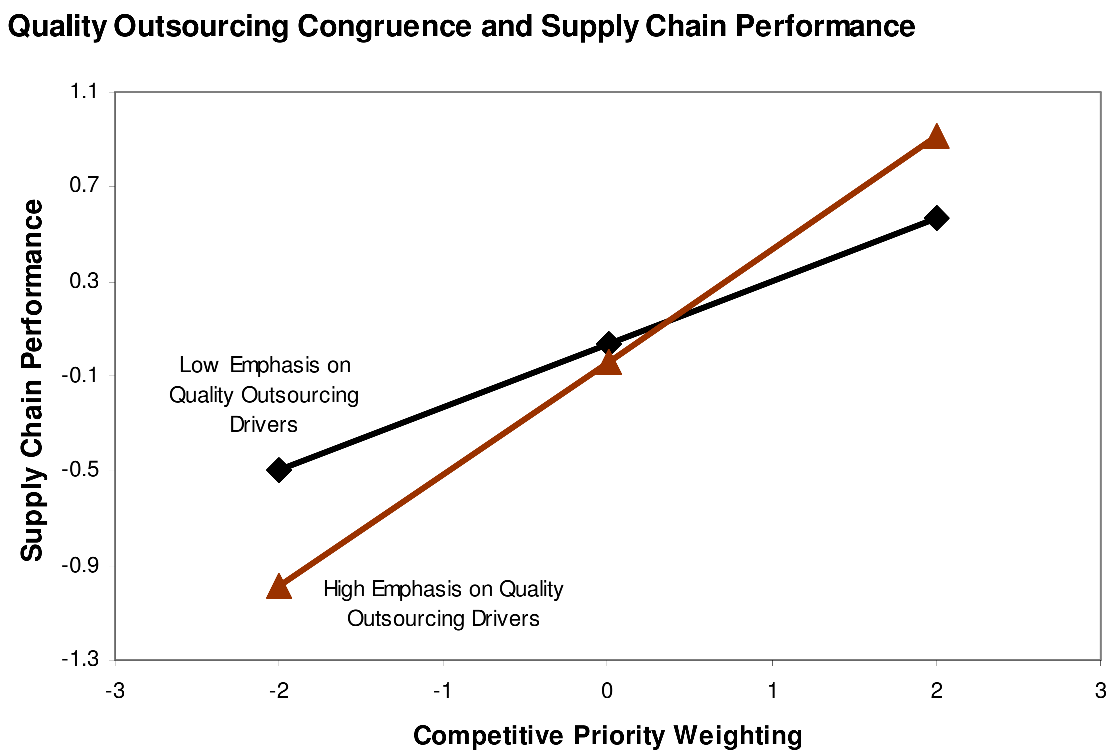


Figure 3.8: Innovativeness Outsourcing Congruence and Performance



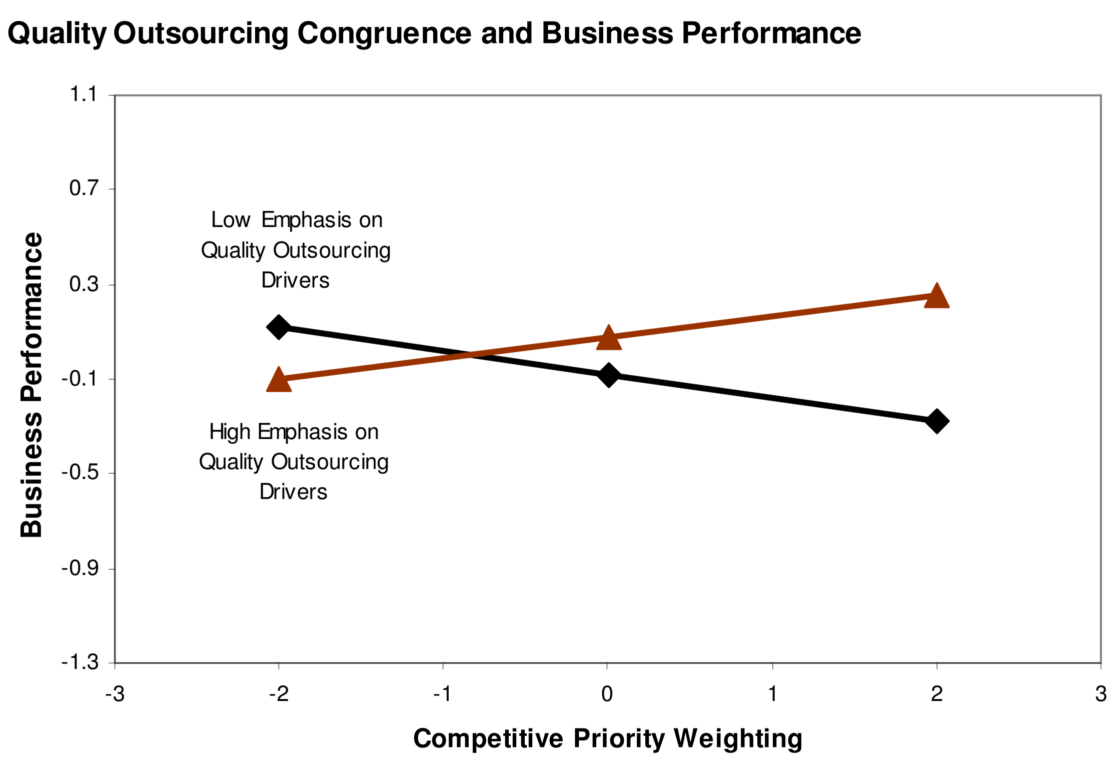


Figure 3.9: Quality Outsourcing Congruence and Performance

Figure 3.10 shows a positive relationship between time outsourcing congruence and supply chain performance for both a low and high level of emphasis on time as a competitive priority. This result provides strong support for H3f. In contrast, the second interaction in Figure 3.10 shows a negative relationship between time outsourcing congruence and business performance for both a low and high level of emphasis on time as a competitive priority which leads us to reject H4f.

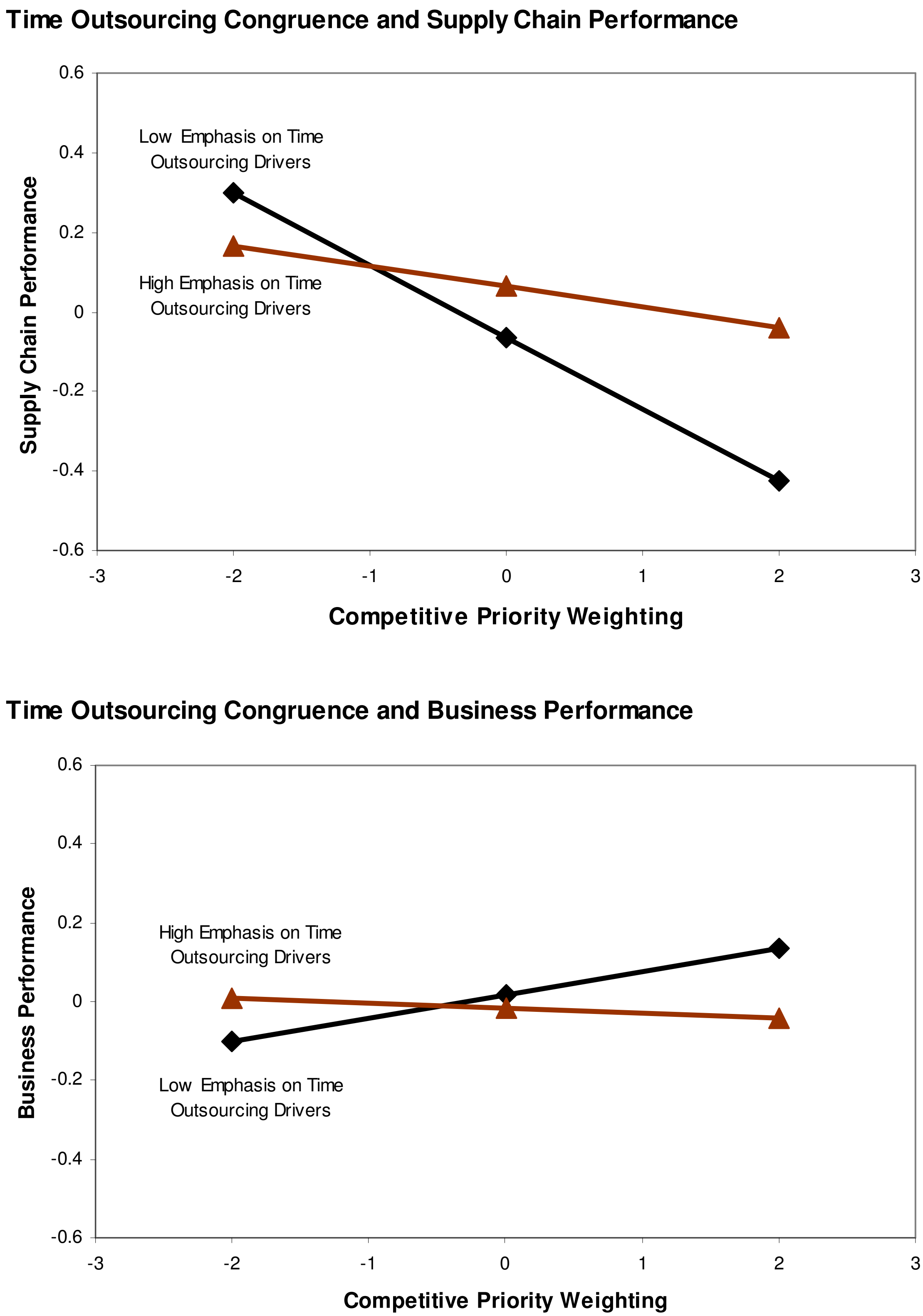


Figure 3.10: Time Outsourcing Congruence and Performance

3.5 Discussion and Managerial Implications

This study empirically investigates the performance impacts of outsourcing congruence in manufacturing business units. A high level of outsourcing congruence, defined as the alignment between the level of emphasis given to the five competitive priorities and the emphasis placed on the associated outsourcing drivers by a firm, was found among the participants in this study. This shows that firms are generally making outsourcing decisions in alignment with their competitive priorities.

Despite the overall high level of congruence in the sample, differences in the level of outsourcing congruence were found to be related to variations in firm performance. Overall, the combined effect of outsourcing congruence across all five competitive priorities was found to be positively related to both supply chain and business performance. These findings, supporting the benefits of strategic alignment, should lead firms to carefully consider their strategic goals when making decisions to insource or outsource an activity or process.

The results of the individual analyses for each of the five competitive priorities shed further light on the performance impacts of outsourcing congruence. These individual analyses (discussed below) show that the relationships between performance and outsourcing congruence are not consistent across the five competitive priorities. The results provide further indication that firms need to clearly understand the role that their competitive strategy plays when making outsourcing decisions.

The cost alignment findings in this study have extensive implications considering that cost is widely accepted to be the leading driver of manufacturing outsourcing decisions (Casale, 2004; Schniederjans et al., 2005). The results show that outsourcing alignment along the cost dimension is most critical for firms that are not attempting to compete on cost. Firms that are not competing on low cost experience lower levels of both supply chain and business performance when they misalign their outsourcing decisions and choose to outsource for low cost based reasons. Several studies found in the literature provide plausible explanations for these findings. First, experience has shown that outsourcing arrangements entail a number of hidden costs which decrease the actual cost savings that firms experience (Garaventa and Tellefsen, 2001). Additionally, research suggests that outsourcing for cost reasons can result in a loss of business capabilities for a firm, which in the long term may reduce a firm's competitive advantage (Bettis et al., 1992).

The performance impacts of flexibility related outsourcing congruence on supply chain and business performance were mixed. Supply chain performance was found to benefit from outsourcing congruence for firms that choose to emphasize flexibility as a competitive priority. In contrast, business performance was found to be lowest when firms competing on flexibility emphasized flexibility related outsourcing drivers. These contrasting findings may be a result of a trade-off effect; while supply chain performance benefits from outsourcing for flexibility reasons, the costs associated with the outsourcing decision may be greater, which negatively impacts business performance.

Similar to flexibility, the impacts of innovativeness related outsourcing congruence on performance were also mixed. Outsourcing congruence was positively associated with better business performance for firms with both high and low levels of emphasis on innovativeness as a competitive priority. However, outsourcing congruence was only associated with better supply chain performance for firms emphasizing innovativeness, but not for firms not competing on innovativeness. From these results, firms that choose to compete on innovativeness can conclude that outsourcing decisions should be made in alignment with the competitive strategy.

Behind cost, quality improvement is typically cited as the next leading driver of outsourcing decisions (Schniederjans et al., 2005). This study finds that quality associated outsourcing congruence is positively related to both supply chain and business performance. Of the five competitive priorities, outsourcing congruence with respect to quality is the only competitive priority where a positive relationship with both business and supply chain performance is found across the range of competitive priority emphasis. The consistency of the impact of quality outsourcing congruence should lead firms to align their outsourcing decisions with their emphasis on quality as a competitive priority.

Time related outsourcing congruence is found to be positively associated with supply chain performance. This finding may be due to the ability of third party suppliers to leverage developed expertise and reduce the cycle times required to conduct supply chain activities (Weber et al., 1991). In contrast, a negative relationship between outsourcing congruence and business performance was observed. Again, this observation may be a result of trade-offs associated with outsourcing to improve the ability to compete on timeliness.

Taken together, the findings of this study show the overall impact of outsourcing congruence on supply chain and business performance to be positive. However, the detailed competitive priority results indicate that the impact of alignment varies across the five competitive priorities illustrating the need for firms to clearly understand their competitive strategies and then tailor their outsourcing decisions to match those specific strategies.

3.6 Contributions, Limitations, and Future Research Directions

This study provides contributions to several areas of operations management research. Our study expands the body of research related to strategic alignment by investigating and developing an understanding of how the congruence between the drivers of an outsourcing decision and a firm's competitive priorities impacts supply chain and business performance. This study also identifies specific factors associated with higher levels of performance that real-world practitioners should consider when making outsourcing decisions. Future researchers will be aided by several methodological contributions which are also developed in this study. We develop an updated competitive priority scale reflecting the addition of innovativeness as a competitive priority. We also develop new scales to evaluate the importance given to outsourcing drivers across a supply chain. To the best of our knowledge, we believe that the SEM interaction methodology employed represents the first use of this method in an operations management research context.

The analysis conducted in this study is based on data collected from manufacturing firms operating in the United States. Generalization of the findings in this study should consider potential differences due to the geography and industry differences.

The assessment of congruence in this study only examines the one-to-one alignment of outsourcing drivers and competitive priorities. A future study is planned to address this issue by examining the interactions and interrelationships between the five competitive priorities and the associated outsourcing drivers.

CHAPTER 4

THE ALIGNMENT BETWEEN OUTSOURCING DRIVERS AND MANUFACTURING STRATEGY CONFIGURATIONS: THE IMPACT ON PERFORMANCE

4.1 Introduction and Background

The outsourcing of manufacturing processes and activities has become a widespread practice throughout industry (Adler, 2003; Chamberland, 2003; Gottfredson et al., 2005; Heikkila and Cordon, 2002; Kirk, 2001; Niezen and Weller, 2006; Nohria, 2005; Orr, 2001; Palvia, 2003; Quinn, 1999; Ross et al., 2005; Willcocks et al., 2004). This growth has transformed outsourcing into a key component of firms' manufacturing strategies (Gottfredson et al., 2005; Kakabadse and Kakabadse, 2000a; Kakabadse and Kakabadse, 2000b; Talluri and Narasimhan, 2004). The elevated strategic importance of outsourcing should drive firms to consider the alignment between the drivers of their outsourcing decisions and their manufacturing goals (Chamberland, 2003; Gottfredson et al., 2005; Insinga and Werle, 2000; Merrifield, 2006).

The impact of the alignment between manufacturing strategies and operational decisions has been widely investigated in operations management research (Bozarth and McDermott, 1998). Much of this research has explored the role that alignment plays in firms by examining taxonomies of manufacturing strategies (Cousins, Lawson, and Squire, 2006; Frohlich and Dixon, 2001; Jonsson, 2000; Kathuria, 2000; Miller and Roth, 1994; Sum, Kow, and Chen, 2004; Zhao, Sum, Qi, Zhang, and Lee, 2006). Investigating alignment using a taxonomic approach provides value in several ways. First, taxonomies allow for the analysis of firms' overall strategies (Ketchen and Shook, 1996; Miller and Roth, 1994; Zhao et al., 2006). This overall strategy picture is provided because the taxonomy approach identifies distinct groups of firms with similar strategic configurations; which provide important insights into the variety of competitive approaches commonly adopted by firms. Additionally, the distinct groups of firms can be examined in detail to understand how differences between the groups can impact a variety of operational dimensions (Kathuria, 2000).

The contributions of a taxonomic analysis lead us to choose this methodology for this study. First, we use cluster analysis to identify groupings of manufacturing firms with similar strategies, measured by the emphasis placed on the five competitive priorities (cost, flexibility, innovativeness, quality, and time.) Next, we individually examine each group to assess the performance impacts of the emphasis given to outsourcing decision drivers associated with each competitive priority. Finally, for each cluster, we will examine the alignment between the importance placed on each competitive priority and the performance impact of each group of outsourcing drivers.

This chapter is organized as follows. In Section 4.2, we discuss the theoretical foundations of this study and the research hypotheses. Section 4.3 outlines the methodology utilized in this study and Section 4.4 describes the analysis and results. Section 4.5 summarizes the implications, limitations, and possible extensions of this study.

4.2 Theoretical Development

Research has shown that operational decisions, such as outsourcing, should be complimentary and aligned with a firm's manufacturing strategy (Miller, 1992). Venkatraman (1989) proposes that alignment or fit within an organization can take six possible forms: moderation, mediation, covariation, typologies, and gestalts. As previously discussed, the impact of the alignment between a firm's competitive priorities and the drivers of its outsourcing decisions can be represented using two of these fit models. The fit as moderation approach, discussed in Chapter 3 of this study allows for the detailed examination of the one-to-one fit between each competitive priority and the associated group of outsourcing drivers. The moderation approach does not test the impact of alignment across overall strategic configurations. Examining fit using gestalts or taxonomies does address the overall strategic configuration since taxonomies consider the multidimensional nature of an overall strategy (Bozarth and McDermott, 1998). Taxonomies provide this view by developing distinct groupings based on the simultaneous influence of multiple variables (Doty and Glick, 1994).

The manufacturing strategy adopted by a firm represents the operationalization of a firm's business strategy (Hayes and Wheelwright, 1984). A manufacturing strategy is determined by the competitive priorities on which a firm chooses to compete (Koufteros et al., 2002). Specifically, the manufacturing strategy is determined by the emphasis placed by a firm on cost, flexibility, innovativeness, quality, and time (Boyer and Lewis, 2002; Krajewski and Ritzman, 1999; Leong et al., 1990; Safizadeh et al., 1996; Skinner, 1974; Ward et al., 1998). Therefore we choose to classify the firms in our study based on the emphasis placed across these five competitive priorities. The choice of classification variables is critical as the variables defining a taxonomy need to be carefully selected to ensure that the groupings provide useful managerial insights (Ketchen and Shook, 1996). The initial step in this study is to segment our sample of manufacturing firms into dissimilar groupings based on the dominant patterns of competitive priority emphasis within the sample. Therefore, we predict:

Hypothesis 5 – The manufacturing firms in this study can be grouped into distinct clusters of manufacturing strategy configurations based on variations in the level of emphasis placed by the firms on the five competitive priorities.

Within each manufacturing strategy configuration that we identify, we will examine the relationship between performance and the alignment between a firm's competitive priorities and its outsourcing drivers. We believe that the impact of the outsourcing drivers on performance is related to the level of emphasis placed on the competitive priorities. Therefore, we expect the outsourcing driver groups associated with the competitive priorities ranked highest within a manufacturing strategy configuration will have the most positive impact on performance and the drivers associated with the lowest ranked competitive priorities will have the least positive impact on performance. Specifically, we predict the following:

> **Hypothesis 6** – For each manufacturing strategy cluster, the relative emphasis given by a firm to its outsourcing driver groupings and its impact on supply chain performance, is influenced by the firm's manufacturing strategy configuration.

> **Hypothesis 7** – For each manufacturing strategy cluster, the relative emphasis given by a firm to its outsourcing driver groupings and its impact on business performance, is influenced by the firm's manufacturing strategy configuration.

4.3 Methodology

4.3.1 Data collection

This study utilize the primary survey data collected from supply chain professionals working at manufacturing firms operating in the domestic United States. This analysis utilizes the competitive priority, outsourcing driver emphasis, and performance scales developed and validated in the Chapter 2 of this dissertation. A survey process collected data concerning the outsourcing practices at 233 domestic manufacturing firms. From this dataset, a sample of 196 respondents that indicated that their firms have outsourced a portion of their supply chain processes or activities is used in this study.

4.3.2 Measures

The five generally accepted competitive priorities in manufacturing are cost, time, innovativeness, quality, and flexibility (Boyer and Lewis, 2002; Krajewski and Ritzman, 1999; Leong et al., 1990; Safizadeh et al., 1996; Skinner, 1974; Ward et al., 1998). The emphasis given to the five priorities by a firm represents the firm's manufacturing strategy (Koufteros et al., 2002). The taxonomy of strategies developed in this study is based on the levels of emphasis placed on the five competitive priorities when positioning the primary product sold by the firms in our sample. A two-step cluster analysis process is employed to identify clusters of firms with similar manufacturing strategies, based on the emphasis placed on the five competitive priorities.

Composite factor scores were calculated for each of the five competitive priorities by averaging the score given to the items associated with each factor by the survey respondents. These composite variables, which represent the emphasis given to cost, flexibility, innovativeness, quality, and time by a firm, are used to develop the operations strategy configurations present in our sample of firms. Composite variables were also created for the five outsourcing driver emphasis factors associated with the five competitive priorities and the supply chain and business performance factors. These variables were used in regression and correlation analyses to test our hypotheses regarding the relationships between outsourcing alignment and performance within the strategic clusters.

4.3.3 Evaluating Alignment

By examining alignment using taxonomies, we segment firms into clusters based on the dominant manufacturing strategies present amongst those firms. We then test the alignment between the competitive priorities emphasized within each cluster and the emphasis placed on the groups of outsourcing drivers associated with each of the competitive priorities. To accomplish this, the outsourcing drivers included in this study are mapped to the competitive priority with which they are most closely related. The mean emphasis placed on each of the competitive priorities, determined from the survey of firms, is used to rank the importance of the priorities within each cluster of firms. A regression analysis of the outsourcing drivers' effect on performance is used to rank the outsourcing driver groups within each cluster. Since each one of the five groups of drivers are matched with one of the competitive priorities, the correlation between the ranking of the five competitive priorities and the ranking of the impact of the associated outsourcing driver groups within each cluster will show whether or not alignment plays a significant role in determining performance. A high level of alignment between the two rankings will show that the firms should weigh the factors most associated with their manufacturing strategies when making outsourcing decisions. Conversely, a lack of alignment will be evidenced by an absence of correlation between the rankings of relative impact of the outsourcing driver groups and the emphasis placed across the competitive priorities within a cluster of firms.

4.4 Analysis

4.4.1 Identifying Competitive Priority Strategies

We used cluster analysis to identify the taxonomy of manufacturing strategies within our sample of firms based on their competitive priorities. As recommended in the literature, a two-step cluster analysis procedure was used to develop our taxonomy (Frohlich and Dixon, 2001; Hair, Anderson, Tatham, and Black, 1992; Ketchen and Shook, 1996; Punj and Stewart, 1983). The first step of this process used hierarchical cluster analysis to identify outliers and to determine the number of clusters and their centers. The second step used iterative nonhierarchical K-means clustering to determine the final cluster membership. The number of clusters and cluster centers determined in the hierarchical stage analysis were used as seeds for the K-means process. Both steps of the cluster analysis were conducted using SPSS 14.0. Ward's method using the squared Euclidean distance measure was selected for the hierarchical cluster analysis was selected due to its ability to robustly maximize within-cluster homogeneity and between-cluster heterogeneity (Aldenderfer and Blashfield, 1984; Frohlich and Dixon, 2001).

To identify outliers in our sample, we ran a hierarchical cluster analysis to form 30 clusters of competitive priority strategies from the 196 responses (Jonsson, 2000). We then examined the resulting clusters and removed from our analysis any clusters formed with only one or two members. This process resulted in a final sample of 181 responses after the elimination of 15 clusters (three clusters of one case and six clusters containing only two cases.)

The appropriate number of clusters for this analysis was determined using a combination of methods established in the literature. First, by rule of thumb, the suggested number of clusters should be approximately between $n/60$ and $n/30$ (where n is the sample size) (Lehmann, 1979). Applying this rule indicates the appropriate number of clusters for our sample should be between three and six. The change in the agglomeration coefficient between stages of the hierarchical analysis was then examined to determine the most appropriate number of clusters within the range recommended by Lehmann's criteria. A large change in the agglomeration coefficient indicates that two dissimilar clusters have been joined together; therefore the number of clusters prior to this stage is more appropriate (Ketchen and Shook, 1996). The change on the agglomeration coefficient for the range of three to six cluster solutions is shown in Table 4.1; from this we see that the largest percent change occurs when the number of clusters reduces from three to two. This indicated that the previous three cluster solution is most appropriate for this sample. The hierarchical clustering process was repeated for a three cluster solution for comparison with the K-means clustering solution to assess the reliability of the clusters. The three cluster solutions results in groups containing 66, 67, and 48 cases.

Table 4.1: Hierarchical Cluster Analysis Agglomeration Schedule

Cluster Analysis Stage	Agglomeration Coefficient	Start Number of Clusters	End Number of Clusters	Agglomeration Coefficient % Change
176	245.65	6	5	9.37%
177	268.08	5	4	9.13%
178	302.27	4	3	12.75%
179	349.96	3	2	15.78%

K-means clustering was used to partition the sample into the final three cluster solution. Nonhierarchical clustering methods, such as K-means clustering, make multiple passes through the data set which results in a final cluster solution where the within-cluster homogeneity and between-cluster homogeneity are optimized (Ketchen and Shook, 1996). Clusters containing 71, 67, and 43 cases each were formed during this process. A comparison of the K-means cluster solution with the hierarchical cluster solution finds that 87% of the cases are placed in the same cluster by the two methods. This high level of consistency between the two methods indicates that the final cluster solution is reliable (Hair et al., 1992).

4.4.2 Cluster Differences

The significance of the differences between the emphases given to the five competitive priorities across the three clusters was tested using ANOVA (Kathuria, 2000; Narasimhan, Swink, and Kim, 2005; Zhao et al., 2006). Pairwise Scheffe tests were conducted post-hoc to examine for differences in the competitive priority emphases between each cluster pair. These tests, presented in Table 4.2, showed that the level of emphasis placed on the five competitive priorities differs significantly at the 5% level between each of the three clusters. This finding showed that the three cluster solutions represent unique manufacturing strategy configurations, which provides support for Hypothesis 5. Figure 4.1 graphically displays the relative emphasis given on average by the members of the three clusters. From this we see that Cluster 1 members emphasize all five competitive priorities at levels significantly higher than the emphasis given by members of both Cluster 2 and 3. We also find that Cluster 2 members emphasize flexibility, innovativeness, and quality more highly compared to Cluster 3 members, while Cluster 3 members emphasize cost and time more highly than Cluster 2 members.

Table 4.2: Between Cluster Competitive Priority Emphasis Differences

	Multidimensional Competitors n = 71 Cluster # 1	*Innovative Customizers* n = 67 Cluster # 2	*Caretakers* n = 43 Cluster # 3	*F* = value (*p* = probability)
Cost				
Cluster Mean	4.51 (2, 3)	3.16 (1, 3)	3.97 (1, 2)	F = 123.45 (p < 0.0001)
SE	0.05	0.07	0.08	
Overall Rank	1	3	2	
Flexibility				
Cluster Mean	4.04 (2, 3)	3.60 (1, 3)	2.95 (1, 2)	F = 37.78 (p < 0.0001)
SE	0.06	0.07	0.14	
Overall Rank	1	2	3	
Innovativeness				
Cluster Mean	4.04 (2, 3)	3.68 (1, 3)	2.81 (1, 2)	F = 71.25 (p < 0.0001)
SE	0.06	0.06	0.10	
Overall Rank	1	2	3	
Quality				
Cluster Mean	4.69 (2, 3)	4.18 (1, 3)	3.80 (1, 2)	F = 32.47 (p < 0.0001)
SE	0.04	0.08	0.11	
Overall Rank	1	2	3	
Time				
Cluster Mean	4.31 (2, 3)	3.25 (1, 3)	3.54 (1, 2)	F = 63.68 (p < 0.0001)
SE	0.06	0.07	0.09	
Overall Rank	1	3	2	

The numbers in parentheses indicate the cluster numbers from which a cluster's emphasis given to a competitive priority differs significantly at the 5% level based on Scheffe pairwise tests.

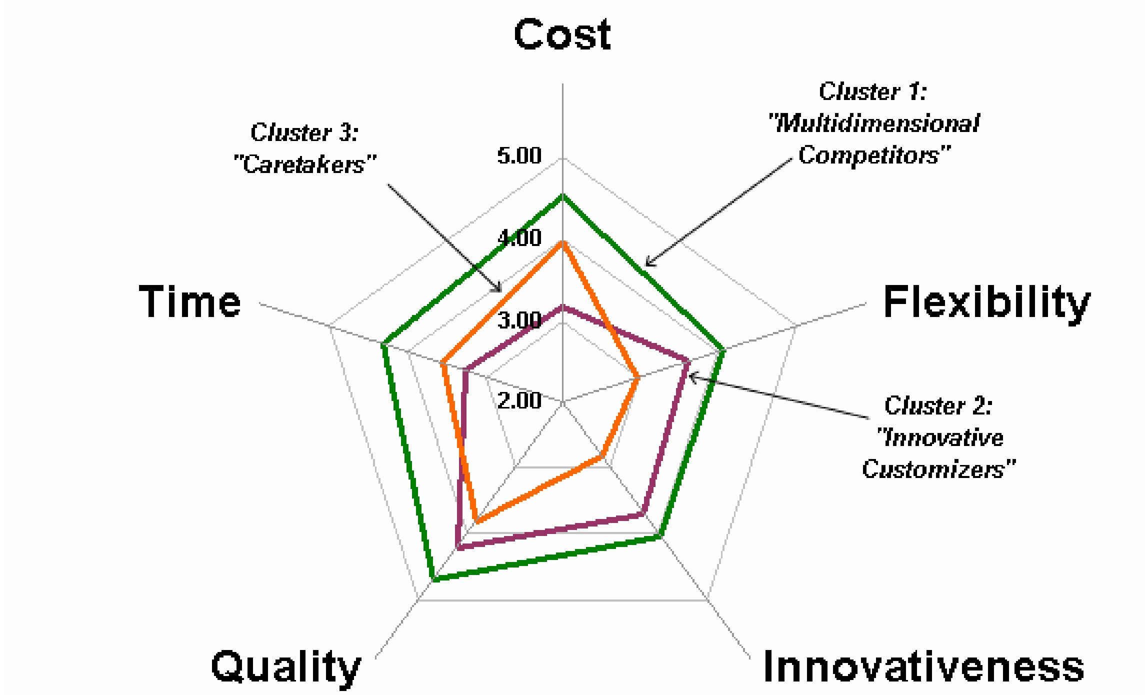


Figure 4.1: Competitive Priority Emphasis Profiles of the Three Strategic Clusters

Differences between the emphasis given to the competitive priorities within each cluster was evaluated using pairwise t-tests (Kathuria, 2000). As shown in Table 4.3, we see that that quality receives the highest emphasis in Cluster 1, followed by cost, and then time (each of which is emphasized at a level significantly different from the other at the 5% level). Flexibility and innovativeness receive the lowest levels of emphasis, although the level of emphasis is not significantly different between the two priorities at the 5% level. Quality is the most highly emphasized priority in Cluster 2, followed by innovativeness and flexibility. Time and cost receive the lowest emphasis in this cluster. Cost and quality receive the highest emphasis in Cluster 3 (at levels not significantly different at the 5% level), followed by time, flexibility, and innovativeness respectively. An interesting observation is that quality is ranked as either the highest or second highest competitive priority (although not significantly different from the highest priority in that case) within all three of the strategy clusters. This finding and similar findings by Kathuria (2000), suggest that quality has become competitive qualifier rather than a differentiator for manufacturers.

Table 4.3: Within Cluster Competitive Priority Emphasis Differences

	Cost (C)	Flexibility (F)	Innovativeness (I)	Quality (Q)	Time (T)
Cluster 1: Multidimensional Competitors					
Cluster Mean	4.51 (F, I, Q, T)	4.04 (C, Q, T)	4.04 (C, Q, T)	4.69 (C, F, I, T)	4.31 (C, F, I, Q)
SE	0.05	0.06	0.06	0.04	0.06
Within Cluster Rank	2	4	5	1	3
Cluster 2: Innovative Customizers					
Cluster Mean	3.16 (F, I, Q)	3.60 (C, Q, T)	3.68 (C, Q, T)	4.18 (C, F, I, T)	3.25 (F, I, Q)
SE	0.07	0.07	0.06	0.08	0.07
Within Cluster Rank	5	3	2	1	4
Cluster 3: Caretakers					
Cluster Mean	3.97 (F, I, T)	2.95 (C, Q, T)	2.81 (C, Q, T)	3.80 (F, I)	3.54 (C, F, I)
SE	0.08	0.14	0.10	0.11	0.09
Within Cluster Rank	1	4	5	2	3

The letters in parentheses indicate the competitive priorities from which the emphasis given to this competitive priority differs significantly at the 5% level based on two-tailed t- tests.

4.5 Results

4.5.1 Identifying Manufacturing Strategy Configurations

The identification and naming of the three operations strategies represented by the clusters was accomplished by comparing our findings with previous taxonomic research in manufacturing. A direct comparison was not possible as the previous studies developed taxonomies either by using only four competitive priorities (excluding innovativeness) (Kathuria, 2000; Ward, Bickford, and Leong, 1996) or by analyzing the firms' competitive capabilities (Frohlich and Dixon, 2001; Miller and Roth, 1994; Zhao et al., 2006). However, strong similarities between our clusters and existing taxonomies are evident, which aided the cluster naming process.

Cluster 1 members emphasize all five competitive priorities at higher levels than the members of the other two clusters. Ward et al. (1996) also identify firms that compete on all of the competitive priorities and deem them *"Lean Competitors."* This designation highlights the ability of firms to simultaneously compete on multiple dimensions through the implementation of cross-functional continuous improvement programs (Ward et al., 1996). Kathuria (2000) and Zhao et al. (2006) both identified similar clusters of firms in their studies, which they labeled *"Do All"* and *"Mass Servers"* respectively. We believe that an extension of Ward et al.'s cluster description that reflects the multidimensional nature of this configuration is most appropriate for the members of Cluster 1; therefore we designate this cluster as *"Multidimensional Competitors."*

Quality, innovativeness, and flexibility are highly emphasized by the members of Cluster 2. As previously discussed, quality does not differentiate the three clusters; therefore we differentiate Cluster 2 by the emphasis placed on innovativeness and flexibility. Similar clusters have been identified by Miller and Roth (1994) (called *"Innovators"*), Ward et al. (1996) (designated as *"Broad Market Differentiators"*), Frohlich and Dixon (2001) (*"Servers"*), and Zhao et al. (2006) (*"Quality Customizers"*). We adopt a combination of these previous designations to reflect the inclusion of innovativeness as a competitive priority and designate Cluster 2 members as *"Innovative Customizers."*

Members of Cluster 3 place a high emphasis on cost and quality and a low emphasis on flexibility and innovativeness. Again, previous studies have identified similar strategy clusters: Miller and Roth (1994) designate comparable firms as *"Caretakers,"* Ward et al. (1996) labels similar firms *"Cost Leaders,"* Kathuria (2000) identifies them *"Efficient Conformers,"* Frohlich and Dixon (2001) call them *"Idlers,"* and Zhao (2006) label these firms as *"Specialized Contractors."* Of these previously identified clusters, Miller and Roth's *Caretakers* most closely match the profile of Cluster 3 as *Caretakers* place a low emphasis on the development of new capabilities while placing a high emphasis on cost (price), time (delivery), and quality. Therefore, we designate the members of Cluster 3 as "*Caretakers.*"

4.5.2 Profile of Cluster Members

Profiles of the cluster members are presented in Table 4.4. An examination of these profiles shows that each cluster contains firms of various sizes competing in a range of industries. By inspection, we see that the industry groupings are fairly consistent across the three clusters with the majority of firms report their industry as either "Electronic and other electrical equipment and components" or "Miscellaneous manufacturing." The sales volume distribution among the *Innovative Customizers* and *Caretakers* is similar, while a higher fraction of *Multidimensional Competitors* report sales volumes over $1 billion. The same relationships do not hold when comparing the number of employees in each firm; the *Innovative Customizers* report the highest percentage of firms with more than 2500 employees, followed by the *Multidimensional Competitors*, and then the *Caretakers*.

Table 4.4: Profile of Cluster Members

Metric	1 Multidimensional Competitors	2 Innovative Customizers	3 Caretakers
Industry Groupings			
Apparel and other finished products made from fabric	7%	2%	0%
Furniture and fixtures	5%	4%	3%
Rubber and miscellaneous plastic products	3%	5%	9%
Fabricated metal products	8%	4%	9%
Industrial and commercial machinery and computer equipment	3%	5%	3%
Electronic and other electrical equipment and components	26%	22%	15%
Transportation equipment	5%	4%	12%
Measuring, analyzing, and controlling instruments	0%	7%	0%
Miscellaneous manufacturing	43%	47%	48%
Sales Volume ($US)			
Less than $50 million	2%	5%	6%
$50 to $100 million	7%	11%	6%
$101 to $250 million	11%	13%	9%
$251 to $500 million	7%	18%	15%
$501 million to $1 billion	11%	4%	18%
Over $1 billion	62%	49%	45%
Number of Employees			
Less than 200	11%	13%	21%
201 to 500	23%	24%	21%
501 to 1000	11%	4%	15%
1001 to 1500	8%	4%	15%
1501 to 2500	10%	11%	12%
Over 2500	36%	45%	15%

4.5.3 Supply Chain and Business Performance

The supply chain and business performance levels associated with each cluster were examined for differences using ANOVA and pairwise Scheffe tests (Table 4.5). The ANOVA results indicated that the performance levels vary between at least two of the clusters for both supply chain (p-value < 0.01) and business performance (p-value < 0.05). From the pairwise test results, we see that the *Innovative Customizers* report the highest levels of supply chain performance, which is significantly higher than the *Caretakers* but not significantly higher compared with the *Multidimensional Competitors*. In contrast, the *Multidimensional Competitors* report the highest level of business performance followed next by the *Caretakers* and then by the *Innovative Customizers*

(which report significantly lower business performance levels than the *Multidimensional Competitors*.)

Table 4.5: Comparison of Performance between Clusters

	Multidimensional Competitors n = 71 Cluster # 1	*Innovative Customizers* n = 67 Cluster # 2	*Caretakers* n = 43 Cluster # 3	*F* = value (*p* = probability)
Supply Chain Performance				
Cluster Mean	3.32	3.47 (3)	3.01 (2)	F = 5.53 (p < 0.005)
SE	0.10	0.70	0.10	
Overall Rank	2	1	3	
Business Performance				
Cluster Mean	3.34 (2)	2.85 (1)	3.21	F = 3.98 (p < 0.02)
SE	0.12	0.14	0.14	
Overall Rank	1	3	2	

The numbers in parentheses indicate the cluster numbers from which a cluster's performance level differs significantly at the 5% level based on Scheffe pairwise tests.

4.5.4 The Impact of Outsourcing Drivers on Performance

The objective of this analysis is to examine if differences in performance levels are attributable to variations in the level of alignment between firm's competitive priorities and the emphasis given to the various drivers considered when making outsourcing decisions. Of the six fit types proposed by Venkatraman (1989), we will treat the manufacturing strategy clusters as gestalts and individually examine the role of alignment within each cluster. As predicted by our hypotheses, we expect that the importance placed on the outsourcing drivers associated with the competitive priorities emphasized within a cluster will have the greatest impact of both performance metrics.

Each of the five outsourcing driver factors measure the emphasis given to items related to one of the five competitive priorities. To analyze the relative impact of these groups we calculate the emphasis given by a firm to each outsourcing driver group compared with the emphasis placed on the other four driver groups by that firm. For a firm, the relative measures are calculated as the difference between the outsourcing driver group of interest and the average of the other four driver groups. The five relative outsourcing driver scores are calculated as:

$$COST\_DRIVER_i = Y_{cost\,i} - \frac{\sum (Y_{flex_i} + Y_{innov\,i} + Y_{qual\,i} + Y_{time\,i})}{4}$$

$$FLEX\_DRIVER_i = Y_{flex_i} - \frac{\sum (Y_{cost_i} + Y_{innov_i} + Y_{qual\,i} + Y_{time\,i})}{4}$$

$$INNO\_DRIVER_i = Y_{innov\,i} - \frac{\sum (Y_{cost\,i} + Y_{flex_i} + Y_{qual\,i} + Y_{time\,i})}{4}$$

$$QUAL\_DRIVER_i = Y_{qual\,i} - \frac{\sum (Y_{cost\,i} + Y_{flex_i} + Y_{qual\,i} + Y_{time\,i})}{4}$$

$$TIME\_DRIVER_i = Y_{time\,i} - \frac{\sum (Y_{cost\,i} + Y_{flex_i} + Y_{innov\,i} + Y_{qual\,i})}{4}$$

where the emphasis given to the five outsourcing driver groupings in firm *i* are represented by the variables $Y_{cost\,i}, Y_{flex\,i}, Y_{innov\,i}, Y_{qual\,i}$ and $Y_{time\,i}$.

Hypotheses 6 and 7 are examined using the results of Ordinary Least Squares regression. Two separate models are tested for each of the three clusters. For each cluster, one model examines the supply chain performance and the other examines business performance. In the regression models, the relative outsourcing driver emphases $COST\_DRIVER_i$, $FLEX\_\_DRIVER_i$, $INNO\_DRIVER_i$, $QUAL\_DRIVER_i$, and

$TIME\_DRIVER_i$ are included as independent variables. The two regressions models are specified as:

$$\begin{aligned} SC\_PERF_i = \quad & \beta_0 + \beta_1 COST\_DRIVER_i + \beta_1 FLEX\_DRIVER_i \\ & + \beta_3 INNO\_DRIVER_i + \beta_4 QUAL\_DRIVER_i \\ & + \beta_5 TIME\_DRIVER_i + \varepsilon_i \end{aligned}$$

$$\begin{aligned} BUS\_PERF_i = \quad & \beta_0 + \beta_1 COST\_DRIVER_i + \beta_1 FLEX\_DRIVER_i \\ & + \beta_3 INNO\_DRIVER_i + \beta_4 QUAL\_DRIVER_i \\ & + \beta_5 TIME\_DRIVER_i + \varepsilon_i \end{aligned}$$

where SC_PERF_i and BUS_PERF_i represent the supply chain and business performance measures for firm *i*. The results of the regression analyses test our hypotheses by determining if the outsourcing driver emphases significantly impact the two performance metrics. The standardized coefficients for the relative outsourcing driver scores determined by the regression allow us to rank the relative impact of the five groups on the two performance metrics.

The results of the six regression analyses are shown in Table 4.6. All six models are found to be significant at the 1% level. The adjusted R^2 values for the six models range from a low of 17.2% to a high of 29.4%.

Table 4.6: Regression Analysis of the Impact of Outsourcing Driver Emphasis on Performance

	Supply Chain Performance			Business Performance		
	1	2	3	1	2	3
Cluster	*Multidimensional Competitors*	*Innovative Customizers*	*Caretakers*	*Multidimensional Competitors*	*Innovative Customizers*	*Caretakers*
COST_DRIVER	0.327 (.014)**	-0.486 (.000)***	0.373 (.026)**	0.386 (.004)***	-0.347 (.011)**	0.217 (.173)
FLEX_DRIVER	-0.066 (.584)	0.076 (.539)	-0.134 (.388)	-0.024 (.841)	0.168 (.208)	-0.262 (.087)*
INNO_DRIVER	-0.086 (.513)	-0.018 (.884)	-0.188 (.237)	-0.085 (.519)	0.015 (.913)	-0.355 (.025)**
QUAL_DRIVER	0.353 (.008)***	0.228 (.087)*	0.214 (.151)	0.305 (.021)**	0.257 (.073)*	0.179 (.215)
TIME_DRIVER	0.190 (.158)	-0.103 (.390)	-0.030 (.849)	0.199 (.142)	-0.107 (.408)	-0.083 (.582)
R^2	0.231	0.348	0.292	0.225	0.246	0.329
Adjusted R^2	0.172	0.294	0.196	0.165	0.185	0.238
F	3.911	6.503	3.050	3.764	3.991	3.620
p-value	(.004)***	(.000)***	(.021)**	(.005)***	(.003)***	(.009)***

p-values for regression coefficients are in parentheses.
*, **, *** significant at 10%, 5%, and 1% level respectively.

Additional tests were conducted to verify the robustness of the regression models. For each model, a visual inspection of the plot of standardized residuals versus the standardized estimate of the dependent variable did not detect a discernible pattern, which supports the homoscedasticity (constancy of error variance) assumption required in regression analysis (Neter, Kutner, Nachtsheim, and Wasserman, 1996). Next, we tested the assumption that the regression residuals are normally distributed by examining the six residual plots; these tests did not identify any large deviations from a normal distribution (Cohen et al., 2003). To examine if outliers are driving the results, we examined the standardized residuals for cases with a residual value greater than 3.3, which would be an indication of a possible outlier (Cohen et al., 2003). In the six models we did not identify any standardized residuals greater than 3.3. Finally, we examined for multicollinearity by computing the VIF (Variance Inflation Factor) for each variable in each of the models. All of the VIFs in our models had values less than 2.0, well below the threshold value of 10.0 which would indicate possible multicollinearity issues (Cohen et al., 2003).

4.5.5 Competitive Priority and Outsourcing Driver Alignment

We used the regression results to examine the alignment between the outsourcing drivers and the competitive priorities within each cluster. For each of the six models, the relative performance impacts of the five groups of outsourcing drivers are ranked using the standardized regression coefficients. The variable with the largest standardized coefficient has the most positive impact on the dependent performance variable and the variable with the smallest coefficient has the least positive impact. Three sets of rankings represent the impact of the outsourcing drivers on supply chain performance for the three clusters of firms. The other three rankings represent the impact on business performance for the three clusters. These rankings are then compared with the rankings of the five competitive priorities within the associated cluster. Both the outsourcing driver and competitive priority rankings are presented in Table 4.7. To analytically compare the rankings, we calculate Spearman's rank-order correlation coefficients (r_s) for each of the six pairs (Cohen et al., 2003). The Spearman correlation coefficients are also presented in Table 4.7. The results of these tests show strong support for Hypotheses 8 and 9; the relative impact of the outsourcing driver rankings on both supply chain and business performance are significantly correlated (p-value < 0.05) with the competitive priority rankings within each of the three clusters.

Table 4.7: Competitive Priority and Outsourcing Driver Rankings by Cluster

Cluster 1: Multidimensional Competitors

Rank	Competitive Priority	Impact of Outsourcing Driver Emphasis on Supply Chain Performance	Impact of Outsourcing Driver Emphasis on Business Performance
1	Quality	**Quality**	Cost
2	Cost	**Cost**	Quality
3	Time	**Time**	**Time**
4	Flexibility	**Flexibility**	**Flexibility**
5	Innovativeness	**Innovativeness**	**Innovativeness**
Spearman's r_s (p-value)		1.00 (.000)***	.90 (.037)**

Cluster 2: Innovative Customizers

Rank	Competitive Priority	Impact of Outsourcing Driver Emphasis on Supply Chain Performance	Impact of Outsourcing Driver Emphasis on Business Performance
1	Quality	**Quality**	**Quality**
2	Innovativeness	Flexibility	Flexibility
3	Flexibility	Innovativeness	Innovativeness
4	Time	**Time**	**Time**
5	Cost	**Cost**	**Cost**
Spearman's r_s (p-value)		.90 (.037)**	.90 (.037)**

Cluster 3: Caretakers

Rank	Competitive Priority	Impact of Outsourcing Driver Emphasis on Supply Chain Performance	Impact of Outsourcing Driver Emphasis on Business Performance
1	Cost	**Cost**	**Cost**
2	Quality	**Quality**	**Quality**
3	Time	**Time**	**Time**
4	Flexibility	**Flexibility**	**Flexibility**
5	Innovativeness	**Innovativeness**	**Innovativeness**
Spearman's r_s (p-value)		1.00 (.000)***	1.00 (.000)***

Note: Driver groups in **Bold** represent rankings in alignment with the competitive priority ranking.
*, **, *** significant at 10%, 5%, and 1% level respectively.

The ranking of the outsourcing drivers within the *Multidimensional Competitors* cluster of firms exhibit a high level of alignment with the competitive priorities emphasized within that cluster. In this cluster, firms place the greatest emphasis on quality followed by cost as competitive priorities. Time, flexibility, and innovativeness receive the next highest levels of emphasis respectively. Similarly, we find that the supply chain performance impacts of the outsourcing driver groups is ranked in the same order as the competitive priorities (r_s = 1.0). The ranking of the outsourcing drivers' impact on business performance is also highly correlated with the competitive priorities in the group (r_s = 0.90), with the only deviation being that the cost related drivers are found to have a higher impact than the quality drivers. These findings suggest that alignment between manufacturing strategies and outsourcing strategies is associated with both higher supply chain and business performance levels for the *Multidimensional Competitors*.

The *Innovative Customizers* emphasize quality and innovativeness when choosing the priorities on which they compete. In contrast with the other two clusters, the *Innovative Customizers* place the lowest emphasis on cost as a competitive priority. Again, we find a high level of alignment between the competitive priorities and the outsourcing driver impact for both supply chain and business performance (r_s = 0.90), with the only difference in both rankings being a swap between flexibility and innovativeness. Further examination shows the level of emphasis placed on the cost related outsourcing drivers to be significantly and negatively associated with performance. These findings carry some interesting implications; not only is alignment with the highly emphasized competitive priorities associated with higher performance but an emphasis on outsourcing drivers related to cost (the least emphasized competitive priority) is associated with lower supply chain and business performance.

Cost and quality are the most highly emphasized competitive priorities for the *Caretakers*. We find the relative impact of the outsourcing driver groups is ranked in the same order as the competitive priorities within this cluster for both performance metrics (r_s = 1.0). Examining the individual independent variables finds the impact of the cost outsourcing drivers to be positively and significantly associated with higher levels of supply chain performance. We do not find the cost outsourcing drivers to be significantly associated with business performance. However, we again find evidence of a relationship between misalignment and lower performance as the drivers related to the two competitive priorities given the least emphasis (innovativeness and flexibility) are significantly and negatively associated with poorer performance.

4.6 Conclusions

4.6.1 Managerial Implications

The segmentation of our sample of firms into clusters based on their manufacturing strategies permits the examination of the role of alignment between manufacturing strategies and the outsourcing practices. The taxonomic method used in this study permits a holistic assessment of the impact of alignment across an entire manufacturing strategy.

The cluster analysis process successfully identified three distinct manufacturing strategy patterns within our sample of firms. We identified firms that simultaneously emphasize all five competitive priorities as the *Multidimensional Competitors*. Firms competing on quality and innovation, without a high emphasis on cost, are designated as the *Innovative Customizers*. Finally, firms that focus on cost, without an emphasis on flexibility or innovativeness, were labeled as *Caretakers*. We find that quality is highly emphasized within all three groups, which signals that quality has moved from being a competitive differentiator to a competitive qualifier.

Across all three clusters, the study finds the magnitude of the outsourcing driver groups' performance impacts to be associated with the level of emphasis given to the competitive priorities. We also find that several groups of outsourcing drivers associated with lowly emphasized competitive priorities are related to lower performance. These findings highlight the importance of alignment across an entire manufacturing strategy, which should drive practitioners to carefully understand their overall competitive strategies when making outsourcing decisions.

4.6.2 Limitations and Extensions

Potential future research efforts will address limitations within this study. First, the study examines alignment only for manufacturing firms operating within the United States. A future study can address this issue by expanding the boundaries to firms across the globe operating in a variety of industries. This will expand the generalizability of this study by considering the effects of differences between industries and geographies.

This study also investigates the competitive position of firms at a single moment in time. The competitive priorities of firms have been shown to be dynamic as firms adapt to changes in their markets (Corbett and Wassenhove, 1993). A follow-up study will permit a longitudinal examination to determine if the strategies identified in this study and the impacts of alignment across those strategies are consistent over time.

CHAPTER 5

CONCLUSIONS

5.1 Summary of Key Findings

This effort investigates the significance of strategic congruence for manufacturing firms making decisions to outsource internal activities across their supply chains. The importance of congruence between firm strategies and operational activities has been well documented in the literature (Bozarth and McDermott, 1998). However, to the best of our knowledge, this study represents the first attempt to empirically investigate the impact of congruence between outsourcing and firm strategies. The analyses and findings in this research project are based on data collected from over 233 manufacturing firms operating in the United States.

To conduct this study, a new survey instrument was developed and validated to assess firms' competitive priorities, outsourcing drivers, supply chain performance levels, and business performance levels. The competitive priority scales update previous instruments with the addition of items designed to measure innovativeness. The outsourcing driver scales, newly developed for this research, will provide future researchers with measures that clearly determine the motivations behind outsourcing decisions.

In Chapter 3, we examine the performance impacts of alignment between individual competitive priorities and related groups of outsourcing drivers. This analysis uses a novel structural equation modeling (SEM) technique to test the impact of the interaction between the emphasis given to a competitive priority and the outsourcing drivers related to that competitive priority. To the best of our knowledge, the use of SEM to test interactions has not been previously employed in operations management research. Tests of the overall impact of outsourcing congruence as well as the impact across each of the five competitive priorities yield a number of interesting results. We find the combined impact of outsourcing congruence across the five competitive priorities is positively associated with higher levels of supply chain and business performance. An examination of outsourcing congruence between cost as a competitive priority and cost related outsourcing drivers finds that congruence is positively associated with higher supply chain and business performance when cost is not emphasized as a competitive priority by a firm. An interesting implication for practitioners is that the lowest levels of performance occur when firms not competing on cost emphasize cost drivers while making outsourcing decisions. Outsourcing congruence between flexibility related factors is found to be positively associated with supply chain performance when flexibility is highly emphasized. Congruence is found to be positively related to higher business performance for both high and low levels of innovativeness within firms while supply chain performance and congruence are only positively related when innovativeness is highly emphasized. Outsourcing congruence is positively associated with both business and supply chain performance for low and high levels of emphasis on quality as a competitive priority. Finally, we find a positive association between supply chain performance and outsourcing congruence related to time. These findings support that alignment between firm strategies and operational activities such as outsourcing significantly contributes to improvements in firm performance.

Chapter 4 presents an investigation into the impact of strategic alignment using a taxonomic approach. Compared with the analysis conducted in Chapter 3, this study provides a higher level view by examining the impact of alignment across a firm's overall strategy. We use cluster analysis to identify three distinct strategy clusters within our sample of firms based on the emphasis placed by these firms across the five competitive priorities. All three clusters place a high emphasis on quality as a competitive priority, which indicates that quality has moved from being a differentiator to a competitive qualifier in manufacturing. The first cluster, named *Multidimensional Competitors*, contains firms that compete by highly emphasizing all five competitive priorities. The second cluster, called *Innovative Customizers*, includes firms which emphasize innovativeness and flexibility. The third cluster of firms is called *Caretakers* due to their focus on low cost and lack of emphasis on innovation or flexibility. Within each cluster, we examine the alignment between the emphasis placed on the five competitive priorities and the relative performance impacts of the groups of outsourcing drivers associated with each competitive priority. Across all three clusters, we find a significant positive correlation between the ranking of the competitive priorities and the ranking of the impact of the outsourcing driver groups on both supply chain and business performance. These findings provide strong support for the proposition that outsourcing decisions need to consider and be in alignment with a firm's overall strategy.

A comparison of the two studies' findings brings several interesting commonalities to the surface. In both studies, we find higher levels of alignment between outsourcing drivers and manufacturing strategies to be positively associated with better performance. In Chapter 3, emphasis on cost outsourcing drivers was found to be negatively related to performance for firms not competing on cost. Echoing this finding, we identified cost outsourcing drivers to be negatively associated with performance for the *Innovative Customizers* (who place the lowest levels of emphasis on cost amongst the three clusters). We find that quality is highly valued by all three strategic clusters in Chapter 4 and in Chapter 3 we find that a high emphasis on quality outsourcing drivers is associated with higher performance for firms that compete on quality. The complimentary nature of the results from the two analyses further strengthens this study's arguments in support of outsourcing congruence.

5.2 Future Research Directions

While this research sheds new light on the relationship importance of congruence between competitive priorities and outsourcing decisions, a number of research extensions will serve to further increase our understanding of this issue.

As previously mentioned, this study can be expanded beyond manufacturing firms operating in the United States. A wider study will highlight similarities and differences in the impact of outsourcing congruence across a variety of industries on a global scale.

In the survey process, we collected additional information that can be leveraged for use in additional analyses concerning the impact of performances. Data regarding the level of outsourcing within the firms as well as the change in the level of outsourcing over the past two years was collected from the firms in our study. This information can be used to further examine the role of alignment within the context of outsourcing. Additionally, data was collected to asses the competitive dynamism faced by the firms in our study. An extension to our research may use this data to determine if the strategies employed by firms are influenced by the level of competitive dynamism they face.

APPENDIX A

CONSTRUCT AND ITEM DESCRIPTIVE INFORMATION

Appendix A - Construct and item descriptive information

Competitive Priorities Scales and Items	Measurement Model Standardized Path Loading	Mean	Standard Deviation	Source
Listed below are several dimensions used by manufacturing organizations to gain competitive advantage. Please indicate the level of importance that you attach to each dimension in selling the primary product line produced in your business unit (the product that comprises a major portion of total sales). Each dimension has five possible responses: [1 = Low Importance, 2 = Moderately Low Importance, 3 = Average Importance, 4 = Moderately High Importance, 5 = High Importance]				
Cost		3.90	0.90	
High capacity utilization	0.699*	3.67	1.12	(Boyer and Lewis, 2002; Safizadeh, Ritzman, and Mallick, 2000; Ward, McCreery, Ritzman, and Sharma, 1998)
High labor productivity	0.627*	3.80	1.07	(Boyer and Lewis, 2002; Ward et al., 1998)
Low inventory costs	0.781*	3.68	1.09	(Boyer and Lewis, 2002; Ward et al., 1998)
Low production / manufacturing Costs	0.762*	3.98	0.95	(Boyer and Lewis; Krajewski and Ritzman, 1999; Safizadeh et al., 2000; Safizadeh, Ritzman, Sharma, and Wood, 1996; Shin, Collier, and Wilson, 2000; Vickery, Droge, and Markland, 1997; Ward et al., 1998)
Flexibility		3.58	1.17	
Ability to adjust capacity and/or volume effectively within a short time period	0.418*	3.90	1.06	(Boyer and Lewis, 2002; Safizadeh et al., 1996; Ward et al., 1998)
Ability to adjust deliveries to meet customer requirements	0.699*	4.31	0.88	(Kathuria, 2000)
Ability to customize products to meet customer specifications	0.849*	3.59	1.12	(Kathuria, 2000; Safizadeh et al., 2000; Safizadeh et al., 1996)
Ability to make design changes in the product after production has started	0.432*	2.90	1.23	(Boyer and Lewis, 2002; Safizadeh et al., 1996; Ward et al., 1998)
Offering a large number of product features or options	0.603*	3.21	1.03	(Boyer and Lewis, 2002; Safizadeh et al., 2000; Safizadeh et al., 1996; Shin et al., 2000; Ward et al., 1998)
Ability to produce a large variety of products	Dropped	3.45	1.09	(Boyer and Lewis, 2002; Vickery et al., 1997)
High production flexibility to allow the efficient new product introduction	Dropped	3.59	1.09	(Safizadeh et al., 1996; Vickery et al., 1997)
Innovativeness		3.58	1.05	
Differentiation from competitors' product technology	0.541*	3.54	1.14	(Gjerde, Slotnick, and Sobel, 2002)
Innovative product features and functionality	0.718*	3.67	1.07	(Lau, 2002)
Offering new product innovations	0.861*	3.71	0.98	(Capon, Farley, Lehmann, and Hulbert, 1992)
Selling products that are in the introductory or growth stages of the product life cycle	0.476*	3.39	1.02	(Capon et al., 1992)
Use of cutting edge product / process technologies	0.641*	3.57	1.09	(Govindarajan and Kopalle, 2006)
Current product technology represents a major advance over previous product technology	Dropped	3.51	1.12	(Safizadeh et al., 2000)
Current products rendered previous products obsolete	Dropped	2.67	1.04	(Govindarajan and Kopalle, 2006)

Appendix A - Construct and item descriptive information

Competitive Priorities Scales and Items (Continued)	Measurement Model Standardized Path Loading	Mean	Standard Deviation	Source
Quality		4.25	0.95	
High conformance of final product to design specifications	0.491*	4.26	0.93	(Shin et al., 2000; Ward et al., 1998)
High product performance	1.000*	4.34	0.88	(Krajewski and Ritzman, 1999; Safizadeh et al., 2000; Safizadeh et al., 1996; Shin et al., 2000; Ward et al., 1998; Zaheer and Venkatraman, 1994)
High product reliability	.791*	4.31	0.96	(Safizadeh et al., 2000; Vickery et al., 1997; Ward et al., 1998)
High product safety	.675*	4.01	1.13	(Koufteros, Vonderembse, and Doll, 2002)
Prompt resolution of customer complaints / inquiries	.328*	4.32	0.83	(Safizadeh et al., 2000; Ward et al., 1998)
Ease (cost and time) to service product	Dropped	3.27	1.18	(Safizadeh et al., 2000; Shin et al., 2000; Ward et al., 1998)
High product durability (long life)	Dropped	3.64	1.22	(Safizadeh et al., 2000; Ward et al., 1998)
Time		3.65	1.06	
Short changeover / setup times	.517*	3.74	1.10	Suggested during Q-sort Exercise
Short product development cycle time	.614*	3.48	1.05	(Krajewski and Ritzman, 1999)
Short production cycle times	.732*	3.51	1.05	(Shin et al., 2000; Ward et al., 1998)
Short production lead times	.928*	3.69	1.00	(Boyer and Lewis, 2002; Ward et al., 1998)
Quick introduction of new product	.848*	3.86	0.94	(Díaz, Gil, and Machuca, 2005)
Ability to deliver on time	Dropped	4.40	0.93	(Safizadeh et al., 2000; Ward et al., 1998)

Appendix A - Construct and item descriptive information

Outsourcing Drivers Scales and Items	Measurement Model Standardized Path Loading	Mean	Standard Deviation	Source
Please rate the level of importance that you have placed or would place (please answer these questions even if you have not outsourced any of these activities, as we are trying to evaluate the importance that you would place on these drivers if you were to consider outsourcing) on each of the following drivers (factors) when making outsourcing decisions related to the primary product produced in your business unit in each of the following four supply chain areas: Product Development, Component Manufacturing, Final Product Assembly, and Distribution / Logistics. If you have not outsourced functions in an area, please respond with the level of importance that you would place if you were to evaluate outsourcing as an option for activities in that area.				
Each driver has five possible responses: [1 = Not Important, 2 = Somewhat Important, 3 = Quite Important, 4 = Very Important, 5 = Extremely Important]				
Cost Related Drivers		3.26	1.27	
Product Development - Allow resources to focus on core competencies - low cost	0.871*	3.11	1.16	(Gottfredson, Puryear, and Phillips, 2005; Leonard-Barton, 1992)
Product Development - Increase volume through new market penetration	0.527*	3.11	1.22	(Bozarth, Handfield, and Das, 1998; Min and Galle, 1991)
Product Development - Lower total costs	0.641*	3.54	1.30	(Bozarth et al., 1998; Insinga and Werle, 2000; Kakabadse and Kakabadse, 2000; Smith, Mitra, and Narasimhan, 1998; Koh and Venkatraman, 1991; Weber et al., 1991)
Product Development - Reduce logistics costs	0.783*	3.03	1.34	Recommended during Q-Sort
Product Development - Reduce regulatory and legal costs	0.643*	2.71	1.24	Recommended during Q-Sort
Component Manufacturing - Allow resources to focus on core competencies - low cost	0.824*	3.30	1.15	(Gottfredson, Puryear, and Phillips, 2005; Leonard-Barton, 1992)
Component Manufacturing - Increase volume through new market penetration	0.607*	3.12	1.23	(Bozarth, Handfield, and Das, 1998; Min and Galle, 1991)
Component Manufacturing - Lower total costs	0.617*	3.80	1.18	(Bozarth et al., 1998; Insinga and Werle, 2000; Kakabadse and Kakabadse, 2000; Smith, Mitra, and Narasimhan, 1998; Koh and Venkatraman, 1991; Weber et al., 1991)
Component Manufacturing - Reduce logistics costs	0.745*	3.37	1.16	Recommended during Q-Sort
Component Manufacturing - Reduce regulatory and legal costs	0.665*	2.87	1.20	Recommended during Q-Sort
Final Assembly - Allow resources to focus on core competencies - low cost	0.801*	3.26	1.18	(Gottfredson, Puryear, and Phillips, 2005; Leonard-Barton, 1992)
Final Assembly - Increase volume through new market penetration	0.581*	3.02	1.18	(Bozarth, Handfield, and Das, 1998; Min and Galle, 1991)
Final Assembly - Lower total costs	0.651*	3.78	1.19	(Bozarth et al., 1998; Insinga and Werle, 2000; Kakabadse and Kakabadse, 2000; Smith, Mitra, and Narasimhan, 1998; Koh and Venkatraman, 1991; Weber et al., 1991)
Final Assembly - Reduce logistics costs	0.742*	3.40	1.24	Recommended during Q-Sort
Final Assembly - Reduce regulatory and legal costs	0.655*	2.82	1.24	Recommended during Q-Sort
	0.760*	3.50	1.17	(Gottfredson, Puryear, and Phillips, 2005; Leonard-Barton, 1992)
Distribution / Logisitics - Increase volume through new market penetration	0.501*	2.83	1.28	(Bozarth, Handfield, and Das, 1998; Min and Galle, 1991)
Distribution / Logisitics - Lower total costs	0.649*	3.84	1.18	(Bozarth et al., 1998; Insinga and Werle, 2000; Kakabadse and Kakabadse, 2000; Smith, Mitra, and Narasimhan, 1998; Koh and Venkatraman, 1991; Weber et al., 1991)
Distribution / Logisitics - Reduce logistics costs	0.719*	3.94	1.15	Recommended during Q-Sort
Distribution / Logisitics - Reduce regulatory and legal costs	0.563*	2.88	1.29	Recommended during Q-Sort

Appendix A - Construct and item descriptive information

Outsourcing Drivers Scales and Items (Continued)	Measurement Model Standardized Path Loading	Mean	Standard Deviation	Source
Flexibility Related Drivers		3.39	1.10	
Product Development - Allow resources to focus on core competencies - flexibility	0.391*	3.48	1.13	(Narasimhan and Das, 1999; Choi and Hartley, 1996; Weber, Current, and Benton, 1991)
Product Development - Improve process responsiveness	0.666*	3.28	1.05	(Lee, 2004)
Product Development - Increase supply chain flexibility	0.836*	3.24	1.15	(Loh and Venkatraman, 1992)
Product Development - Increase volume capability	0.694*	3.07	1.18	Recommended during Q-Sort
Product Development - Multiple sourcing for uncertainty preparedness	0.624*	2.89	1.15	(Gottfredson et al., 2005; Leonard-Barton, 1992)
Component Manufacturing - Allow resources to focus on core competencies - flexibility	0.358*	3.57	1.01	(Narasimhan and Das, 1999; Choi and Hartley, 1996; Weber, Current, and Benton, 1991)
Component Manufacturing - Improve process responsiveness	0.715*	3.47	0.97	(Lee, 2004)
Component Manufacturing - Increase supply chain flexibility	0.882*	3.60	1.06	(Loh and Venkatraman, 1992)
Component Manufacturing - Increase volume capability	0.581*	3.43	1.05	Recommended during Q-Sort
Component Manufacturing - Multiple sourcing for uncertainty preparedness	0.587*	3.14	1.08	(Gottfredson et al., 2005; Leonard-Barton, 1992)
Final Assembly - Allow resources to focus on core competencies - flexibility	0.487*	3.45	1.06	(Narasimhan and Das, 1999; Choi and Hartley, 1996; Weber, Current, and Benton, 1991)
Final Assembly - Improve process responsiveness	0.831*	3.42	1.03	(Lee, 2004)
Final Assembly - Increase supply chain flexibility	0.874*	3.60	1.10	(Loh and Venkatraman, 1992)
Final Assembly - Increase volume capability	0.632*	3.55	1.07	Recommended during Q-Sort
Final Assembly - Multiple sourcing for uncertainty preparedness	0.607*	3.16	1.06	(Gottfredson et al., 2005; Leonard-Barton, 1992)
Distribution / Logisitics - Allow resources to focus on core competencies - flexibility	0.516*	3.44	1.14	(Narasimhan and Das, 1999; Choi and Hartley, 1996; Weber, Current, and Benton, 1991)
Distribution / Logisitics - Improve process responsiveness	0.684*	3.47	1.12	(Lee, 2004)
Distribution / Logisitics - Increase supply chain flexibility	0.847*	3.93	0.94	(Loh and Venkatraman, 1992)
Distribution / Logisitics - Increase volume capability	0.610*	3.49	1.06	Recommended during Q-Sort
Distribution / Logisitics - Multiple sourcing for uncertainty preparedness	0.470*	3.18	1.16	(Gottfredson et al., 2005; Leonard-Barton, 1992)

Appendix A - Construct and item descriptive information

Outsourcing Drivers Scales and Items (Continued)	Measurement Model Standardized Path Loading	Mean	Standard Deviation	Source
Innovativeness Related Drivers		3.36	1.20	
Product Development - Access to specific labor and/or technology expertise	0.521*	3.33	1.10	(Bozarth et al., 1998; Loh and Venkatraman, 1992; McFarlan and Nolan, 1995; Weber et al., 1991)
Product Development - Allow resources to focus on core competencies - innovativeness	0.557*	3.60	1.36	(Gottfredson et al., 2005; Leonard-Barton, 1992)
Product Development - Gain access to new technology	1.000*	3.73	1.10	(Koh and Venkatraman, 1991; Bozarth et al., 1998; Loh and Venkatraman, 1992; Smith et al., 1998; McFarlan and Nolan, 1995; Weber et al., 1991)
Component Manufacturing - Access to specific labor and/or technology expertise	0.587*	3.37	1.01	(Bozarth et al., 1998; Loh and Venkatraman, 1992; McFarlan and Nolan, 1995; Weber et al., 1991)
Component Manufacturing - Allow resources to focus on core competencies - innovativeness	0.504*	3.30	1.14	(Gottfredson et al., 2005; Leonard-Barton, 1992)
Component Manufacturing - Gain access to new technology	1.000*	3.58	1.09	(Koh and Venkatraman, 1991; Bozarth et al., 1998; Loh and Venkatraman, 1992; Smith et al., 1998; McFarlan and Nolan, 1995; Weber et al., 1991)
Final Assembly - Access to specific labor and/or technology expertise	0.667*	3.21	1.11	(Bozarth et al., 1998; Loh and Venkatraman, 1992; McFarlan and Nolan, 1995; Weber et al., 1991)
Final Assembly - Allow resources to focus on core competencies - innovativeness	0.615*	3.17	1.41	(Gottfredson et al., 2005; Leonard-Barton, 1992)
Final Assembly - Gain access to new technology	0.976*	3.41	1.21	(Koh and Venkatraman, 1991; Bozarth et al., 1998; Loh and Venkatraman, 1992; Smith et al., 1998; McFarlan and Nolan, 1995; Weber et al., 1991)
Distribution / Logisitics - Access to specific labor and/or technology expertise	0.608*	3.07	1.11	(Bozarth et al., 1998; Loh and Venkatraman, 1992; McFarlan and Nolan, 1995; Weber et al., 1991)
Distribution / Logisitics - Allow resources to focus on core competencies - innovativeness	0.522*	3.22	1.39	(Gottfredson et al., 2005; Leonard-Barton, 1992)
Distribution / Logisitics - Gain access to new technology	1.000*	3.34	1.15	(Koh and Venkatraman, 1991; Bozarth et al., 1998; Loh and Venkatraman, 1992; Smith et al., 1998; McFarlan and Nolan, 1995; Weber et al., 1991)

Appendix A - Construct and item descriptive information

Outsourcing Drivers Scales and Items (Continued)	Measurement Model Standardized Path Loading	Mean	Standard Deviation	Source
Quality Related Drivers		3.23	1.30	
Product Development - Allow resources to focus on core competencies - quality	0.597*	3.28	1.45	(Gottfredson et al., 2005; Leonard-Barton, 1992)
Product Development - Improve conformance quality	1.000*	3.27	1.15	(Bozarth et al., 1998; Loh and Venkatraman, 1992; McFarlan and Nolan, 1995; Frohlich and Dixon, 2001)
Product Development - Improve product performance design quality	0.689*	3.28	1.22	(Bozarth et al., 1998; Loh and Venkatraman, 1992; McFarlan and Nolan, 1995; Frohlich and Dixon, 2001)
Component Manufacturing - Allow resources to focus on core competencies - quality	0.640*	3.36	1.47	(Gottfredson et al., 2005; Leonard-Barton, 1992)
Component Manufacturing - Improve conformance quality	1.000*	3.52	1.12	(Bozarth et al., 1998; Loh and Venkatraman, 1992; McFarlan and Nolan, 1995; Frohlich and Dixon, 2001)
Component Manufacturing - Improve product performance design quality	0.633*	3.23	1.26	(Bozarth et al., 1998; Loh and Venkatraman, 1992; McFarlan and Nolan, 1995; Frohlich and Dixon, 2001)
Final Assembly - Allow resources to focus on core competencies - quality	0.663*	3.29	1.45	(Gottfredson et al., 2005; Leonard-Barton, 1992)
Final Assembly - Improve conformance quality	0.988*	3.44	1.18	(Bozarth et al., 1998; Loh and Venkatraman, 1992; McFarlan and Nolan, 1995; Frohlich and Dixon, 2001)
Final Assembly - Improve product performance design quality	0.620*	3.07	1.26	(Bozarth et al., 1998; Loh and Venkatraman, 1992; McFarlan and Nolan, 1995; Frohlich and Dixon, 2001)
Distribution / Logisitics - Allow resources to focus on core competencies - quality	0.676*	3.12	1.50	(Gottfredson et al., 2005; Leonard-Barton, 1992)
Distribution / Logisitics - Improve conformance quality	0.919*	3.26	1.09	(Bozarth et al., 1998; Loh and Venkatraman, 1992; McFarlan and Nolan, 1995; Frohlich and Dixon, 2001)
Distribution / Logisitics - Improve product performance design quality	0.616*	2.69	1.28	(Bozarth et al., 1998; Loh and Venkatraman, 1992; McFarlan and Nolan, 1995; Frohlich and Dixon, 2001)

Appendix A - Construct and item descriptive information

Outsourcing Drivers Scales and Items (Continued)	Measurement Model Standardized Path Loading	Mean	Standard Deviation	Source
Time Related Drivers		3.34	1.26	
Product Development - Allow resources to focus on core competencies - time	0.742*	3.10	1.48	(Gottfredson et al., 2005; Leonard-Barton, 1992)
Product Development - Improve process capability and cycle times	0.709*	3.28	1.08	(Weber et al., 1991)
Product Development - Improve process lead times	0.821*	3.15	1.28	(Narasimhan and Das, 1999; Choi and Hartley, 1996; Weber et al., 1991)
Component Manufacturing - Allow resources to focus on core competencies - time	0.769*	3.31	1.51	(Gottfredson et al., 2005; Leonard-Barton, 1992)
Component Manufacturing - Improve process capability and cycle times	0.733*	3.51	1.03	(Weber et al., 1991)
Component Manufacturing - Improve process lead times	0.851*	3.35	1.24	(Narasimhan and Das, 1999; Choi and Hartley, 1996; Weber et al., 1991)
Final Assembly - Allow resources to focus on core competencies - time	0.653*	3.45	1.34	(Gottfredson et al., 2005; Leonard-Barton, 1992)
Final Assembly - Improve process capability and cycle times	0.736*	3.51	1.05	(Weber et al., 1991)
Final Assembly - Improve process lead times	0.768*	3.34	1.18	(Narasimhan and Das, 1999; Choi and Hartley, 1996; Weber et al., 1991)
Distribution / Logisitics - Allow resources to focus on core competencies - time	0.757*	3.27	1.42	(Gottfredson et al., 2005; Leonard-Barton, 1992)
Distribution / Logisitics - Improve process capability and cycle times	0.784*	3.45	1.14	(Weber et al., 1991)
Distribution / Logisitics - Improve process lead times	0.862*	3.42	1.25	(Narasimhan and Das, 1999; Choi and Hartley, 1996; Weber et al., 1991)

Appendix A - Construct and item descriptive information

Performance Scales	Measurement Model Standardized Path Loading	Mean	Standard Deviation	Source
Please indicate the level of your business unit's performance along each of the following dimensions compared to that of your major industry competitor(s): Each dimension has five possible responses: [1 = Worse than Competitor(s), 2 = Slightly Worse than Competitor(s), 3 = Same as Competitor(s), 4 = Slightly Better than Competitor(s), 5 = Better than Competitor(s)]				
Supply Chain Performance		3.30	0.96	
Delivery cycle times	0.610*	3.30	0.95	(Swafford, Ghosh and Murthy 2005)
Manufacturing cycle time	0.589*	3.13	0.87	(Swafford et al., 2005)
Missing / wrong / damaged / defective products shipped	0.693*	3.40	0.96	(Supply Chain Council, 2005)
On-time delivery performance	0.756*	3.51	0.99	(Lee, 2004)
Warranty / returns processing costs	0.748*	3.16	0.98	(Supply Chain Council, 2005)
Business Performance		3.37	0.88	
Profit margin (%)	0.814*	3.36	0.93	(Swafford et al., 2005)
Return on sales	0.809*	3.39	0.85	(Hendricks and Singhal, 2005)
Return on total assets (ROA)	0.869*	3.38	0.87	(Tan, Kannan, Handfield, and Ghosh, 1999)
Sales over assets	0.837*	3.36	0.85	(Hendricks and Singhal, 2005)

Appendix A - Construct and item descriptive information

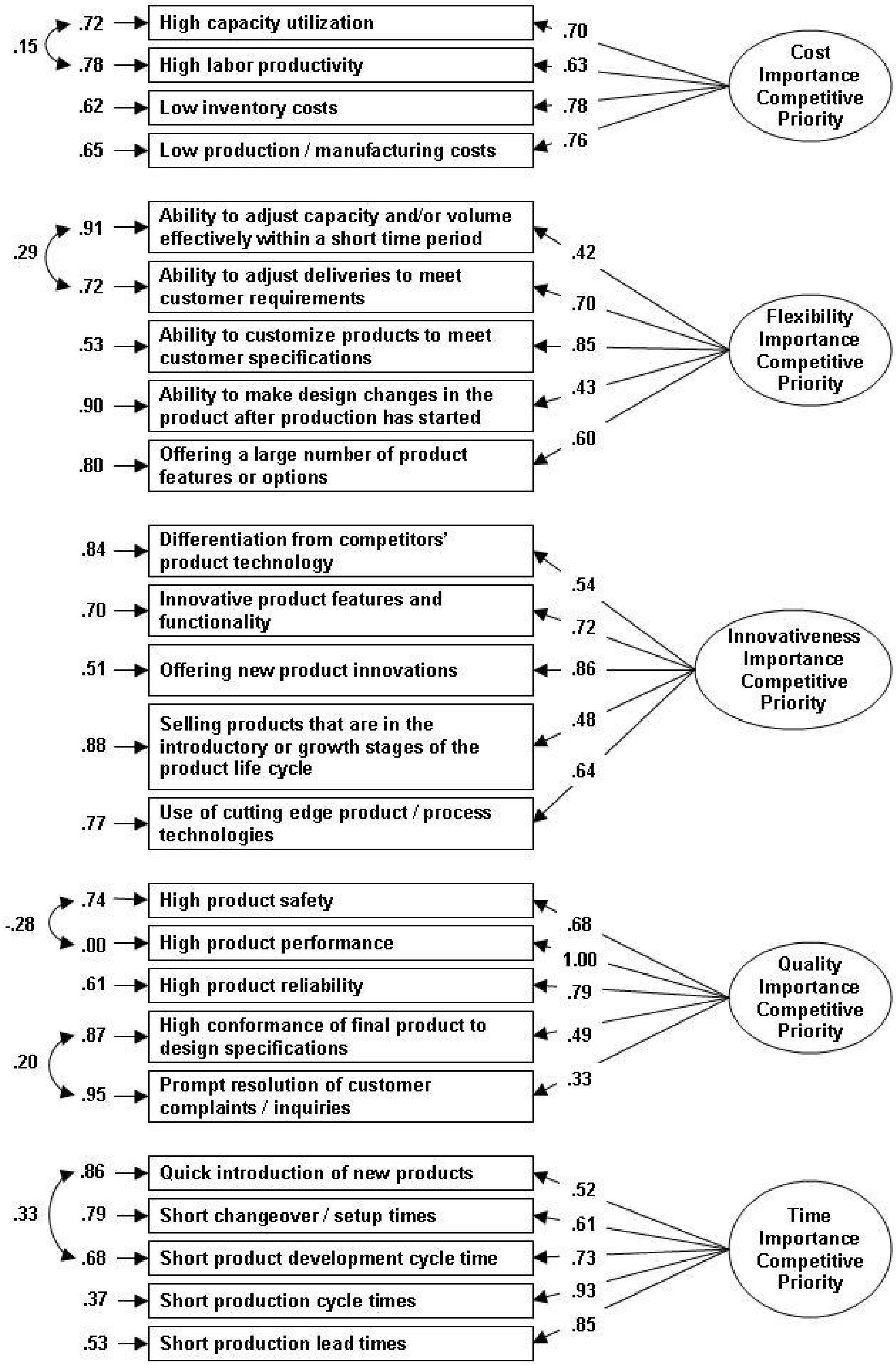
Additional survey items	
What was 2005's approximate sales volume, in US dollars, for your business unit? (1 to 5)	1 - Less than $50 million 2 - $50 to $100 million 3 - $101 to $250 million 4 - $251 to $500 million 5 - $501 million to $1 billion 6 - Over $1 billion
Please indicate the percentage (%) of total activities in each supply chain area that are currently outsourced. (1 to 5)	1 - 0% 2 - 1% to 25% 3 - 26% to 50% 4 - 51% to 75% 5 - Greater than 75%
How many people are employed in your business unit? (1 to 6)	1 - Less than 200 2 - 201 to 500 3 - 501 to 1000 4 - 1001 to 1500 5 - 1501 to 2500 6 - Over 2500
Please select the category that best describes the industry in which your business unit competes.	1 - Apparel and other finished products made from fabric 2 - Furniture and fixtures 3 - Rubber and miscellaneous plastic products 4 - Fabricated metal products 5 - Industrial and commercial machinery and computer equipment 6 - Electronic and other electrical equipment and components 7 - Transportation equipment 8 - Measuring, analyzing, and controlling instruments 9 - Miscellaneous manufacturing industries
Please indicate the level of your position within your organization:	1 - Supply Chain Specialist 2 - Supply Chain Team Leader 3 - Supply Chain Manager 4 - Supply Chain Director 5 - Supply Chain Executive / VP 6 - Other

APPENDIX B

MEASUREMENT MODELS

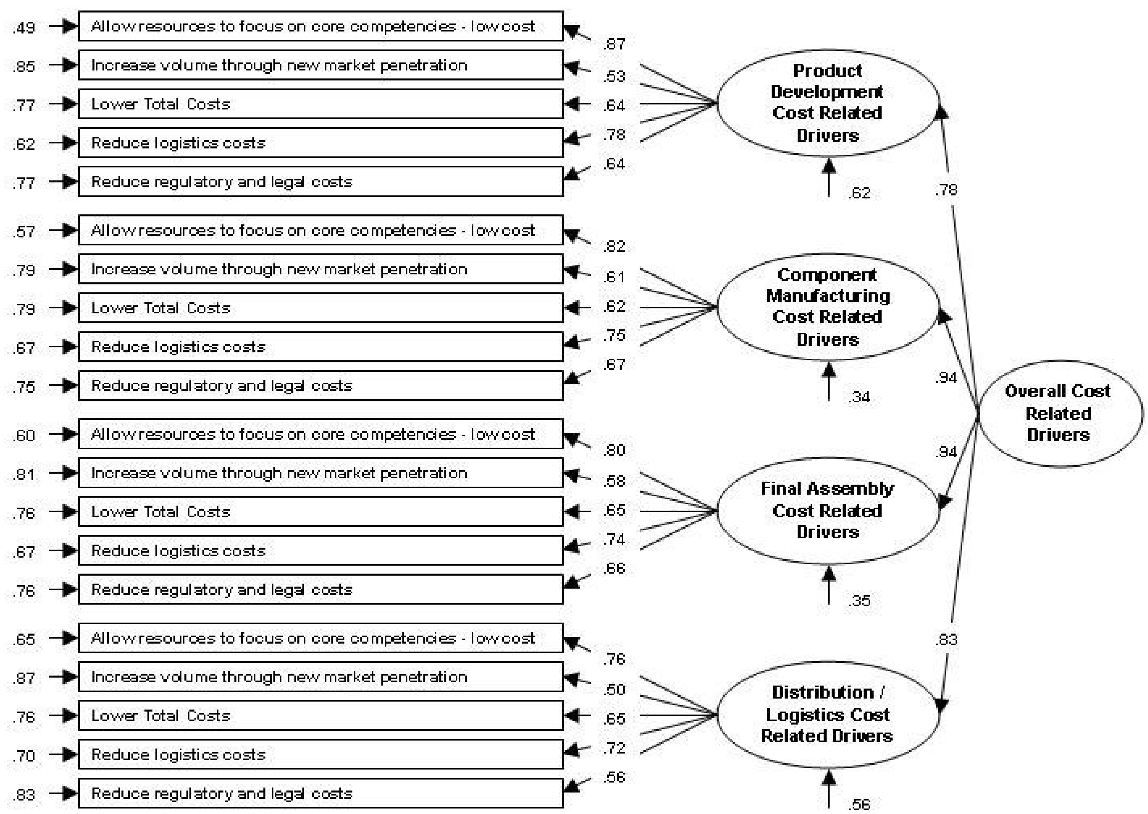
Appendix B - Measurement Models

Competitive Priority Measurement Models



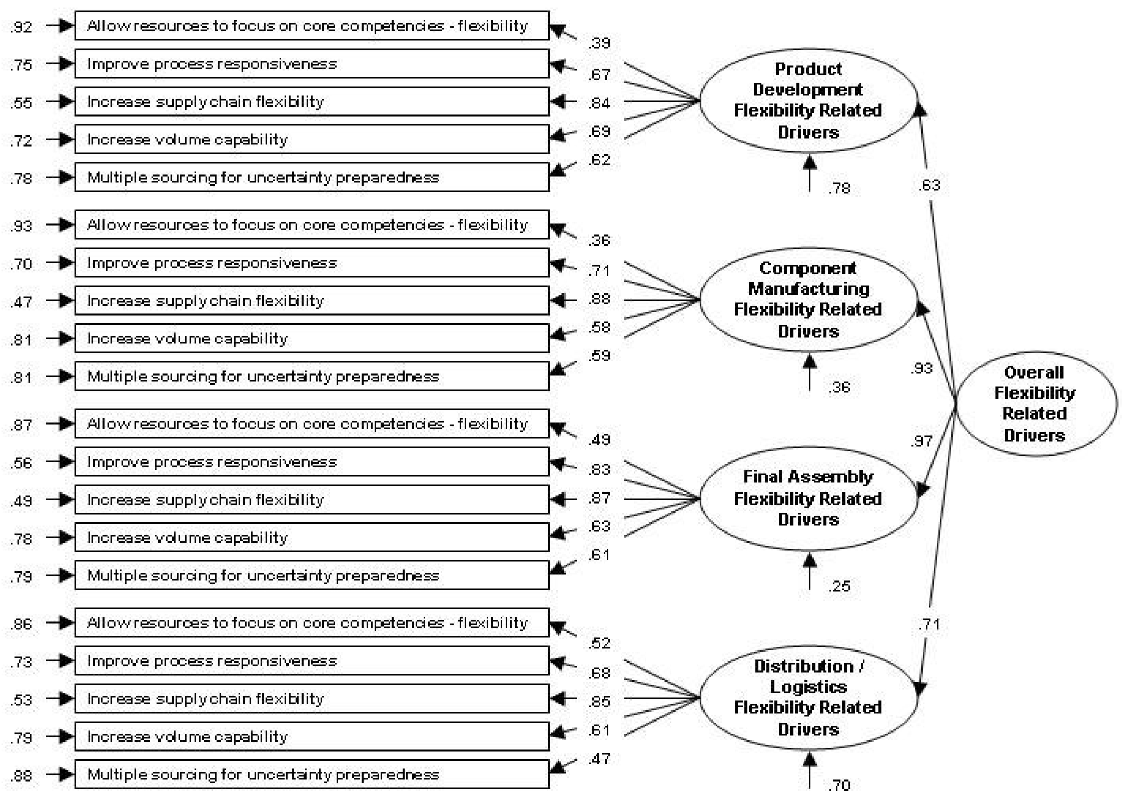
Appendix B - Measurement Models

Cost Related Outsourcing Drivers Measurement Model



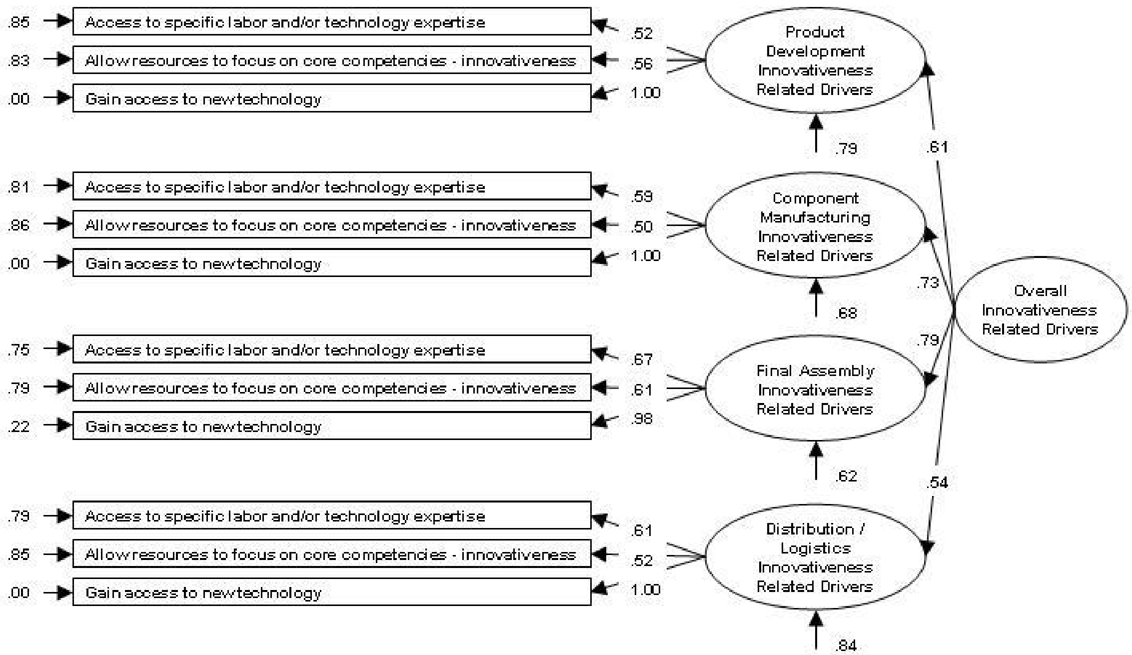
Appendix B - Measurement Models

Flexibility Related Outsourcing Drivers Measurement Model

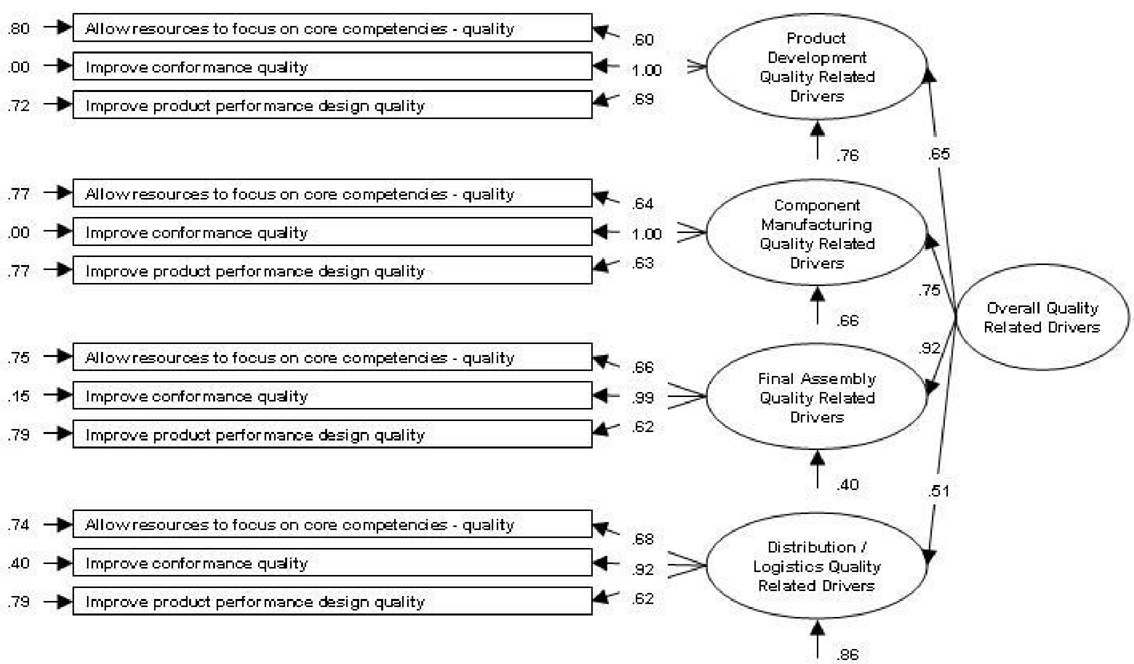


Appendix B - Measurement Models

Innovativeness Related Outsourcing Drivers Measurement Model

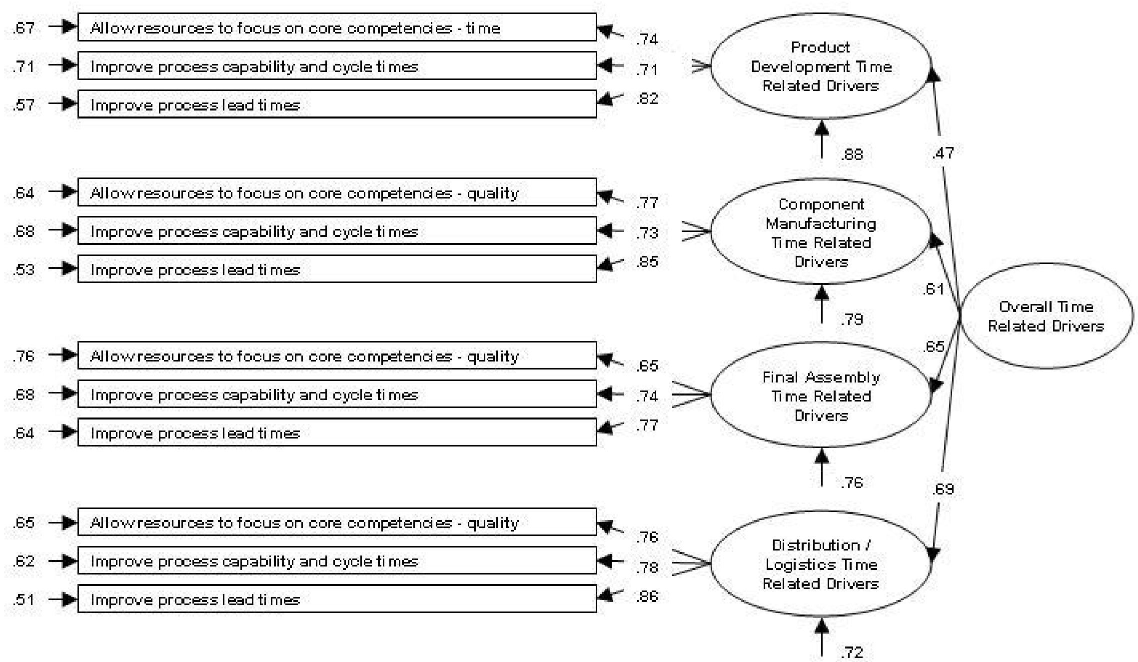


Quality Related Outsourcing Drivers Measurement Model

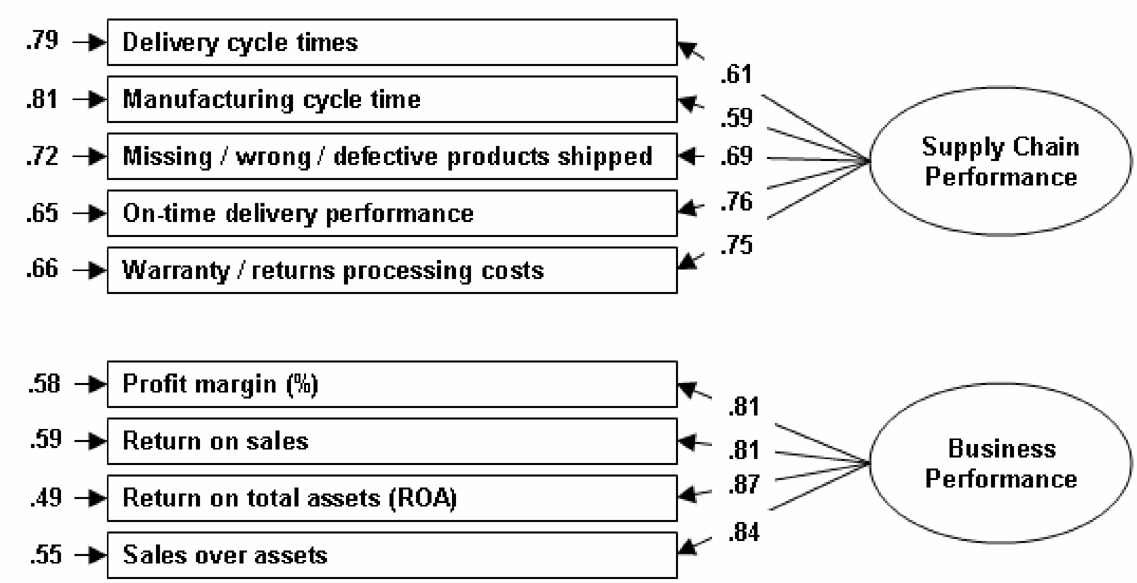


Appendix B - Measurement Models

Time Related Outsourcing Drivers Measurement Model



Performance Measures Measurement Models



REFERENCES

Adler, P.S., 2003. Making the HR outsourcing decision. *MIT Sloan Management Review* 45 (1), 53-60.

Ahire, S.L., Devaraj, S., 2001. An empirical comparison of statistical construct validation approaches. *IEEE Transactions on Engineering Management* 48 (3), 319-329.

Aiken, L.S., West, S.G., 1991. *Multiple regression: Testing and interpreting interactions*. Sage: Newbury Park, CA.

Aldenderfer, M.S., Blashfield, R.K., 1984. *Cluster Analysis*. Sage: London.

Anderson, M.G., Katz, P.B., 1998. Strategic sourcing. *International Journal of Logistics Management* 9 (1), 1.

Armstrong, J.S., Overton, T.S., 1977. Estimating Nonresponse Bias in Mail Surveys. *Journal of Marketing Research* 14 (3), 396-402.

Aubert, B.A., Rivard, S., and Patry, M., 2004. A transaction cost model of IT oursourcing. *Information & Management* 41 (7), 921-932.

Barney, J., 1991. Firm Resources and Sustained Competitive Advantage. *Journal of Management* 17 (1), 99-120.

Benjaafar, S., Elahi, E., and Donohue, K.L., 2007. Outsourcing via Service Competition. *Management Science* 53 (2), 241-259.

Bettis, R.A., Bradley, S.P., and Hamel, G., 1992. Outsourcing and Industrial Decline. *The Executive* 6 (1), 7-22.

Bollen, K.A., 1989. *Structural equations with latent variables*. Wiley: New York.

Bornstedt, G.W., Marwell, A.S., 1978. The reliability of the products of two random variables. In K.F. Schuessler (Ed.), *Sociological Methodology*, 254-273. Jossey-Bass: San Francisco.

Boyer, K.K., Lewis, M.W., 2002. Competitive priorities: Investigating the need for trade-offs in operations strategy. *Production and Operations Management* 11 (1), 9-20.

Boyer, K.K., McDermott, C., 1999. Strategic consensus in operations strategy. *Journal of Operations Management* 17 (3), 289-305.

Bozarth, C., Handfield, R., and Das, A., 1998. Stages of global sourcing strategy evolution: A exploratory study. *Journal of Operations Management* 16 (2/3), 241-255.

Bozarth, C., McDermott, C., 1998. Configurations in manufacturing strategy: A review and directions for future research. *Journal of Operations Management* 16 (4), 427-439.

Brown, S., Blackmon, K., 2005. Aligning Manufacturing Strategy and Business-Level Competitive Strategy in New Competitive Environments: The Case for Strategic Resonance. *Journal of Management Studies* 42 (4), 793-815.

Buckley, M.R., Cote, J.A., and Comstock, S.M., 1990. Measurement Errors in the Behavioral Sciences: The Case of Personality/Attitude Research. *Educational and Psychological Measurement* 50 (3), 447-474.

Byrne, B.M., 1994. *Structural Equation Modeling With EQS and EQS / Windows*. Sage Publications, Inc.: Thousand Oaks, CA.

Campbell, D.T., Fiske, D.W., 1959. Convergent and discriminant validation by the multitrait-multimethod matrix. *Psychological bulletin* 56 (1), 81-105.

Capon, N., Farley, J.U., Lehmann, D.R., and Hulbert, J.M., 1992. Profiles of Product Innovators Among Large U.S. Manufacturers. *Management Science* 38 (2), 157-169.

Capron, L., Mitchell, W., 2004. Where firms change: internal development versus external capability sourcing in the global telecommunications industry. *European Management Review* 1 (2), 157-174.

Casale, F., 2004. The Sixth Annual Outsourcing Index: Buyers Ready to Spend. *Outsourcing Essentials* 1 (4).

Chamberland, D., 2003. Is it core strategic? Outsourcing as a strategic management tool. *Ivey Business Journal Online* (Jul/Aug), 1-5.

Chan, P.S., Pollard, D., 2003. Succeeding in the dotcom economy: Challenges for brick & mortar companies. *International Journal of Management* 20 (1), 11-16.

Chase, R.B., Jacobs, F.R., and Aquilano, N.J., 2004. *Operations Management for Competitive Advantage* (10th ed.). Irwin / McGraw-Hill: Boston.

Chesley, J.A., Wenger, M.S., 1999. Transforming an organization: Using models to foster a strategic conversation. *California Management Review* 41 (3), 54-73.

Choi, T.Y., Hartley, J.L., 1996. An exploration of supplier selection practices across the suppy chain. *Journal of Operations Management* 14 (4), 333-343.

Chou, C.P., Bentler, P.M., and Sattora, A., 1991. Scaled test statistics and robust standard errors for non-normal data in covariance structure analysis. *British Journal of Mathematical and Statistical Psychology* 44, 347-357.

Christiansen, T., Berry, W.L., Bruun, P., and Ward, P., 2003. A mapping of competitive priorities, manufacturing practices, and operational performance in groups of Danish manufacturing companies. *International Journal of Operations & Production Management* 23 (10), 1163-1183.

Churchill, G.A., 1979. A paradigm for developing better measures of marketing constructs. *Journal of Marketing Research* 16 (1), 64-73.

Cohen, J., Cohen, P., West, S.G., and Aiken, L.S., 2003. *Applied Multiple Regression / Correlation Analysis for the Behavioral Sciences* (3rd ed.). Lawrence Erlbaum Associates, Inc.: Mahwah, NJ.

Corbett, C., Wassenhove, L.V., 1993. Trade-offs? What trade-offs? Competence and competiveness in manufacturing strategy. *California Management Review* 35 (4), 107-122.

Cortina, J.M., Chen, G., and Dunlap, W.P., 2001. Testing interaction effects in LISREL: Examination and illustration of available procedures. *Organizational Research Methods* 4 (4), 324-360.

Cousins, P.D., Lawson, B., and Squire, B., 2006. An empirical taxonomy of purchasing functions. *International Journal of Operations & Production Management* 26 (7), 775-794.

da Silveira, G.J.C., 2005. Market priorities, manufacturing configuration, and business performance: an empirical analysis of the order-winners framework. *Journal of Operations Management* 23 (6), 662-665.

D'Aveni, R.A., Canger, J.M., and Doyle, J.J., 1995. Coping with hypercompetition: Utilizing the new 7S's framework1. *The Academy of Management Executive* 9 (3), 45-60.

Devaraj, S., Hollingworth, D.G., and Schroeder, R.G., 2004. Generic manufacturing strategies and plant performance. *Journal of Operations Management* 22 (3), 313-333.

Díaz, M.S., Gil, M.J.Á., and Machuca, J.A.D., 2005. Performance measurement systems, competitive priorities, and advanced manufacturing technology: Some evidence from the aeronautical sector. *International Journal of Operations & Production Management* 25 (7/8), 781-799.

Dillman, D.A., 2000. *Mail and Internet Surveys* (2nd ed.). John Wiley and Sons, Inc.: New York.

Doty, D.H., Glick, W.H., 1994. Typologies as a unique form of theory building: Toward improved understanding and modeling. *Academy of Management. The Academy of Management Review* 19 (2), 230-251.

Doty, D.H., Glick, W.H., and Huber, G.P., 1993. Fit, equifinality, and organizational effectiveness: A test. *Academy of Management Journal* 36 (6), 1196-1250.

Embleton, P.R., Wright, P.C., 1998. A practical guide to successful outsourcing. *Empowerment in Organizations* 6 (3), 94-106.

Ettlie, J.E., Sethuraman, K., 2002. Locus of supply and global manufacturing. *International Journal of Operations & Production Management* 22 (3), 349-370.

Fisher, M., Ramdas, K., and Ulrich, K., 1999. Component sharing in the management of product variety: A study of automotive braking systems. *Management Science* 45 (3), 297.

Frohlich, M.T., Dixon, J.R., 2001. A taxonomy of manufacturing strategies revisited. *Journal of Operations Management* 19 (5), 541-558.

Ganster, D.C., Hennessey, H.W., and Luthans, F., 1983. Social Desirability Response Effects: Three Alternative Models. *Academy of Management Journal* 26 (2), 321-331.

Garaventa, E., Tellefsen, T., 2001. Outsourcing: The hidden costs. *Review of Business* 22 (1/2), 28-31.

Gerbing, D.W., Anderson, J.C., 1988. An Updated Paradigm for Scale Development Incorporating Unidimensionality and Its Assessment. *Journal of Marketing Research* 25 (2), 186-192.

Gerwin, D., 1987. An agenda for research on the flexibility of manufacturing processes. *International Journal of Operations & Production Management* 7 (1), 38-49.

Gjerde, K.A.P., Slotnick, S.A., and Sobel, M.J., 2002. New product innovation with multiple features and technology constraints. *Management Science* 48 (10), 1268-1284.

Goldsmith, N.M., 2003. *Outsourcing Trends*. The Conference Board: New York.

Goold, M., Campbell, A., 2002. Do you have a well-designed organization? *Harvard Business Review* 80 (3), 117-124.

Gottfredson, M., Puryear, R., and Phillips, S., 2005. Strategic Sourcing: From Periphery to the Core. *Harvard Business Review* 83 (2), 132-139.

Govindarajan, V., Kopalle, P.K., 2006. Disruptiveness of innovations: measurement and an assessment of reliability and validity. *Strategic Management Journal* 27 (2), 189-199.

Hair, J.F., Anderson, R.E., Tatham, R.L., and Black, W.C., 1992. *Multivariate Data Analysis* (3rd ed.). Macmillan: New York.

Hamel, G., Prahalad, C.K., 2005. Strategic Intent. *Harvard Business Review* 83 (7), 148-161.

Hamm, S., 2004. Is Outsourcing in the Outs? *Business Week.* October 4, 2004, 42.

Hatcher, L., 1994. *A step-by-step approach to using the SAS system for factor analysis and structural equation modeling*. SAS Institute: Cary, NC.

Hayes, R.H., Schmenner, R.W., 1978. How should you organize manufacturing? *Harvard Business Review* 56 (1), 105-115.

Hayes, R.H., Wheelwright, S.C., 1979. Link Manufacturing Process and Product Life Cycles. *Harvard Business Review* 57 (1), 133-140.

Hayes, R.H., Wheelwright, S.C., 1984. *Restoring our competitive edge: Competing through manufacturing.* Wiley: New York.

Heikkila, J., Cordon, C., 2002. Outsourcing: a core or non-core strategic management decision? *Strategic Change* 11 (4), 183-193.

Hendricks, K.B., Singhal, V.R., 2005. Association Between Supply Chain Glitches and Operating Performance. *Management Science* 51 (5), 695-711.

Hoecht, A., Trott, P., 2006. Innovation risks of strategic outsourcing. *Technovation* 26 (5/6), 672-681.

Holcomb, M.C., 1994. Customer service measurement: A methodology for increasing customer value through utilization of the Taguchi Strategy. *Journal of Business Logistics* 15 (1), 29-52.

Holcomb, T.R., Hitt, M.A., 2007. Toward a model of strategic outsourcing. *Journal of Operations Management* 25 (2), 464-481.

Hu, L.-t., Bentler, P.M., 1999. Cutoff Criteria for Fit Indexes in Covariance Structure Analysis: Conventional Criteria Versus New Alternatives. *Structural Equation Modeling* 6 (1), 1-55.

Hu, L.-t., Bentler, P.M., and Kano, Y., 1992. Can test statistics in covariance structure analysis be trusted? *Psychological Bulletin* 112 (2), 351-362.

Huber, G.P., Power, D.J., 1985. Retrospective Reports of Strategic-Level Managers: Guidelines for Increasing Their Accuracy. *Strategic Management Journal* 6 (2), 171-180.

Insinga, R.C., Werle, M.J., 2000. Linking outsourcing to business strategy. *The Academy of Management Executive* 14 (4), 58-70.

Jonsson, P., 2000. An empirical taxonomy of advanced manufacturing technology. *International Journal of Operations & Production Management* 20 (12), 1446-1474.

Jonsson, P., Mattsson, S.-A., 2003. The implications of fit between planning environments and manufacturing planning and control methods. *International Journal of Operations & Production Management* 23 (7/8), 872-900.

Jöreskog, K.G., Sorbom, D., 1993. *LISREL 8: User's reference guide*. SPSS: Chicago.

Jöreskog, K.G., Yang, F., 1996. The Kenny-Judd model with interaction effects. In G.A. Marcoulides, R.E. Schumacker (Eds.), *Advanced structural equation modeling techniques*, 57-88. Lawrence Erlbaum: Hillsdale, NJ.

Kakabadse, A., Kakabadse, N., 2000a. Sourcing: new face to economies of scale and the emergence of new organizational forms. *Knowledge and Process Management* 7 (2), 107-118.

Kakabadse, A., Kakabadse, N., 2003. Outsourcing best practice: transformational and transactional considerations. *Knowledge and Process Management* 10 (1), 60-71.

Kakabadse, N., Kakabadse, A., 2000b. Critical review - outsourcing: A paradigm shift. *The Journal of Management Development* 19 (8), 670-728.

Kannan, V.R., Tan, K.C., 2002. Supplier selection and assessment: Their impact on business performance. *Journal of Supply Chain Management* 38 (4), 11-21.

Kannan, V.R., Tan, K.C., 2005. Just in time, total quality management, and supply chain management: understanding their linkages and impact on business performance. *Omega* 33 (2), 153-162.

Kathuria, R., 2000. Competitive priorities and managerial performance: A taxonomy of small manufacturers. *Journal of Operations Management* 18 (6), 627-641.

Kathuria, R., Porth, S.J., 2003. Strategy-managerial characteristics alignment and performance: A manufacturing perspective. *International Journal of Operations & Production Management* 23 (3/4), 255-276.

Katz, D., Khan, R., 1978. *The Social Psychology of Organizations*. Wiley: New York.

Kenny, D., Judd, C.M., 1984. Estimating the nonlinear and interactive effects of latent variables. *Psychological bulletin* 96 (1), 201-210.

Kern, T., Willcocks, L., 2002. Exploring relationships in information technology outsourcing: The interaction approach. *European Journal of Information Systems* 11 (1), 3-19.

Ketchen, D.J., Shook, C.L., 1996. The Application of Cluster Analysis in Strategic Management Research: An Analysis and Critique. *Strategic Management Journal* 17 (6), 441-458.

Ketokivi, M., Schroeder, R., 2004. Manufacturing practices, strategic fit and performance: A routine-based view. *International Journal of Operations & Production Management* 24 (1/2), 171-191.

Kirk, C., 2001. Should you outsource your business processes? *Strategic Finance* 82 (7), 26-31.

Kline, R.B., 1998. *Principles and practice of structural equation modeling*. Guilford Press: New York.

Koh, J., Venkatraman, N., 1991. Joint Venture Formations and Stock Market Reactions: An Assessment in the Information Technology Sector. *Academy of Management Journal* 34 (4), 869-892.

Koufteros, X.A., Vonderembse, M.A., and Doll, W.J., 2002. Examining the Competitive Capabilities of Manufacturing Firms. *Structural Equation Modeling* 9 (2), 256-282.

Krajewski, L.J., Ritzman, L.P., 1999. *Operations Management : Strategy and Analysis* (6th ed.). Prentice Hall: Upper Saddle River, NJ.

Krause, D.R., Scannell, T.V., and Calantone, R.J., 2000. A structural analysis of the effectiveness of buying firms' strategies to improve supplier performance. *Decision Sciences* 31 (1), 33-55.

Krizner, K., 2000. New strategies let companies concentrate on their core competencies. *Frontline Solutions* 1 (4), 30.

Lagace, D., Bourgault, M., 2003. Linking manufacturing improvement programs to the competitive priorities of Canadian SMEs. *Technovation* 23 (8), 705-715.

Lankford, W.M., Parsa, F., 1999. Outsourcing: A Primer. *Management Decision* 37 (4), 310-316.

Lau, R.S.M., 2002. Competitive factors and their relative importance in the US electronics and computer industries. *International Journal of Operations & Production Management* 22 (1), 125-135.

Lee, H.L., 2002. Aligning supply chain strategies with product uncertainties. *California Management Review* 44 (3), 105-119.

Lee, H.L., 2004. The Triple-A Supply Chain. *Harvard Business Review* 82 (10), 102-112.

Lehmann, D.R., 1979. *Market Research and Analysis*. Irwin: Homewood, Il.

Leiblein, M.J., 2003. The Choice of Organizational Governance Form and Performance: Predictions from Transaction Cost, Resource-based, and Real Options Theories. *Journal of Management* 29 (6), 937-961.

Leonard-Barton, D., 1992a. Core Capabilities and Core Rigidities: A Paradox in Managing New Product Development. *Strategic Management Journal* 13 (8), 111-125.

Leonard-Barton, D., 1992b. The Factory as a Learning Laboratory. *Sloan Management Review* 34 (1), 23.

Leong, G.K., Snyder, D.L., and Ward, P.T., 1990. Research in the process and content of manufacturing strategy. *Omega* 18 (2), 109-122.

Loh, L., Venkatraman, N., 1992. Determinants of information technology outsourcing: A cross-sectional analysis. *Journal of Management Information Systems* 9 (1), 7-24.

MacCallum, R.C., Browne, M.W., and Sugawara, H.M., 1996. Power Analysis and Determination of Sample Size for Covariance Structure Modeling. *Psychological Methods* 1 (2), 130-149.

Malhotra, M.K., Grover, V., 1998. An assessment of survey research in POM: From constructs to theory. *Journal of Operations Management* 16 (4), 407-425.

Malhotra, N.K., Kim, S.S., and Patil, A., 2006. Common Method Variance in IS Research: A Comparison of Alternative Approaches and a Reanalysis of Past Research. *Management Science* 52 (12), 1865-1883.

Mathieu, J.E., Tannenbaum, S.I., and Salas, E., 1992. Influences of Individual and Situational Characteristics on measures of Training Effectiveness. *Academy of Management Journal* 35 (4), 828-839.

McFarlan, F.W., Nolan, R.L., 1995. How to manage an IT outsourcing alliance. *Sloan Management Review* 36 (2), 9-23.

Merrifield, D.B., 2006. Make Outsourcing a Core Competency. *Research Technology Management* 49 (3), 10-13.

Miles, R.E., Coleman, H.J., and Creed, W.E.D., 1995. Keys to success in corporate redesign. *California Management Review* 37 (3), 128-145.

Miller, D., 1992. Environmental fit versus internal fit. *Organization Science* 3 (2), 159-178.

Miller, J.G., Roth, A.V., 1994. A taxonomy of manufacturing strategies. *Management Science* 40 (3), 285-304.

Min, H., Galle, W.P., 1991. International Purchasing Strategies of Multinational U.S. Firms. *International Journal of Purchasing and Materials Management* 27 (3), 9-18.

Moore, G.A., 2002. *Crossing the Chasm*. HarperCollins Publishers: New York.

Moore, G.C., Benbasat, I., 1991. Development of an Instrument to Measure the Perceptions of Adopting Information Technology Innovation. *Information Systems Research* 2 (3), 192-222.

Mulaik, S.A., 1997. Evaluating structural equation models with a four-step nested sequence of models, *Annual Meeting of the Society for Multivariate Experimental Psychology*, 1-8: Scottsdale, AZ.

Murray, J.Y., Kotabe, M., 1999. Sourcing strategies of U.S. service companies: A modified transaction-cost analysis. *Strategic Management Journal* 20 (9), 791-809.

Narasimhan, R., Carter, J.R., 1998. Linking business unit and material sourcing strategies. *Journal of Business Logistics* 19 (2), 155-171.

Narasimhan, R., Das, A., 1999. An empirical investigation of the contribution of strategic sourcing to manufacturing flexibilities and performance. *Decision Sciences* 30 (3), 683.

Narasimhan, R., Swink, M., and Kim, S.W., 2005. An exploratory study of manufacturing practice and performance interrelationships: Implications for capability progression. *International Journal of Operations & Production Management* 25 (9/10), 1013-1033.

Neter, J., Kutner, M.H., Nachtsheim, C.J., and Wasserman, W., 1996. *Applied Linear Statistical Models* (3rd ed.). WCB / McGraw Hill: Boston.

Niezen, C., Weller, W., 2006. Procurement as Strategy. *Harvard Business Review* 84 (9), 22-25.

Nohria, N., 2005. HBR case study: Feed R&D - or Farm It Out? *Harvard Business Review* 83 (7), 17-28.

Nunnally, J.C., 1978. *Psychometric Theory* (1st ed.). McGraw-Hill: New York, New York.

O'Leary-Kelly, S.W., Vokurka, R.J., 1998. The empirical assessment of construct validity. *Journal of Operations Management* 16 (4), 387.

Orr, J., 2001. Strategic options for CRM: Which way off the roundabout? *Vital Speeches of the Day* 67 (20), 615.

Palvia, S.C.J., 2003. Global outsourcing of IT and IT enabled services: Impact on US and global economy. *Journal of Information Technology Cases and Applications* 5 (3), 1-11.

Papke-Shields, K.E., Malhotra, M.K., and Grover, V., 2002. Strategic manufacturing planning systems and their linkage to planning system success. *Decision Sciences* 33 (1), 1-29.

Pedhazur, E.J., Schmelkin, L.P., 1991. *Measurement, design, and analysis: A integrated approach*. Lawrence Erlbaum Associates: Hillsdale, NJ.

Perreault, W.D., Leigh, L.E., 1989. Reliability Of Nominal Data Based On Qualitative Judgements. *Journal of Marketing Research* 26 (2), 135-148.

Podasakoff, P.M., MacKenzie, S.B., Lee, J.-Y., and Podsakoff, N.P., 2003. Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology* 88 (5), 879-903.

Porter, M.E., 1980. Industry Structure and Competitive Strategy: Keys to Profitability. *Financial Analysts Journal* 36 (4), 30.

Punj, G., Stewart, D.W., 1983. Cluster Analysis in Marketing Research: Review and Suggestions for Application. *Journal of Marketing Research* 20 (2), 134-148.

Quinn, J.B., 1999. Strategic outsourcing: Leveraging knowledge capabilities. *Sloan Management Review* 40 (4), 9-21.

Rencher, A.C., 1995. *Methods of Multivariate Analysis* (1st ed.). Wiley-Interscience: New York.

Rhee, M., Mehra, S., 2006. Aligning operations, marketing, and competitive strategies to enhance performance: An empirical test in the retail banking industry. *Omega* 34 (5), 505-515.

Ross, W.T., Dalsace, F., and Anderson, E., 2005. Should you set up your own sales force or should you outsource it? Pitfalls in the standard analysis. *Business Horizons* 48 (1), 23-36.

Safizadeh, M.H., Ritzman, L.P., and Mallick, D., 2000. Revisiting alternative theoretical paradigms in manufacturing strategy. *Production and Operations Management* 9 (2), 111-127.

Safizadeh, M.H., Ritzman, L.P., Sharma, D., and Wood, C., 1996. An empirical analysis of the product-process matrix. *Management Science* 42 (11), 1576-1591.

Sattora, A., Bentler, P.M., 1988. Scaling corrections for chi-squared statistics in covariance structure analysis. *Proceedings of the American Statistical Association* 1988, 308-313.

Schniederjans, M.J., Schniederjans, A.M., and Schniederjans, D.G., 2005. *Outsourcing and Insourcing in an International Context* (1st ed.). M.E. Sharpe, Inc.: Armonk, NY.

Shah, R., Goldstein, S.M., 2006. Use of structural equation modeling in operations management research: Looking back and forward. *Journal of Operations Management* 24 (2), 148-169.

Shin, H., Collier, D.A., and Wilson, D.D., 2000. Supply management orientation and supplier/buyer performance. *Journal of Operations Management* 18 (3), 317-333.

Shook, C.L., Ketchen, D.J., Hult, G.T.M., and Kacmar, K.M., 2004. An Assessment of the use of Structural Equation Modeling in Strategic Management Research. *Strategic Management Journal* 25 (4), 397-404.

Sislian, E., Satir, A., 2000. Strategic sourcing: A framework and a case study. *Journal of Supply Chain Management* 36 (3), 4.

Skinner, W., 1966. Production Under Pressure. *Harvard Business Review* 44 (6), 139-146.

Skinner, W., 1969. Manufacturing – the missing link in corporate strategy. *Harvard Business Review* 47 (3), 113-121.

Skinner, W., 1974. The focused factory. *Harvard Business Review* 52 (3), 113-121.

Smith, M.A., Mitra, S., and Narasimhan, S., 1998. Information Systems Outsourcing: A Study of Pre-Event Firm Characteristics. *Journal of Management Information Systems* 15 (2), 61-93.

Steensma, H.K., Corley, K.G., 2000. On the performance of technology-sourcing partnerships: The interaction between partner interdependence and technology attributes. *Academy of Management Journal* 43 (6), 1045-1067.

Stratman, J.K., Roth, A.V., 2002. Enterprise resource planning (ERP) competence constructs: Two-stage multi-item scale development and validation. *Decision Sciences* 33 (4), 601.

Sum, C.-C., Kow, L.S.-J., and Chen, C.-S., 2004. A taxonomy of operations strategies of high performing small and medium enterprises in Singapore. *International Journal of Operations & Production Management* 24 (3/4), 321-345.

Supply Chain Council. 2005. *SCOR Overview, available at http://www.supply-chain.org.*

Swafford, P.M., Ghosh, S., and Murthy, N., 2006. The antecedents of supply chain agility of a firm: Scale development and model testing. *Journal of Operations Management* 24 (2), 170-188.

Talbert, N., 2002. Getting the most from an enterprise system. *MIT Sloan Management Review* 44 (1), 11.

Talluri, S., Narasimhan, R., 2004. A methodology for strategic sourcing. *European Journal of Operational Research* 154 (1), 236.

Tan, K.-C., Kannan, V.R., Handfield, R.B., and Ghosh, S., 1999. Supply chain management: an empirical study of its impact on performance. *International Journal of Operations & Production Management* 19 (10), 1034.

Tarigan, R., 2005. An Evaluation of the Relationship between Alignment of Strategic Priorities and Manufacturing Performance. *International Journal of Management* 22 (4), 586-597.

Tracey, M., Lim, J.-S., and Vonderembse, M.A., 2005. The impact of supply-chain management capabilities on business performance. *Supply Chain Management* 10 (3/4), 179-191.

Venkatesan, R., 1992. Strategic Sourcing: To Make or not To Make. *Harvard Business Review* 70 (6), 98.

Venkatraman, N., 1989. The Concept Of Fit In Strategy Research: Toward Verbal And Statistical Correspondence. *Academy of Management. The Academy of Management Review* 14 (3), 423-444.

Venkatraman, N., Prescott, J.E., 1990. Environmental Strategy Coalignment: An empirical test of its performance implications. *Strategic Management Journal* 11 (1), 1-23.

Venkatraman, N.V., 2004. Offshoring Without Guilt. *MIT Sloan Management Review* 45 (3), 14-16.

Vickery, S.K., 1991. A Theory of Production Competence Revisited. *Decision Sciences* 22 (3), 635.

Vickery, S.K., Droge, C., and Markland, R.E., 1997. Dimensions of manufacturing strength in the furniture industry. *Journal of Operations Management* 15 (4), 317-330.

Ward, P.T., Bickford, D.J., and Leong, G.K., 1996. Configurations of manufacturing strategy, business strategy, environment and structure. *Journal of Management* 22 (4), 597-626.

Ward, P.T., McCreery, J.K., Ritzman, L.P., and Sharma, D., 1998. Competitive priorities in operations management. *Decision Sciences* 29 (4), 1035-1046.

Watts, C.A., Kim, K.Y., and Hahn, C.K., 1992. Linking Purchasing to Corporate Competitive Strategy. *International Journal of Purchasing and Materials Management* 28 (4), 2-8.

Weber, C.A., Current, J.R., and Benton, W.C., 1991. Vendor Selection Criteria and Methods. *European Journal of Operational Research* 50 (1), 2-18.

Wheelwright, S.C., Bowen, K., 1996. The Challenge of Manufacturing Advantage. *Production and Operations Management* 5 (1), 59-77.

Willcocks, L., Hindle, J., Feeny, D., and Lacity, M., 2004. IT and Business Process Outsourcing: The Knowledge Potential. *Information Systems Management* 21 (3), 7-15.

Williamson, O.E., 1975. *Markets and Hierarchies: Analysis and Antitrust Implications*. Free Press: New York.

Williamson, O.E., 1985. *The Economic Institutions of Capitalism*. Free Press: New York.

Zhao, X., Sum, C.-C., Qi, Y., Zhang, H., and Lee, T.-S., 2006. A taxonomy of manufacturing strategies in China. *Journal of Operations Management* 24 (5), 621-636.

VITA

James R. Kroes

James Kroes is an Operations Management PhD candidate in the College of Management at the Georgia Institute of Technology. James has a Masters of Science in Management of Technology from the Georgia Institute of Technology and a Bachelors of Science in Mechanical Engineering from Rensselaer Polytechnic Institute. Prior to pursuing his doctorate, James worked professionally for nine years as an operations management consultant and as a project manager. On completion of his doctoral studies, James will join the faculty of the University of Rhode Island as an Assistant Professor in Operations and Supply Chain Management.