

The Effect of Internal Cost Management, Information Systems Integration, and Absorptive Capacity on Interorganizational Cost Management: A Pilot Study

Dutch Fayard
Lorraine Lee
Robert Leitch *
William Kettinger

University of South Carolina
Moore School of Business
Columbia, SC 29208

* leitch@moore.sc.edu
803-777-6418
803-777-0712 (fax)

November 1, 2006

The Effect of Internal Cost Management, Information Systems Integration, and Absorptive Capacity on Interorganizational Cost Management: A Pilot Study

Abstract

Competition is forcing organizations to collaborate more with their business partners. Interorganizational cost management (IOCM) has been used by organizations to achieve the collaborative management of costs throughout the value chain. Effective management of costs that cross organizational boundaries has the potential to improve the overall performance of each firm in the value chain. It is therefore important to understand what factors may lead to the management of these interorganizational costs and if management of these costs is beneficial. Based on previous research, we model several antecedents that lead to IOCM. Using path analysis, we study several constructs that may affect IOCM and the benefits that result from its use. These constructs are internal cost management, electronic integration, and absorptive capacity. We focus on the interorganizational cost management practices of target costing, kaizen costing, open book accounting, and information sharing. The components of absorptive capacity in our study are the relevant knowledge, the communications network, and the communications climate, which includes trust. Electronic integration in our study refers to the degree that a firm's information technology (IT) systems are integrated and accessible both internally and externally. Internal cost management refers to the cost system used to analyze costs and manage organizational resources. Our model is tested using a sample of managerial accountants who work for organizations that are part of a supply chain. Electronic integration is found to affect both absorptive capacity and internal cost management practices. We also find that absorptive capacity is a direct antecedent to IOCM practices, and electronic integration impacts IOCM indirectly through internal cost management practices. Furthermore, internal cost management leads to IOCM in the presence of a high degree of electronic integration and dependency. Lastly, our analysis suggests that management accountants do perceive significant benefits from engaging in IOCM techniques. In summary, all of these constructs play a role in the effective use of IOCM in a supply chain.

Keywords: *cost management; strategic cost management; interorganizational cost management; absorptive capacity; supply chain management; electronic integration.*

INTRODUCTION

Organizations concerned with managing costs must not only consider their internal activities, but also their relationships with business partners in the supply chain in today's global and competitive economic environment. Effective management of costs that cross organizational boundaries has the potential to improve the overall performance of each organization affected. It is therefore important to understand what factors may lead to the management of these inter-organizational costs and if management of these costs is beneficial. Based on previous research, we develop a model to study potential antecedents to inter-organizational cost management (IOCM) as well as the perceived benefits of IOCM. We empirically test our model by surveying IMA members. We use path analysis and we find support for our antecedent constructs and our model as a whole. The constructs examined in our model are interorganizational cost management (IOCM), internal cost management (ICM), electronic integration (EI), and absorptive capacity (AC). We further find that IMA members whose organizations engage in IOCM techniques perceive IOCM to be beneficial.

Inter-organizational cost management has evolved to become a *strategic capability* for organizations that are not satisfied with the incremental cost improvements associated with externally integrated information systems or internally focused cost management processes such as activity-based costing. Instead, managers are seeking higher-order goals such as gaining new competencies through joint learning, gaining market power, creating legitimacy, and moving more quickly into new markets and technologies (Eisenhardt and Schoonhoven 1996). One result of this new strategic focus has been the "evolution" of IOCM (Coad and Cullen 2006).

IOCM refers to a set of activities, processes, or techniques that managers can use to manage costs that span organizational boundaries (Cooper and Slagmulder 2004). Some of the

techniques associated with IOCM would be easily recognized as an interorganizational application of traditional internal cost management practices (e.g. budgeting and performance, investment appraisal, target costing, and open book accounting), while other techniques may not be related to conventional management accounting. The outcomes associated with IOCM techniques transcend the transactional cost benefits that are generally provided by supply chain integration by adding strategic advantages, which includes identifying ways of reducing costs and increasing revenues through activities such as joint product development and joint interorganizational cost investigations (Cooper and Slagmulder 2004). However, *all* of the IOCM techniques are similar in that they are *cooperative* activities that have a *common* goal to create value for *both* partner firms through modification of interorganizational cost structures (Coad and Cullen 2006).

According to Eisenhardt and Schoonhoven (1996), the *transition* from a purely transactional focus to a more strategic focus is dependent upon cooperation, collaboration, the sharing of proprietary information, and the generation of mutual knowledge. Similarly, Coad and Cullen (2006) characterize IOCM as an institution that is built upon knowledge, skill, relationships, and physical assets which define the institution's capabilities and dynamic capabilities¹, or the ability to learn and change.

Most studies that investigate IOCM have generally identified critical factors leading to IOCM using qualitative investigations. This research uses a sample of managerial accountants to empirically tests the factors previously identified. Our empirical analysis answers the call from Coad and Cullen (2006) to address the “dearth” of empirical IOCM studies. The goals of this research are to first identify the institutional and dynamic capabilities that have allowed

¹ Dynamic capabilities have been defined as capability-building processes, which are “the organizational and strategic routines by which firms achieve new resource configurations as markets emerge, collide, split, evolve, and die” (Eisenhardt and Martin, 2000, p. 1107).

organizations to engage in IOCM activities and secondly to examine how the organizations have benefited from IOCM.

The research questions in this study are:

- 1) What capabilities (antecedents) precede IOCM?
- 2) Does IOCM lead to strategic and transactional benefits?

We address the research questions by developing an empirical model that links IOCM and its related benefits to constructs that are expected to be key enablers for IOCM. We selected these constructs as IOCM enablers for our model because they capture many of the factors that were observed to influence IOCM in previous qualitative studies. These *enablers* include two capabilities: (1) the focal firm's *information technology integration* (electronic integration among supply chain members), and 2) the focal firm's existing *internal cost management* capabilities and practices. One additional enabler is a dynamic capability -- a firm's *interorganizational absorptive capacity*² (behavioral relationships) for cost management as perceived by the focal firm. The "focal" firm in our study refers to a specific firm of interest within a supply chain, while the "partner" firm refers to a firm within the focal firm's supply chain, either a customer or a supplier or both.

The intense focus by firms to integrate the supply chain has resulted in firms achieving a high level of technical integration among their suppliers and customers, resulting in incremental improvements in efficiencies and productivity by reducing the overall cost of supplies and reducing other transaction costs. Research has also shown that technical integration, through the use of information technology (IT), is an enabler of supply chain effectiveness (e.g. Handfield

² In the vein of dynamic capabilities, Zahra and George (2002, p. 185) characterize absorptive capacity as a "dynamic capability pertaining to knowledge creation and utilization that enhances a firm's ability to gain and sustain a competitive advantage" and they define absorptive capacity as "a set of organizational routines and processes by which firms acquire, assimilate, transform, and exploit knowledge to produce a dynamic organizational capability" (Zahra and George, 2002, p. 186).

and Nichols 1999). At a more strategic level, internal and external IT integration has resulted in an increase of sharing of information³ (e.g. Vickery et al. 2003), which is a central part of IOCM (Coad and Cullen 2006). Therefore, we contend that *IOCM* is enabled by electronic systems integration, which we define as the degree to which the IT systems employed throughout the organization are integrated and accessible both internally (within-firm) and externally (outside the firm).

While electronic integration through information technology provides the physical infrastructure to enable IOCM, other factors such as individual knowledge and skills will also impact IOCM (Coad and Cullen 2006). We examine the internal cost management capabilities as one measure of a firm's cost management skills and knowledge. Since many IOCM activities are simply interorganizational extensions of internal cost management practices, the internal knowledge reflected by the use of these practices should enable the organization to develop *related* inter-organizational cost management practices.

Our final antecedent construct in the model is *inter-organizational absorptive capacity*, which is the ability of two partner firms to “recognize the value of new, external information, assimilate it, and apply it to commercial ends” (Cohen and Levinthal 1990, p. 128). This concept has been deemed a “dynamic capability” to reflect its capability of building processes for new markets and reconfiguring resources to gain and sustain competitive advantage (Zahra and George 2002; Eisenhardt and Martin 2000). Our interorganizational absorptive capacity construct measures the *collective* knowledge, communication and trust that exists between partners. These relationship characteristics have all been deemed requisite for developing inter-organization capabilities (Kelle and Akbulut 2005; Coad and Cullen 2006).

³ Information sharing also reduce reduces inefficient outcomes that may result from information asymmetry such excess inventory or inventory stock-outs) (Simchi-Levi et. al. 2003)

The remainder of this paper is organized as follows: First, we examine the extant literature on IOCM in a supply chain context where an organization's partner is a supplier or a customer⁴. Second, we develop the theoretical foundations and the associated hypotheses for the antecedents (electronic integration, absorptive capacity, internal cost management) and consequences (IOCM benefits) of IOCM. Next, we test this model empirically through a survey of management accountants working in supply chain environments. Finally, we conclude with a discussion of our findings.

INTERORGANIZATIONAL COST MANAGEMENT (IOCM)

A fundamental concept of supply chain management is that organizations must look beyond their own boundaries to consider relationships with their suppliers and customers along the value chain (Berry and Ahmed 1997). For most of the 20th century, the norm for inter-organizational behavior has been that of autonomous firms engaging in arm's length transactions with other firms (Cullen et al. 1999). This internal focus by firms has made it difficult for organizations to take advantage of cost management synergies that may be obtained through the cooperation and collaboration of business partners. These synergies require additional coordination mechanisms to extend cost management programs beyond organizational boundaries, with the overall objective of finding lower cost solutions than would be possible if the firm and its customers and suppliers attempted to reduce costs independently (Cooper and Slagmulder 1998a).

These synergies may be obtained through vertical integration; but now many organizations engage in IOCM instead. These organizations can be described as hybrid organizations who achieve the cost management synergy benefits of vertical integration while

⁴ IOCM within a supply chain context differentiates itself from IOCM that can occur when companies outsource internal business activities.

maintaining the efficiency of arms-length transactions (Coad and Cullen 2006). From this view, the strategic employment of IOCM can be viewed as a hybrid between strategic intra-firm cost management focus and strategic inter-firm cost management focus as presented by Shank (1989).

Strategic Cost Management

The origin of IOCM can be traced to the work of Porter (1985) and Shank (1989). Porter (1985) identified strategic cost analysis as a means of better managing the linkages with buyers and suppliers in a value chain in order to reduce costs and enhance differentiation. Shank (1989, p. 48) builds upon Porter's value chain concept and defines the term strategic cost management as "the managerial use of cost information explicitly directed at one or more of the four stages of the strategic management cycle." The four stages of the strategic management cycle as defined by Shank (1989) are:

1. Formulating strategies
2. Communicating those strategies throughout the firm
3. Developing and carrying out tactics to implement the strategies
4. Developing and implementing controls to monitor the strategy implementation

Based on the strategic management cycle, Shank (1989) defines strategic cost management in terms of three underlying themes from the strategic management literature – 1) value chain analysis; 2) strategic position analysis; and 3) cost driver analysis. According to Shank (1989, p. 50), each of the three themes represents "a stream of research and analysis in which cost information is cast in a much different light than viewed in traditional management accounting." In general, IOCM blends of inter-organizational value chain analysis and intra-organizational cost driver analysis by focusing on the management of costs related to activities that impact the focal firm as well as its business partners. Even before this combination was described as IOCM, researchers as well as practitioners have recognized the value of merging these ideas.

LaLonde and Pohlen (1996) were critical of ABC's internal focus because they recognized the potential advantages provided by ABC within a supply chain. Traditionally, the only use of ABC in terms of being extra-organizationally focused is in determining how supply chain partners affect the firm's cost and profitability -- an internally-focused orientation. Organizations have ignored an orientation that looks outside of the firm to determine where in the supply chain activities can best be performed in terms of cost, time, or quality (LaLonde and Pohlen 1996). Dekker and Van Goor (2000) also recognize the importance of cooperative relationships within the supply chain and through a case study in the pharmaceutical industry, they demonstrate how ABC can be used to support decisions about relocating and changing logistics activities in order to optimize across the entire supply chain. The implication of this study is that organizations can benefit by engaging in cost analysis throughout the entire supply chain. In general, organizational boundaries are blurring (Coad and Cullen 2006) and strategic exploitation of linkages within the firm's value chain and between value chains of business partners are important to an organization's performance (Porter 1985).

Interorganizational Cost Management Practices

From its origins with Porter (1985) and Shank (1989), IOCM has emerged in the management accounting field as a general-purpose term referring to a portfolio of specific strategic management accounting practices that are specifically targeted at optimizing and integrating cost management systems in order to jointly reduce costs between partners (Cooper and Slagmulder 1998a, 2004). According to Cooper and Slagmulder (1998a), IOCM practices facilitate the coordination of cost reduction in 2 ways: 1) helps identify ways to make the interface between the firms more efficient and 2) helps the firm and its buyers and suppliers find

additional ways to reduce the costs of products. Among the accounting practices commonly discussed in IOCM literature are:

- Interorganizational Target Costing
- Interorganizational Kaizen costing
- Open Book Accounting
- Information Sharing

Interorganizational Target Costing

Target costing focuses on managing the product development and design processes of a firm (Monden and Sakurai 1989; Sakurai 1996; Cooper and Slagmulder 1997; Mouritsen et al. 2001). Target costing is defined by Cooper (1996, p. 28) as a “structured approach for determining the cost at which a proposed product with specified functionality and quality must be produced to generate the desired level of profitability at the product’s anticipated selling price.” Specifically, Cooper (1996) identifies 3 steps associated with target costing:

1. Estimate the selling price at which a proposed product will sell, utilizing market research techniques
2. Determine the new product’s target profit margin
3. Determine the product’s target cost by subtracting the target profit from the target selling price.

Next, organizations apply value engineering techniques to determine how they can effectively design a product that can be manufactured at the target cost. During the value engineering process, an analysis is performed to assess ways of increasing functionality without increasing costs, as well as reducing costs without reducing functionality (Cooper 1996).

The literature regarding target costing suggests that target costing itself is an internal cost management technique in that it does not actively involve the partner firm in the focal firm’s cost management program (e.g. Monden 1995; Cooper and Slagmulder 1997, 2004). Instead, it is the focal firm’s cost management system that contains the design information that is applicable to meeting the target price of a product. It is this design information that can be used by the partner

firm to identify where cost reductions may be possible. Therefore, the key extension of target costing that brings it into the realm of IOCM is the active involvement by both the focal firm's and the partner firm's design teams in the joint identification, management, and resolution of cost issues (Cooper and Slagmulder 2004).

Cooper and Slagmulder (2004) identify three specific IOCM techniques resulting from target costing processes that progressively involve more collaboration between the focal firm and the partner firm. The first IOCM technique is the functionality-price-quality (FPQ) tradeoffs, which Cooper and Slagmulder (2004) identify as useful for resolving minor cost overrun problems and requiring limited interaction between the design teams of the focal and partner firms. The second technique is an interorganizational cost investigation, which is used when FPQ tradeoff analysis is not able to achieve the desired level of cost reductions. The third IOCM technique related to target costing processes is concurrent cost management, which requires significant interaction and collaboration between design teams and can lead to fundamental changes in both firms' product and processes. Cooper and Slagmulder (2004) provide a complete discussion of these three techniques via case analysis, demonstrating how these IOCM techniques have been used in three Japanese supply chains to cooperatively identify mutually beneficial low-cost solutions.

Interorganizational Kaizen Costing

Originating from successful cost management practices in Japanese firms, kaizen costing is a system of incremental and continuous cost reduction improvements of the product manufacturing process (Monden and Hamada 1991). Kaizen costing is similar to target costing in that *both* processes focus on cost reduction activities. However, target costing focuses on the

design and development phases of a product, whereas kaizen costing is used to reduce costs in the manufacturing and delivery phases (Cooper 1996).

Kaizen costing has interorganizational implications in that firms can use kaizen costing to identify and set cost-reduction objectives for suppliers. Cooper and Slagmulder (1998b, p. 19) identify the real benefit of interorganizational kaizen costing as being “when the firms in the supply chain cooperate to find new low-cost solutions that they cannot identify in isolation.” Guilding et al. (2000, p. 120) go as far as to classify kaizen costing as a strategic management accounting practice when it focuses on an external, market-oriented approach “that is forward-looking and closely aligned to a quest for competitive advantage.”

Open Book Accounting

Open book accounting refers to the practice of partners within a supply chain opening up their internal accounting information to each other in order to support their collaboration on cost management (Berry and Ahmed 1997). Open book accounting increases the transparency of cost information between partner firms, as evidenced by Lamming (1993, p. 214):

Cost transparency means the sharing of costing information between customer and supplier including data which would traditionally be kept secret by each party, for use in negotiations. The purpose of this is to make it possible for customer and supplier to work together to reduce costs.

By increasing information transparency between partners, open book accounting can improve the effectiveness of other IOCM techniques (i.e. by enabling more in-depth and strategic target costing and kaizen costing).

Mouritsen et al. (2001, p. 221) identify open book accounting as an effective interorganizational management control to “create new possibilities for management intervention.” These new possibilities extend the reach of a firm’s management beyond the boundaries of their own firm and outward towards the control of a partner firm’s activities.

Mouritsen et al. (2001) demonstrate these new possibilities through a case analysis where they document the benefits of one firm's experience with open book accounting. In the case study, open book accounting not only improved efficiencies in the firm's production system, but also impacted its strategic direction by transforming the firm's core competencies and competitive strategy via the insights gained from access to the supplier's production processes (Mouritsen et al. 2001).

Information Sharing

A common thread in all of the managerial accounting techniques described in the previous sections is the sharing of cost information among suppliers and customers. Ramos (2004) points out that managerial accounting systems should include a more comprehensive set of organizational *and external* data, thus facilitating and perhaps even standardizing the information sharing processes in order to support supply chain activities.

Supply chain management emphasizes the benefits that can be achieved by all parties along the chain through cooperation and information sharing (Yu et al. 2001). The operations management literature has explored the role of including customer requirements in the new product development process (e.g. Griffin and Hauser 1996), as well as including supplier integration in the new product development process (e.g. Petersen et al. 2005; Primo and Amundson 2002). In the accounting literature, Coad and Cullen (2006) state that information sharing is critical for partners to jointly learn new skills and identify new opportunities. This is exemplified by Cooper and Slagmulder (2004) who explore the processes that enable firms to collaborate effectively, specifically investigating the role of guest engineers in joint development projects and identifying guest engineers as an example of an IOCM practice that facilitates information sharing.

Several specific forms of information sharing have been identified as salient in supply chain integration, including the sharing of real-time information about material flow and the sharing of real-time documents that can be used to create collaborative forecasts and plans and the sharing of information related to order entry, shipping, and billing through business process automation (Marquez et al. 2004). Furthermore, Malhotra et al. (2005) identify the breadth of information exchange as having an impact on leveraging interorganizational partnerships and specifically identify information related to market demand and forecasts, demand shifts and changes in customer preferences, and the sharing of future plans such as long-term production plans and capital investments.

Summary

From the managerial accounting literature, we have identified several practices / techniques associated with interorganizational cost management in a supply chain context. Additionally, we used studies from the operations management field to more fully explore the role of information sharing in managing costs throughout the supply chain. Table 1 summarizes our synthesis of the primary practices and techniques associated with interorganizational cost management.

[Insert Table 1 about here]

ANTECEDENTS AND BENEFITS OF IOCM

Most of the studies on IOCM have been qualitative case studies (e.g. Mouritsen et al. 2001; Dekker and Van Goor 2000; Cooper and Slagmulder 2004), with little quantitative analysis addressing IOCM. One exception is the study by Guilding et al. (2000) who surveyed 1,292 firms in New Zealand, United Kingdom, and the United States and presented statistical evidence on the extent of strategic management accounting practices. However, Guilding et al.

(2000) did not investigate the antecedents to the strategic accounting practices, of which IOCM is a subset. Given the extent of qualitative work that has been conducted on the topic of IOCM behavior, this research attempts to bring together some of the findings of the previous research through the development of a theoretical model that succinctly reflects the conclusions of many of the qualitative studies.

Despite the lack of quantitative studies addressing antecedents of IOCM, several of the qualitative case studies have suggested possible antecedents. Mouritsen et al. (2001) identify two important prerequisites for open book accounting to be effectively implemented between partners – 1) a highly developed sense of trust between partners and 2) a system by which information is actively shared. Cullen et al. (1999), in a case study of three firms, identify the quest for continuous improvements as the driving force for adopting IOCM practices. Evans and Ashworth (1996) recognize several factors influencing the success of activity-based costing projects, including the effectiveness of leadership, the adequacy of the resources, the receptiveness of the culture to organizational change, and the effectiveness of the communication strategy. Mentzer et.al. (2000 and 2001) also suggest several antecedents such as trust, interdependence, technology utilization, cooperation, joint programs, and information sharing to supply chain performance (i.e., IOCM). Most recently, Coad and Cullen (2006) suggest that behavioral relationship factors (i.e. trust and communication) along with skill, knowledge, and physical assets (i.e. integrated information systems) are critical in order to engage in IOCM.

Based on the qualitative work in the literature, our research categorizes the potential antecedents of IOCM into three areas – 1) internal cost management capabilities of the focal firm, 2) electronic integration among supply chain partners (information sharing capability) and 3) the absorptive capacity for interorganizational cost management partnership by the focal firm.

[Insert Figure 1 about here]

Internal Cost Management (ICM)

Cost management uses the information from cost accounting systems in order to understand the nature and behavior of costs associated with managing firm resources (Stenzel and Stenzel 2003). From the Coad and Cullen (2006) perspective, ICM is a capability that captures an organization's cost management skills and knowledge and supports the evolution of IOCM. Kaplan and Cooper (1998) also view cost management from an evolutionary or maturity perspective in their four-stage model of cost system development that is based on the level of integration of product, service, and customer costing information. The Kaplan and Cooper model focuses on integration from an internal firm perspective. We view IOCM as an extension of cost management from an internal focus to the external focus, which positions IOCM beyond Kaplan and Cooper's stage 4 of an integrated, internal cost management system. As firms gain more internal expertise within an area, the next step in the maturation process is to move beyond the internal boundaries of the firm and take an external perspective (Cooper and Slagmulder 1999). Therefore, we posit:

H1: There is a positive relationship between internal cost management and interorganizational cost management.

Absorptive Capacity (AC)

Originating in the field of macroeconomics, the concept of absorptive capacity refers to the ability of an economy to absorb and utilize external information and resources (Adler 1965). Cohen and Levinthal (1990) adapted this macroeconomic concept to the organizational level and defined absorptive capacity as the "ability of a firm to recognize the value of new, external information, assimilate it, and apply it to commercial ends" (Cohen and Levinthal 1990, p. 128). In Cohen and Levinthal's view, the absorptive capacity of an organization is primarily a function

of the level of prior related knowledge, as well as a function of the structure of communication between the external environment and the firm.

Following the conceptualization by Cohen and Levinthal (1990), Brown (1997) proposed that a firm's absorptive capacity consists of 3 major components – prior relevant knowledge, the communications network, and the communications climate. Prior relevant knowledge provides the foundation that allows individuals to recognize the potential importance of new information (Cohen and Levinthal 1990, Brown 1997). The communications network refers to the flow of information across and within organizational boundaries (Brown 1997). The communications climate is defined as the organizational atmosphere regarding communications behavior (Putnam and Cheney 1985; Brown 1997) and it is the absorptive capacity factor that measures trust. Tu et al. (2005) use Brown's basic 3-component conceptualization of absorptive capacity and add a fourth component -- knowledge scanning⁵, which is defined as an organizational mechanism enabling firms to identify and capture relevant knowledge.

Our study positions inter-organizational absorptive capacity as a dynamic capability that enables the interorganizational cost management capabilities of a firm. We operationalize AC using modified items from Tu et al. (2005) and focus on the 4 dimensions that lead to higher IOCM -- 1) prior relevant knowledge, 2) communications network, 3) communications climate, and 4) knowledge scanning. Therefore, we predict:

H2: There is a positive relationship between absorptive capacity and the extent of interorganizational cost management.

⁵ Knowledge scanning is a part of the original Cohen and Levinthal concept of integrating external knowledge within the firm and is also a component of Brown's communications network construct.

Electronic Integration (EI)

In our study, electronic integration refers to the capability of an organization's information technology (IT) systems to provide visibility of information to employees both within the focal firm (internal integration) and to the employees of partner firms (external integration). In other words, it is the degree to which the IT systems employed are integrated and accessible both internally (intra-firm) and externally (inter-firm). Our definition is based on Barua et al (2004, p. 593) who define systems integration as "the extent to which a firm integrates its various IT systems to provide visibility to customer and supplier data and to allow online information sharing and transaction execution across the value chain."

An organization's level of internal cost management is dependent on the firm's level of IT integration to the extent that integrated systems allow for more accurate tracking of costs and enable the tracking of specific costs to specific activities (Moscove et al., 1999). Accounting information systems are commonly deployed to support the collecting, processing, and communicating of cost management information to enhance decision-making. Therefore, we predict the following:

H3: There is a positive relationship between electronic integration and the extent of internal cost management practices

In addition to playing a role internally, information technology has also been identified as an important enabler of supply chain integration, allowing multiple organizations to coordinate activities (Handfield and Nichols 1999). The presence of IT applications has been shown to be a necessary but not sufficient condition to achieve supply chain integration (Short and Venkatraman 1992; Venkatraman 1994). Craighead and LaForge (2003) developed a taxonomy of IT adoption / integration patterns based on the type of IT applications (e.g. supplier applications, shipping applications) adopted by firms for use internally and externally and the

extent of the adoption downstream and upstream. According to Ellram and Zsidisin (2002), one of the most important activities of purchasing and supply chain management is cost analysis, (such as examining supplier cost structures and encouraging suppliers to share cost data) requiring the extensive use of IT. Therefore, we predict:

H4: There is a positive relationship between electronic integration and the use of interorganizational cost management

Electronic integration has also been studied as a direct antecedent to a firm's absorptive capacity. Malhotra et al. (2005, p. 153) explore how firms in supply chain partnerships configure their IT infrastructure and processes to build absorptive capacity to "acquire, assimilate, transform, and exploit information resources." Specifically, Malhotra et al. (2005) identify two distinct groups of constructs that enhance a firm's absorptive capacity for engaging in supply chain relationships – 1) integrative interorganizational process mechanisms and 2) partner interface-directed information systems. In our study, external electronic integration focuses on partner interface-directed information systems that provide the infrastructure support for much of the interorganizational communications that occur between partners. This includes systems that integrate and process data from suppliers and/or customers and systems that allow data to be shared between firms. Tomkins (2001) suggests that business relationships are developed and cultivated through stages of experience and trust intensities. Because communications are facilitated due to infrastructure support and can therefore occur more frequently, trust and the overall communications climate (a component of our study's absorptive capacity construct) can improve as a result of electronic integration. Therefore we posit:

H5: There is a positive relationship between electronic integration and IOCM absorptive capacity.

Benefits

Organizational cost management benefits may follow from both internal cost management (ICM) and inter-organizational cost management (IOCM) practices. These benefits include: 1) those that are operational in nature, such as reducing costs associated with daily purchasing or sales transactions and reducing costs through the streamlining of inter-organizational processes and 2) those that are more strategic-oriented benefits, such as decreasing the response time to market changes and identifying new business opportunities.

In addition to the benefits that are directly related to cost management, a firm should also receive benefits that are more macro-level in nature. These general benefits include measures like perceptions of a firm's financial performance, market share growth, and level of product and service innovation.

It is our expectation that benefits related to the capability to manage costs both within and across organizational boundaries will increase as organizations engage in more cost management processes. Therefore, we predict:

H6: There is a direct positive relationship between internal cost management and benefits.

H7: There is a direct relationship between interorganizational cost management collaboration and benefits.

Hypotheses H1-H7 are summarized on Figure 1, which shows the research model.

RESEARCH METHODOLOGY

This section presents the details about the operationalization of our empirical constructs, the procedures used to develop the survey items, the context of our pilot study, and the procedures used for data collection.

Operationalization of Constructs

In order to operationalize the empirical constructs with survey items, we examined literature from a variety of business disciplines, including accounting, information systems, and operations and supply chain management (see Tables A1-A6 in Appendix A for references used in developing constructs). Many of the items used to operationalize the constructs in this study were adopted from previously validated instruments. However, in some cases, when the exact wording of original survey items did not capture the aspect of the construct that we desired, we made minor modifications to the item.

When a review of the literature revealed that there were no previous instruments designed to operationalize our construct, we used the literature related to that construct to help us define and develop items that could be used measure the construct. The survey items that were used to collect our data (main survey) are presented in Tables A1-A6 in Appendix A⁶. Figure 2 shows the hierarchical structure of the constructs and depicts the number of items related to and used for each first order construct. The remainder of this section provides details regarding how the items for each construct were selected.

[Insert Figure 2 about here]

Electronic Integration

We developed our empirical electronic integration construct by adopting and modifying measures that were previously validated in Barua et al. (2004). The original Barua et al. (2004) measures had a strong internal systems integration focus, with only one question addressing external systems integration. Because our study focuses on the relationship between two firms,

⁶ Note that this table provides the specific references from which the final survey items were adopted. In some cases, new items were added to our survey in order to capture the interorganizational aspect of the constructs.

we added two additional items that are expected to capture the external or interorganizational aspect of systems integration. Table A-2 lists our measures for Electronic Integration.

Absorptive Capacity

We developed our absorptive capacity constructs primarily by adopting and modifying measures that were previously used in Tu et al. (2005). Modifications to the original items were made in order to capture the interorganizational absorptive capacity that exists between two partner firms as opposed to a single firm. For items that were intended to assess knowledge, we made additional modifications that would allow us to assess knowledge regarding cost management. In addition to the items modified from Tu et al. (2005), two additional survey items were also obtained from instruments used by Stuart and McCutcheon (2000) and Dyer (1997) related to trust and the communications climate between firms. Table A-1 lists our measures for absorptive capacity.

Cost Management

Since there were no previous survey instruments designed to assess the extent to which firm engage in cost management practices, we used the academic literature related to internal and interorganizational cost management to develop the survey items related to our empirical cost management constructs -- internal cost management (ICM) and interorganizational cost management (IOCM). These cost management constructs simply assess whether the respondents' firm engages in multiple cost management practice. ICM describes the degree to which respondents firms engage in internal cost management practices, and IOCM describes the degree to which respondents firms engage in interorganizational cost management practices with a supply chain partner. Tables A-4 and A-5 list our measures for IOCM and ICM respectively.

Benefits

We again turn to the academic literature related to interorganizational cost management processes to develop our benefits construct. Several of the items used in our survey were items used in previous research to assess general firm benefits. These items were adapted for our research. In addition to the established items, we also included several items designed to specifically capture the benefits that should be associated with engaging in interorganizational cost management practices. These items were developed based on benefits directly attributable to cost management practices. Table A-3 lists the measures for cost management benefits along with a source⁷.

Dependency

Although dependency is not an empirical construct we investigate, we recognize that it is a control variable that must be measured. Dependency is a measure that refers to the level of dependence each firm has on its partner and vice versa. Dependence has been defined in the literature as the extent to which a target firm needs the source firm to achieve its goals (Frazier 1983; Kale 1986; Frazier et al. 1989; Andaleeb 1995). Andaleeb (1995, p. 159) identifies two important factors that create perceptions of dependence – 1) “the importance or criticality of the resources provided by the source firm” and 2) “the number of alternate sources available to the target firm for the needed resources.” Our construct of dependency is based on those 2 factors. Table A-6 provides a list of the items used in the dependency measure.

Q-Sort

Prior to administering our survey, we first evaluated the survey items for reliability as prescribed by Rust and Cooil (1994), which presents guidelines for measuring the reliability of qualitative data through a “q-sort”. This is particularly important given the fact that several of

⁷ These are representative sources; there may be other sources.

our constructs were new and several of items that were based on previous constructs were reworded in order to meet our research requirement. In our initial q-sort, we asked 8 judges to read our preliminary list of 65 items and to categorize each item into 1 of 5 groups (constructs). Two of the eight judges were accounting professors who teach financial and managerial accounting. The remaining 6 judges were Ph.D. students in the accounting (2), management information systems (2), and operations management programs (2).

The first step of the q-sort analysis is to determine the “proportional agreement.” This is the total number of pair-wise agreements between judges across all 65 items divided by the total number of pair-wise comparisons. Next, we used the tables provided by Rust and Cooil (1994) in order to determine the proportional reduction in loss and obtained a value of 1.00, suggesting that the instrument items were reliable.

While this methodology does provide for an overall reliability of the measures based on inter-judge agreement, this methodology does not address any deviation of judgments from the predicted groupings. Therefore, we also examined each item in which there were more than 3 judges who did not place the item into the predicted category (12 out of 65). These 12 items were then examined and reworded to address the likely cause(s) for misclassification.

Initial Pilot Study

Initially our survey was administered electronically to one chapter of the Institute of Management Accountants (IMA) using the same sample frame and methodology used in the study presented here. An e-mail with a link to the survey was sent to each of the 185 members. Out of the 185 members, 20 (10.8%) participated in the survey. Of the 20 respondents, 8 worked

in an organization that is part of a supply chain⁸. We used the results of this initial pilot study to revise our survey items.

Survey Administration

The revised survey (Tables A1-A6) was administered to members of a regional IMA chapter. The survey items were presented to respondents via an online survey in which respondents were asked to rate their responses on a Likert-type scale ranging from 1 (strongly disagree) to 7 (strongly agree). The survey was administered via e-mail to 1833 individuals who are registered IMA members of North and South Carolina. Of the 1833 IMA members surveyed, 333 (18 %) of the emails were returned as undeliverable, rejected as spam, or were not immediately received because the e-mail recipient was out of the office. A total of 144 IMA members participated in the survey for an overall response rate of 8%. Of those that responded, 95 indicated that they did not fit our target respondent group of managerial accountants working within a supply chain⁹, which left 73 responses from our desired audience. Of the 73, we had 49 individuals complete the entire survey, giving us a final sample size of 49 for our analysis. This low response rate may have been due to several factors. First, the survey recipients were not targeted to those who were part of a supply chain; it was sent to all IMA members in the regional chapter. Second, previous studies (e.g. Cook et al. 2000, Sheehan and McMillan 1999, Dommeyer and Moriarty 2000, and Cobanoglu et al., 2001) have found that response rates for Internet-based surveys are usually lower than for equivalent mail surveys. Third, we only made 3 contacts to the respondents requesting participation in the survey. Dillman (2000) suggests that for surveys to receive a good response rate, five contacts should be made.

⁸ The remaining 12 indicated that the survey was not appropriate for their organization, That is they viewed their role as not being part of a supply chain.

⁹ This option was included in the survey and if exercised terminated the survey.

The average age of the 49 respondents was 46, and the gender breakdown is approximately 27% female and 73% male (9 respondents did not disclose their gender). Ninety percent of the respondents reported 4+ years of college. The firm types represented by the survey respondents include manufacturer (73%), distributor (13%), retailer (4%), and wholesaler (7%). Eighty percent of the respondents reported their firm had annual revenue > \$10 million.

DATA ANALYSIS

To test the research hypotheses, path analysis was used. The path analysis was conducted using the SAS Calis procedure, which is a maximum likelihood method of parameter estimation. The variables used in the path analysis were obtained by deriving principal component scores for each of the empirical constructs in our model using principal components analysis.¹⁰ In the cases where the empirical construct is a second order construct (i.e. absorptive capacity, electronic integration, and dependency), we obtain a second order component scores using principal components analysis where the inputs into the analysis are the previously derived first order principal component scores.

Path analysis using component scores is the most appropriate methodology due to the formative nature of our constructs (e.g. Chenhall and Morris 1986; Rai et al. 2006). Because our constructs are formative, there is no expectation that the items should have high internal reliability or consistency (Bollen 1984; Bollen and Lennox 1991). Therefore, the calculation of Cronbach's alpha for our constructs is not applicable in this study (Jarvis et al. 2003), and we focused the evaluation of our constructs on their content (face) validity. Nevertheless, Appendix A does include both composite reliability values and average variance extracted values for each construct.

¹⁰ Principal components analysis is a data reduction technique that is useful when trying to obtain a reduced number of variables in the form of scores or indexes to parsimoniously represent a much larger set of variables.

By adopting and adjusting constructs and items that have already been successfully implemented in previous research, many of our construct begin with content validity. Additional construct validity is provided though the q-sort process. Finally, our method of obtaining principle component scores for each of the constructs provides further support for construct validity because in general all of the items for each construct grouped together as predicted.

Measurement Validation

The first phase of our data analysis focused on the measurement properties of the constructs. We performed a principal components analysis on the second order constructs, with all of the first-order items as input. Appendix A, Tables A1-A6, provides the loadings of the principal components analysis for each of the six empirical constructs. In all cases, we used the principal components axis method and set the prior communality estimates to one, which are the options required in a principal components analysis (Hatcher 1994). When appropriate (in cases where there is more than 1 factor), we used oblique rotation. We selected oblique rotation over varimax¹¹ because it was our expectation, based on the literature from which our items were adapted, that the components would be correlated.

The number of components retained was based on the eigenvalue-greater-than-one criterion, where any components with an eigenvalue greater than 1.00 are retained (Sharma 1996). In interpreting the factor loadings, items were said to load on a component if the loading was greater than or equal to .50 (Sharma 1996). The loading of item components ranged from .55 to .97. Components were then named based on the items that loaded on it. In the cases where constructs and items were adopted from previous research, our items loaded as expected based

¹¹ Principal components analysis was also run with varimax on each of these components and the number of factors remained the same.

on the loading observed in the previous research. This result provides additional support for the validity of those constructs.

For our second order constructs of absorptive capacity, electronic integration, and dependency, we used SAS's Proc Factor program to first obtain a component score for each of the first order constructs as presented in Appendix A. These component scores are each a linear combination of only the items that were found to load on that component¹². Next, we conducted principal component analysis where the first order construct components scores were used as the measure of the first order construct in the formation of the second order construct. Based on the results of the principal components analysis (Appendix A), our survey items are linked to formative constructs as depicted in Figure 1. Our empirical model includes the following constructs:

1. Absorptive capacity (AC)
2. Electronic integration (EI)
3. Internal cost management (ICM)
4. Interorganizational cost management (IOCM)
5. Firm benefits (BEN)
6. Dependency (DEP)

Overall, our constructs were formed as predicted. The exceptions were as follows:

1. Absorptive capacity items that were expected to load separately as “working knowledge” and “knowledge seeking,” loaded together under one factor called knowledge.
2. Three items from internal cost management (ICM 3, ICM 5, and ICM 6 from Table A-4) were dropped because they did not load on either the IOCM or ICM.

¹² In addition to the method describe in the text, we also obtain component scores that were a linear combination of all of the items used to measure the AC construct which is referred to as a true component score according to Hatcher (1994). The component scores for both methods were very similar and did not affect any of our empirical findings.

3. The kaizen costing item of IOCM (Item IOCM 4 – Table A-3) was dropped because it did not load on either the IOCM or ICM.

The correlation among these constructs is presented in Table 2

[Insert Table 2 about here]

Structural Model

Path analysis with SAS's Proc Calis was used to assess the structural portion of the model. Goodness-of-fit measures were used to indicate an acceptable fit between the model and the data. Our model has a Goodness of Fit Index (GFI) of .945, a normed fit index (NFI) of .900, and a comparative fit index (CFI) of .958. Model fit is also assessed by a Chi-square test. Our model has a Chi-square value of 11.16 with 8 degrees of freedom and a p-value of .169. This value does not allow us to reject the null hypothesis that the proposed model is a good fit to the data. Taken together with each of our fit indices meeting or exceeding the desired level of .90 (Bentler and Bonnett 1980; Bentler 1989; Hatcher 1994), we conclude that our model provides a good fit to the data.

Results

Figure 3 shows the results of the path analysis. This figure presents standardized path coefficients for the model, the accompanying t-statistics, and a summary of the results of our hypotheses.

[Insert Figure 3 about here]

Hypothesis 1: In evaluating our initial hypothesis, we find that the use of cost management practices internally does not appear to be a precursor to the use of IOCM. This finding fails to support Hypothesis 1 using path analysis.

Hypothesis 2: Our second hypothesis, which predicts a positive relationship between absorptive capacity and IOCM, is supported with a standardized coefficient of .3006 and a t-statistic of 2.16. This supports our belief that firms with a strong external cost focus as exhibited by knowledge, communications, and trust engage in IOCM practices.

Hypothesis 3: Next, we find support for Hypothesis 3, which predicts a positive relationship between systems integration and internal cost management. This path has a standardized coefficient of .4604 and a t-stat of 3.54. This supports our expectation that a firm's level of internal cost management is dependent on the degree to which the firm's information systems are integrated.

Hypothesis 4: We did not find a significant relationship between electronic integration and IOCM. H4 is not supported by the path analysis.

Hypothesis 5: We did find support that the degree a firm's IT is integrated impacts the absorptive capacity of the firm. Thus hypothesis 5 is supported with a path coefficient of .3907 and a t-stat of 3.34. While EI consist of both internal and external integration, support for the hypothesis suggests that the external integration between the partners leads to greater trust and a more effective communication environment.

Hypothesis 6 and Hypothesis 7: Our final test of the hypotheses focuses on the impact of cost management practices on perceived firm benefits. Hypothesis 6, which predicts that high levels of ICM will lead to perceived benefits, is supported by a path coefficient of .2933 with a t-statistic of 2.34. Hypothesis 7, which predicts that high levels of IOCM will lead to perceived firm benefits, is also supported with a path coefficient of .4428 and a t-statistic of 3.40. Taken together, firms clearly perceive that they are benefiting from both intra-organizational and inter-organizational cost management.

Supplemental Analysis

With H1 and H4 not supported according to the path analysis results, we were interested in determining if the insignificance of the results could be due to a mediation effect or a moderation (interaction) effect.

ICM and IOCM

We hypothesized in H1 that IOCM is more likely in firms that emphasize internal cost management techniques. However, the results from the path analysis does not support this hypothesis (H1). To further explore the relationship between internal and IOCM, we first investigated a possible mediation effect. For mediation to occur, a series of steps must be met (Baron and Kenny (1986). The first step is that the independent variable must have a significant regression coefficient when the independent variable is regressed on the dependent variable. When the independent variable ICM is regressed on the dependent variable IOCM, the result is not significant (t-statistic of .790), implying that there is not another variable mediating the relationship between ICM and IOCM.

Next, we explored the possibility of an interaction among variables that could explain the lack of a relationship between IOCM and ICM. Several anomalous characteristics of the data suggested that an interaction effect may be present. First, the correlation between IOCM and ICM (.115 from Table 2) is positive, while the path model relationship (-.045 from Figure 3) is negative. Second, although the relationship between ICM and IOCM was found to be insignificant, both of these constructs *significantly* covary directly and positively with the EI construct, suggesting the IOCM and ICM should also covary. Both ICM and IOCM are also found to significantly covary with the dependency construct, although ICM is found to covary negatively with dependency while IOCM covaries positively. This suggests that IOCM and ICM

should negatively covary. Based on these observations, we conducted regression analysis to determine if an interaction existed among these variables (electronic integration, dependency, and ICM)¹³.

[Insert Table 3 about here]

The results in Table 3 show a three-way interaction effect between dependency, ICM, and electronic integration that the interaction is positively associated with IOCM. The results also show that electronic integration has a main effect on IOCM. All other interactions were insignificant. The main effect of EI was predicted in H4 and is not surprising because we expect that electronic integration would positively impact the use of IOCM. Similarly, it is expected that within the three-way interaction, EI still serves an enabler of IOCM.

Under this presumption, our three-way interaction can be simply assessed by examining the remaining variables of the interaction, dependency and ICM. In general, the results of this survey appear to capture an environmental relationship where firms that score high on the dependency construct tend to score low on the ICM construct (-.179 of Table 2 and -.2883 (-2.21) in Figure 3). This is the only inverse relationship that was observed among any of the variables. However, when the dependency construct is high and firms contrarily also have high ICM, the presence of electronic integration appears to lead to higher IOCM values (.359 (2.23) in Table 3). This assessment is also supported by the ICM *Dependency interaction value which has a high coefficient, but which may not be significant due to the sample size. In summary, this result can be interpreted to suggest that when partners have the capability to transfer information via relatively highly integrated electronic systems (i.e. high EI), firms are more likely to engage in IOCM practices when they unexpectedly are *both* highly dependent on their partners *and*

¹³ AC was not included because there was no predicted relationship of interaction between AC and ICM.

engaging in ICM practices. Thus our data does provide some limited evidence supporting H1, where ICM leads to IOCM (in the presence of high EI and high dependency).

Electronic Integration and IOCM

Because our path analysis failed to support our fourth hypothesis, we also performed exploratory analysis on the relationship between electronic integration and IOCM. Based on the path model presented in Figure 3, there are two possible constructs which could mediate the EI to IOCM relationship – 1) ICM or 2) AC. Since we already established that ICM does not have a direct relationship with IOCM, it cannot mediate the relationship between EI and IOCM. Therefore, we investigate AC as a potential mediating variable between the EI to IOCM constructs using the Baron and Kenny (1986) steps.

Table 4 provides the results of the regression analyses that were conducted. In the first step, AC is regressed on EI and the coefficient on EI (.4839) is significant $p=.0004$. In the second step, IOCM is regressed on EI and the coefficient on EI (.4200) is significant at $p=.027$. In the final step, IOCM is regressed on both EI and the potential mediator, AC. In the presence of AC, the coefficient on EI (.2104) becomes insignificant at $p=.1368$ while the coefficient on AC (.5349) is significant at $p<.001$. The insignificant coefficient of EI in step 3 supports the proposition that AC fully mediates the relationship between EI and IOCM, which can explain the lack of support for H4 in the path analysis.

[Insert Table 4 about here]

DISCUSSION

Overall, our results suggest that electronic systems integration, absorptive capacity, and internal cost management all play a role in determining interorganizational cost management practices in a firm, which in turn results in firm benefits.

Internal Cost Management (H1)

Although it seems intuitive that a firm emphasizing internal cost management practices could easily mature to engage in inter-firm cost management, the non-support of H1 demonstrates there are perhaps other factors that affect the relationship between ICM and IOCM. As demonstrated by our supplementary analysis, we found that the level of ICM may impact an organization's involvement in IOCM as moderated by the level of dependency between a firm and its partner firm and the extent of the electronic integration between the firms.

There are also alternative reasons that may explain the path analysis results. First, our measure of ICM only contains three items and may not fully capture the degree to which firms use cost management internally. Another potential cause for our findings is that in the partner relationship, it could be the partner whose use of ICM is driving the IOCM activities. If so, Coad and Cullen (2006) suggest that when firms have relative low ICM, using IOCM may result in the firm increasing its own ICM.

Absorptive Capacity (H2)

One result of our study which may be particularly of interest to practitioners is the role of a firm's absorptive capacity in influencing IOCM. Our study provides empirical support that absorptive capacity does indeed enable the interorganizational cost management capabilities of a firm. This suggests that the somewhat intangible factors of absorptive capacity such as employee knowledge, trust, and the communications climate between firms are important enablers of extending cost management practices beyond the walls of a single firm. By focusing on these intangible factors, managers can set the stage for IOCM.

Electronic Integration (H3, H4, H5)

The role of information technology infrastructure has long been recognized as an enabler of business capabilities (e.g. Broadbent et al. 1999). Our study provides further support of IT enabling even more business capabilities. We find that EI directly enables AC and ICM.

Although H4 was not supported in our main analysis, the supplemental analysis shows that EI indirectly enables interorganizational cost management via its impact on absorptive capacity and its role in moderating the relationship between ICM and internal cost management. We conclude that the presence of external electronic integration influences absorptive capacity by acting as an enabler of communication and knowledge sharing.

Benefits (H6 and H7)

The results of this research provide additional support for the importance of employing cost management practices both within the organization and beyond the boundaries of the organization. The benefits of interorganizational cost management range from operational cost-saving strategies to strategic benefits like new business opportunities and increased levels of product and service innovation.

LIMITATIONS AND FUTURE RESEARCH

A primary limitation of this research is the size of our sample (49). However, despite, the small sample size, we were able to find significant results and support the validity of our constructs through the use of principal components analysis. We plan on extending this research by collecting additional data from a national study of IMA members in order to continue testing our model. This extension will likely use a refined instrument, especially ICM, based on the findings of this study.

Another related limitation to this research is a low response rate. We have several strategies planned to increase the response rate of future survey respondents. First, with the potential assistance of IMA, the next survey will only be sent to those IMA members that represent our target sample. Second, we will also follow the methodology prescribed by Dillman (2000) to maximize response rate (i.e. up to 5 contacts). Finally, with the potential support of IMA, we feel that we can improve the overall response rate of future surveys.

While we fully expect to improve the sample size and response rate of our survey instrument, we recognize that one weakness of the survey methodology is that the nature of a cross-sectional survey makes interpreting the temporal nature of the constructs difficult. Nevertheless, our use of path analysis provides support for the direction of the predicted relationship.

A final limitation to our research is that data is collected about a supply chain *partnership* from only one of the partners. Future studies might measure responses from both partners which would allow the researcher to assess the *partnership* more accurately. This might be especially important when considering the impact of ICM on IOCM because the survey respondent in our study can likely only assess the ICM of his/her own firm.

The absorptive capacity aspect of cost management is a ripe area for future research in collaborative supply chains. The underlying constructs of absorptive capacity (communications climate (including trust), communications network, and knowledge) can be further explored in an interorganizational cost management context.

A final area for future research is to further explore the specific types of IT that support ICM and IOCM. Our research demonstrates that electronic integration in general is an indirect

antecedent (through absorptive capacity and internal cost management) to IOCM. Future research might explore the repertoire of interorganizational systems that best facilitate IOCM.

CONCLUDING REMARKS

Our study shows that an interorganizational absorptive capacity for cost management, as well as the electronic integration of firms, significantly contribute to IOCM. Furthermore, the use of IOCM practices by management accountants leads to positive firm benefits.

The most significant implications of this study can be applied to practice. We have provided empirical support that collaboration between firms to manage inter-organizational costs can result in tangible benefits for both firms. This can encourage more firms to participate in IOCM techniques. Our results can also be extended to practice by providing specific areas a firm can focus on if it wants to improve its IOCM capability. Specific examples include focusing on electronic integration between firms, improving the cost management knowledge of employees, developing the communications climate (e.g. trust) between firms, and increasing the amount of communications interactions, all of which can result in firm benefits that are both operational and strategic in nature.

From a theoretical perspective, our study provides a framework for understanding the drivers of IOCM, utilizing the theoretical construct of absorptive capacity and providing a concrete example / validation of the concept in a managerial accounting context.

This study provides support that interorganizational cost management leads to recognizable, tangible benefits for firms in today's highly competitive environment. The results provide empirical support in identifying and understanding the direct and indirect factors that impact interorganizational cost management.

REFERENCES

- Adler, J.H. 1965. *Absorptive Capacity: The Concept and its Determinants*. Brookings Institution, Washington.
- Andaleeb, S.S. 1995. Dependence relations and the moderating role of trust: Implications for behavioral intentions in marketing channels. *International Journal of Research in Marketing* 12: 157-172.
- Baron, R.M., and D.A. Kenny. 1986. The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology* 51(6): 1173-1182.
- Barua, A., P. Konana, and A. Whinston. 2004. An empirical investigation of net-enabled business value. *MIS Quarterly* 28(4): 585-620.
- Bentler, P.M. 1989. *EQS structural equations program manual*. Los Angeles: BMDP Statistical Software.
- Bentler, P.M., and D.G. Bonnet. 1980. Significance tests and goodness-of-fit in the analysis of covariance structures. *Psychological Bulletin* 88: 588-606.
- Berry, T., and A. Ahmed. 1997. The consequences of inter-firm supply chains for management accounting. *Management Accounting: Magazine for Chartered Management Accountants* 75(10): 74-75.
- Bollen, K. 1984. Multiple indicators: Internal consistency or no necessary relationship? *Quality and Quantity* 18(4): 377-385.
- Bollen, K. and R. Lennox. 1991. Conventional wisdom on measurement: A structural equation perspective. *Psychological Bulletin*, 110: 305-314.
- Broadbent, M., P. Weill, and D. St. Clair. 1999. The implications of information technology infrastructure for business process redesign. *MIS Quarterly*, 23(2): 159-182.
- Brown, S.A. 1997. Knowledge, communication, and progressive use of information technology. Ph.D. Dissertation. University of Minnesota.
- Chenhall, R.H. and D. Morris. 1986. The impact of structure, environment, and interdependence on the perceived usefulness of management accounting systems. *The Accounting Review* 61(1): 16-35.
- Coad, A. F., and J. Cullen. 2006. Inter-organisational cost management: Towards an evolutionary perspective. *Management Accounting Research*, In-Press.

- Cobanoglu, C., Warde, B. and Moreo, P.J. 2001. A comparison of mail, fax and web-based survey methods. *International Journal of Market Research*. 43(4):441-452.
- Cohen, W.M., and D.A. Levinthal. 1990. Absorptive Capacity: A New Perspective on Learning and Innovation. *Administrative Science Quarterly* 35: 128-152.
- Cook, C., Heath, F., and Thompson, R. (2000). A Meta-Analysis of Response Rates in Web- or Internet-Based Surveys. *Educational and Psychological Measurement*, 60:6, 821-836.
- Cooper, R. 1988. The Rise of Activity-Based Costing -- Part One: What is an Activity-Based Cost System? *Journal of Cost Management* 2(2): 45-54.
- Cooper, R. 1996. The changing practice of management accounting. *Management Accounting: Magazine for Chartered Management Accountants* 74(3): 26-33.
- Cooper, R., and R. Slagmulder. 1997. *Target Costing and Value Engineering*, Productivity Press, Portland, OR.
- Cooper, R., and R. Slagmulder. 1998a. The scope of strategic cost management. *Management Accounting (USA)* 79(8): 16-17.
- Cooper, R., and R. Slagmulder 1998b. The scope of strategic cost management. *Management Accounting (USA)* 79(9): 18-19.
- Cooper, R., and Slagmulder, R. 1999. Supply chain management for lean enterprises: interorganizational cost management, *Strategic Finance* 80(10): 15-16.
- Cooper, R., and R. Slagmulder. 2004. Interorganizational cost management and relational context. *Accounting, Organization, and Society* 29: 1-26.
- Craighead, C.W., and R.L. LaForge. 2003. Taxonomy of information technology adoption patterns in manufacturing firms. *International Journal of Production Research* 41(11): 2431-2449.
- Cullen, J., A.J. Berry, W. Seal, A. Dunlop, M. Ahmed, and J. Marson,. 1999. Interfirm supply chains: The contribution of management accounting. *Management Accounting*, June: 30-32.
- Dekker, H. 2003. Value chain analysis in interfirm relationships: A field study. *Management Accounting Research*, 14: 1-23.
- Dekker, H., and A.R. Van Goor. 2000. Supply chain management and management accounting: A case study of activity-based costing. *International Journal of Logistics, Research and Applications*, 3(1): 41-52.

- Dillman, D.A. 2000. *Mail and Internet Surveys: The Tailored Design Method, 2nd Edition*. New York: John Wiley and Sons.
- Dommeier, C.J. and Moriarty, E. 2000. Comparing two forms of an e-mail survey: embedded vs. attached. *International Journal of Market Research*, 42 (1):39-50.
- Donelan, J.G., and E.A. Kaplan. 1998. Value chain analysis: A strategic approach to cost management. *Journal of Cost Management*, March/April: 7-15.
- Dyer, J. 1997. Effective interfirm collaboration: How firm's minimize transaction costs and maximize transaction value. *Strategic Management Journal*, 18(7): 535-556.
- Ellram, L, and G. Zsidisin. 2002. Factors that drive purchasing and supply management's use of information technology. *IEEE Transactions on Engineering Management*, 49(3): 269-281.
- Eisenhardt, K.M., and J.A. Martin. 2000. Dynamic capabilities: What are they? *Strategic Management Journal* 21: 1105-1121.
- Eisenhardt, K.M. and C.B. Schoonhoven. 1996. Resource-based view of strategic alliance formation: Strategic and social effects in entrepreneurial firms. *Organization Science*, 7 (2): 136-150.
- Evans, H., and G. Ashworth, G. 1996. Exploiting activity-based information: Easy as ABC? *Management Accounting: Magazine for Chartered Management Accountants*, 74(7): 24-29.
- Fornell, C. and Larcker, D. 1981. Evaluating Structural Equation Models With Unobservable Variables and Measurement Error. *Journal of Marketing Research* 18 (February): 39-50.
- Frazier, G.L. 1983. Interorganizational exchange behavior: A broadened perspective. *Journal of Marketing*, 47: 68-78.
- Frazier, G., J. Gill, and S. Kale. 1989. Dealer dependence levels and reciprocal actions in a channel of distribution in a developing country. *Journal of Marketing*, 53: 50-69.
- Griffin, A., and J. Hauser. 1996. Integrating R&D and marketing: A review and analysis of the literature. *Journal of Product Innovation Management*, 13(3): 191-215.
- Guiding, C., K. Cravens, and M. Tayles. 2000. An international comparison of strategic management accounting practices. *Management Accounting Research* 11: 113-135.
- Handfield, R.B., and E.L. Nichols. 1999. *Introduction to Supply Chain Management*. Prentice-Hall, Upper Saddle River, N.J.

- Hartung, V., and A. MacPherson. 2000. Innovation and collaboration in the geographic information systems (GIS) industry: Evidence from Canada and the United States. *R&D Management*, 30(3): 225-234.
- Hatcher, L. 1994. *A Step-by-Step Approach to Using SAS for Factor Analysis and Structural Equation Modeling*. SAS Institute: Cary, NC.
- Hergert, M., and D. Morris. 1989. Accounting data for value chain analysis. *Strategic Management Journal* 10: 175-188.
- Jarvis, C.B., MacKenzie, S.B., and Podsakoff, P.M. 2003. A Critical Review of Construct Indicators and Measurement Model Misspecification in Marketing and Consumer Research, *Journal of Consumer Research* 30: 199-218.
- Kale, S. H. 1986. Dealer perceptions of manufacturer power and influence strategies in a developing country. *Journal of Marketing Research* 23: 387-393.
- Kaplan, R.S. and Cooper, R. 1998. The promise—and peril—of integrated cost systems. *Harvard Business Review* Jul-Aug 76(4):109-119.
- Kelle, P. and A. Akbulut. 2005. The role of ERP tools in supply chain information sharing, cooperation, and cost optimization. *International Journal of Production Economics* 93-94: (1): 41-52.
- Kulmala, H, J. Paranko, and E. Uusi-Rauva. 2002. The role of cost management in network relationships. *International Journal of Production Economics* 79: 33-43.
- Lamming, R. 1993. *Beyond Partnership: Strategies for Innovation and Lean Supply*. Prentice Hall: New York.
- LaLonde, B., and T. Pohlen. 1996. Issues in supply chain costing, *The International Journal of Logistics Management* 7(1): 1-12.
- Malhotra, A., S. Gosain, and O.A. El Sawy. 2005. Absorptive capacity configurations in supply chains: Gearing for partner-enabled market knowledge creation. *MIS Quarterly*, 29(1): 145-187.
- Marchand, D., W. Kettinger, and J. Rollins. 2001. *Information Orientation: The Link to Business Performance*. Oxford University Press: Oxford.
- Marquez, A.C., C. Bianchi, and J.N.D.Gupta. 2004. Operational and financial effectiveness of e-collaboration tools in supply chain integration. *European Journal of Operational Research* 159: 348-363.
- Mentzer, J. T., S. Min and Z G. Zacharia. 2000. The nature of interfirm partnering in supply chain management. *Journal of Retailing*, 76(4): 549-568.

- Mentzer, J. T., W. DeWhitt, J. S. Keebler, S. Min, N. W. Nix, C. D. Smith, and Z. G. Zacharia. 2001. Defining supply chain management. *Journal of Business Logistics*. 22(2): 1-25.
- Mitra, S. and A.K. Chaya. 1996. Analyzing cost-effectiveness of organizations: The impact of information technology. *Journal of Management Information Systems*, 39(2): 29-57.
- Monden, Y. 1995. *Cost reduction systems: Target costing and kaizen costing*. Productivity Press, Portland, OR.
- Monden, Y., and K. Hamada, K. 1991. Target costing and kaizen costing in Japanese automobile companies. *Journal of Management Accounting Research* Fall: 16-34.
- Monden, Y. and M. Sakurai. 1989. *Japanese Management Accounting: A World Class Approach to Profit Management*. Cambridge, MA, Productivity Press.
- Morrow, M., and G. Ashworth 1994. An evolving framework for activity-based approaches. *Management Accounting: Magazine for Management Accountants*, 17(2): 32-36.
- Moscove, S.A., Simkin, M.G., and Baganoff, N.A. (1999). *Core Concepts of Accounting Information Systems*, Sixth Edition, New York, John Wiley and Sons.
- Mouritsen, J., A. Hansen, C. Hansen. 2001. Inter-organizational controls and organizational competencies: episodes around target cost management/functional analysis and open book accounting. *Management Accounting Research* 12: 221-244.
- Peterson, K.J., R. B. Handfield, and G.L. Ragatz. 2005. Supplier integration into new product development: coordinating product, process, and supply chain design. *Journal of Operations Management*, 23: 371-388.
- Poston, R., and S. Grabski. 2001. Financial impacts of enterprise resource planning implementations. *International Journal of Accounting Information Systems* 2: 271-294.
- Porter, M. 1985. *Competitive advantage: Creating and Sustaining Superior Performance* The Free Press, New York.
- Primo, M. and S. Amundson. 2002. An exploratory study of the effects of supplier relationships on new product development outcomes. *Journal of Operations Management* 20(1): 33-52.
- Putnam, L, and G. Cheney. 1985. Organizational communication: Historical development and future directions, in T.W. Benson (editor), *Speech Communication in the 20th Century*. Southern Illinois Press, Carbondale, IL.
- Rai, A., R. Patnayakuni, and N. Seth. 2006. Firm performance impacts of digitally enabled supply chain integration capabilities. *MIS Quarterly* 30(2): 225-246.

- Ramos, M. 2004. Interaction between management accounting and supply chain management. *Supply Chain Management: An International Journal*, 9(2): 134-138.
- Rust, R.T., and Cooil, B. 1994. Reliability measures for qualitative data: Theory and implications. *Journal of Marketing Research* 31(1): 217-224.
- Sakurai, M. 1996. *Integrated Cost Management*. Productivity Press, Portland, OR.
- Shank, J.K. 1989. Strategic cost management: New wine, or just new bottles. *Journal of Management Accounting Research*, 1: 47-65.
- Shank, J.K. and V. Govindarajan. 1992. Strategic cost management: The value chain perspective. *Journal of Management Accounting Research*, 4: 177-197.
- Shank, J.K. and V. Govindarajan. 1993. *Strategic Cost Management*. The Free Press, New York.
- Sharma, S. 1996. *Applied Multivariate Techniques*. New York: Wiley.
- Sheehan, K. and McMillan, S. (1999). Response Variation in E-Mail Surveys: An Exploration. *Journal of Advertising Research*, 45-54.
- Short, J.E. and N. Venkatraman. 1992. Beyond business process redesign: Redefining Baxter's business network. *Sloan Management Review*, 33: 7-20.
- Simchi-Levi, D., P. Kaminsky, and E. Simchi-Levi. 2003. *Designing and Managing the Supply Chain, 2nd Edition*, McGraw-Hill, New York.
- Soh, C., and M. Markus. 1995. How IT creates business value: A process theory synthesis. *Proc. 16th International Conference Information Systems*, Amsterdam, The Netherlands, 29-41.
- Stenzel, C., and J. Stenzel. 2003. *Essentials of Cost Management*. Hoboken, N.J: John Wiley and Sons.
- Stevens, G. 1989. Integrating the supply chain. *International Journal of Physical Distribution and Materials Management*, 19(8): 3-8.
- Stuart, I. and D. McCutcheon. 2000. The manager's guide to supply chain management. *Business Horizons*, 43(2): 35-44.
- Tomkins, C. 2001. Interdependencies, trust and information in relationships, alliances and networks. *Accounting, Organizations, and Society* 26(2): 161-191.

- Tu, Q., M.A. Vonderembse, T.S. Ragu-Nathan, and T.W. Sharkey. 2005. Absorptive capacity: Enhancing the assimilation of time-based manufacturing practices. *Journal of Operations Management* (in-press).
- Venkatraman, N., 1994. IT-enabled business transformation: From automation to business scope redefinition." *Sloan Management Review* 35: 73-87.
- Vickery, S. K., J. Jayaram, C. Droge, and R. Calatone. 2003. The effects of an integrative supply chain strategy on customer service and financial performance: An analysis of direct versus indirect relationships. *Journal of Operations Management* 21(5): 523.
- Yu, Z., H. Yan, and T.C. Cheng. 2001. Benefits of information sharing with supply chain partnerships. *Industrial Management & Data Systems* 101(3): 114-119.
- Zahra, S.A., and G. George 2002. Absorptive capacity: A review, reconceptualization, and extension. *Academy of Management Review*, 27(2): 185-203.

TABLES

Table 1: Summary of Interorganizational Cost Management Practices

Technique	Interorganizational Context	Example Studies
Target Costing	Active involvement by the focal firm's and partner firm's design team in the joint identification, management, and resolution of cost issues	Cooper and Slagmulder, 2004
Kaizen Costing	Use of Kaizen (continuous) costing to identify and set cost reduction objectives for suppliers	Cooper and Slagmulder, 1998
Open Book Accounting	Partners within a supply chain opening up their internal accounting information to each other to support active collaboration and partnership	Berry and Ahmed, 1996; Mouritsen et al. 2001
Information Sharing	Identification of specific types of information and organizational processes that can facilitate interorganizational cost management	Kulmala et al., 2002; Malhotra et al, 2005

Table 2: Correlation between Constructs

	EI	AC	DEP	IOCM	ICM	BEN
EI	1					
AC	0.484	1				
DEP	0.236	0.487	1			
IOCM	0.42	0.535	0.416	1		
ICM	0.392	0.157	-0.179	0.115	1	
BEN	0.45	0.324	0.158	0.536	0.405	1

Key:

EI	Electronic Integration
AC	Absorptive Capacity
DEP	Dependency
IOCM	Interorganizational Cost Management
ICM	Internal Cost Management
BEN	Benefits

TABLE 3: Relationship between ICM and IOCM

Dependent Variable: IOCM		
Intercept	Coefficient	-.0177
	standard error	.1415
	t-stat	-.13
	p-value	.9007
ICM	Coefficient	-.0038
	standard error	.1708
	t-stat	-.02
	p-value	.9823
EI	Coefficient	.313*
	standard error	.146
	t-stat	2.14
	p-value	.0382
Dependency	Coefficient	.2008
	standard error	.1480
	t-stat	1.36
	p-value	.1823
ICM* EI	Coefficient	.1287
	standard error	.1186
	t-stat	1.09
	p-value	.2841
ICM * Dependency	Coefficient	.3230
	standard error	.2377
	t-stat	1.36
	p-value	.1817
EI * Dependency	Coefficient	-.2211
	standard error	.1363
	t-stat	-1.62
	p-value	.1125
ICM * EI * Dependency	Coefficient	.359*
	standard error	.161
	t-stat	2.23
	p-value	.0316

Table 4: Absorptive Capacity as a Mediating Variable (Baron and Kenny 1986)

Step	Path	Coefficient	Standard Error	t-stat	p-value
1. The coefficient on the independent variable (EI) must be significant when the mediator variable (AC) when regressed on the independent variable	EI to AC	0.4839	0.1276	3.79	0.0004 ***
2. The coefficient of the independent variable (EI) must be significant when regressed dependent variable (IOCM) is regressed on the independent variable	EI to IOCM	.4200	.1323	3.17	.0027**
3. the coefficient of independent variable must become insignificant when the dependent variable (IOCM) is regressed on both the mediator (AC) and the independent variable (EI)	EI AC to IOCM				
EI		.2104	.1389	1.51	.1368
AC		.5349	.1232	4.34	<.0001 ***

** p < .01

*** p < .001

FIGURES

Figure 1: Research Model

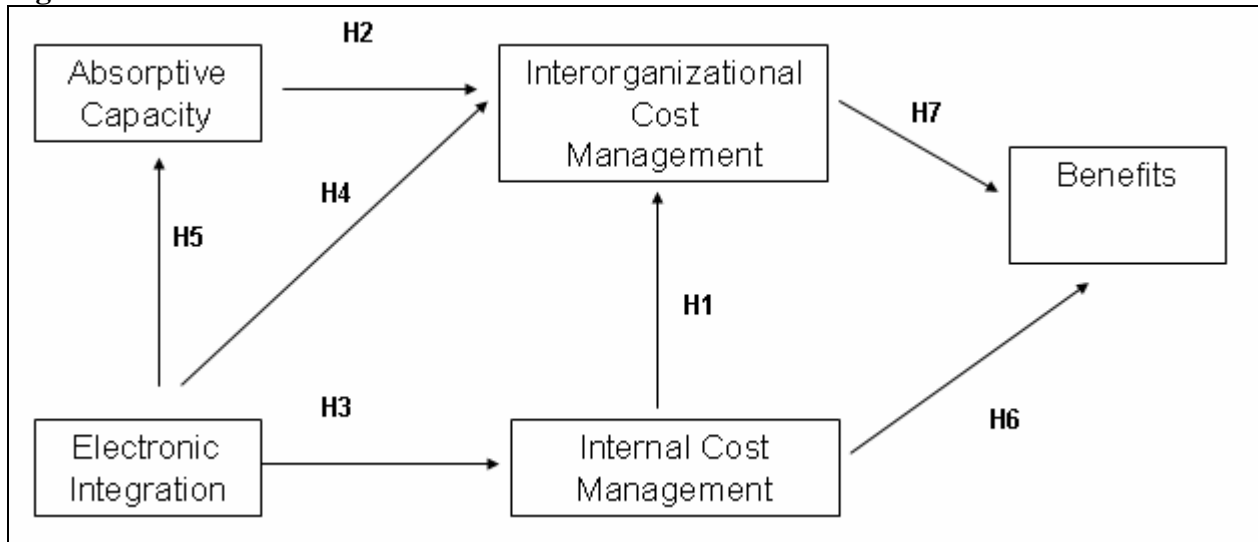


Figure 2: Hierarchical Characterization of Research Constructs

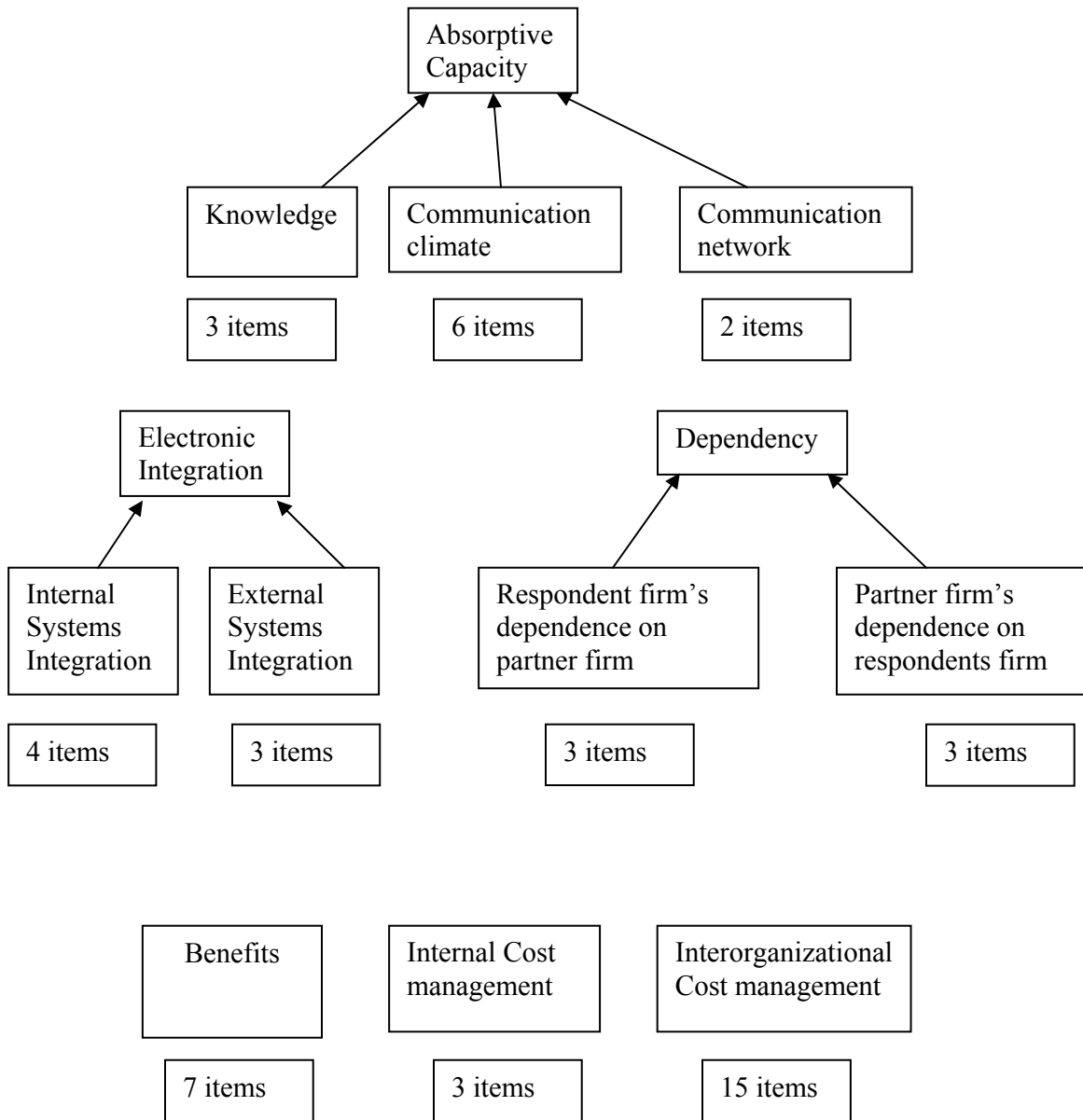
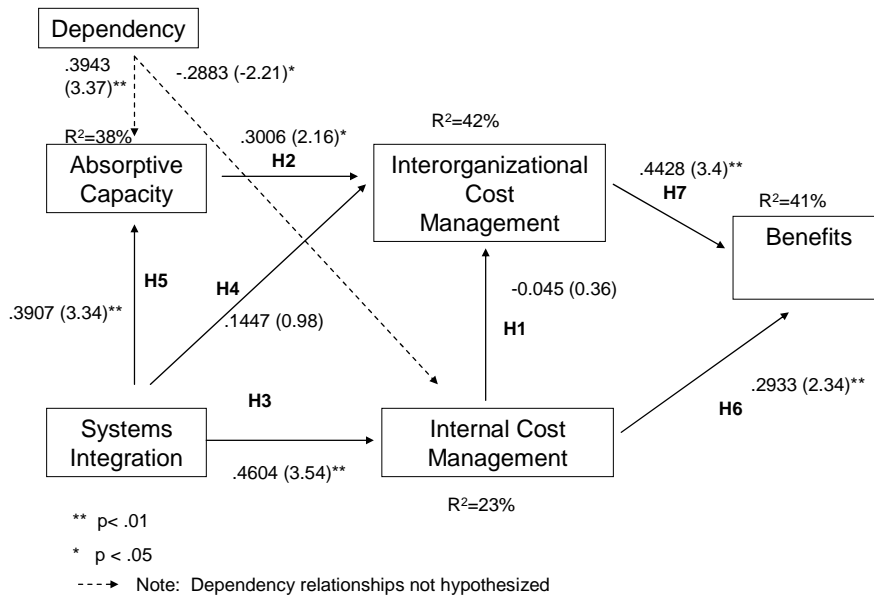


Figure 3: Results of Path Analysis



	Hypothesis	Path coefficients	t-statistic	Support
H1	ICM to IOCM	-0.0450	0.36	NO*
H2	AC TO IOCM	0.3018	2.16	YES
H3	EI TO ICM	0.4604	3.54	YES
H4	EI TO IOCM	0.1428	0.98	NO*
H5	EI TO AC	0.3907	3.34	YES
H6	ICM TO BEN	0.2965	2.34	YES
H7	IOCM TO BEN	0.4458	3.40	YES

Key:

- EI Electronic Integration
- AC Absorptive Capacity
- DEP Dependency
- IOCM Interorganizational Cost Management
- ICM Internal Cost Management
- BEN Benefits

Appendix A: Summary Analysis of the Measurement Model: Factor Structure^a, Composite Reliability^b, and Average Variance Extracted^c

Tables A-1 – A-6 provide the results of the principal components analysis for the constructs in the research model and also include the composite reliability and average variance extracted calculations for the constructs.

Overall, our constructs were formed as predicted with the following exceptions:

1. Absorptive capacity items that were expected to load separately as “working knowledge” and “knowledge seeking,” loaded together under one factor called knowledge (Table A-1).
2. Three items from internal cost management (ICM 3, ICM 5, and ICM 6 from Table A-5) were dropped because they did not load on either IOCM or ICM.
3. The kaizen costing item of IOCM (Item IOCM 4 – Table A-4) was dropped because it did not load on either IOCM or ICM.

Notes for Tables A-1-- A-6:

- a. Rotated factor solution is based on principal component analysis with an oblique (oblimin) rotation. All loadings above .50 are kept.
- b. Internal consistency was measured by calculating the composite reliability as proposed by Fornell and Larcker (1981) using the formula:

$$\text{Composite reliability} = (\sum L_i)^2 / ((\sum L_i)^2 + \sum \text{Var}(E_i))$$

where

L_i = the standardized factor loadings for the factor

$\text{Var}(E_i)$ = the error variance associated with the individual indicator variables.

- c. Average variance extracted (AVE) is calculated using the formula:

$$\text{AVE} = \sum L_i^2 / (\sum L_i^2 + \sum \text{Var}(E_i))$$

where

L_i = the standardized factor loadings for the factor

$\text{Var}(E_i)$ = the error variance associated with the individual indicator variables.

- d. Item was dropped because it did not meet the cut-off criteria of .50.

Table A-1. Absorptive Capacity

Latent Construct	Variable	Absorptive Capacity	Origin of Items in Scale	Factor Structure and Loadings		
				Communications Climate	Knowledge	Communications Network
Working Knowledge	KN-1	Our firm's employees are knowledgeable about the characteristics of operational costs in our firm.	Tu et al. 2005	0.0024	0.7495	0.2496
Knowledge Scanning	KN-2	Our firm's employees seek to learn from cost information to improve our business activities.	Tu et al. 2005	-0.0753	0.9170	-0.0761
Knowledge Scanning	KN-3	Our firm's employees seek to learn from benchmarking the best cost management practices in our industry.	Tu et al. 2005	0.0345	0.7203	-0.3749
Communications Network	CN-1	The communications between our firm and our partner firm are FREQUENT.	Tu et al. 2005	0.0952	0.0183	0.8675
Communications Network	CN-2	The communications between our firm and our partner firm are EXTENSIVE.	Tu et al. 2005	-0.0556	-0.0957	0.9049
Communications Climate	CC-1	The employees in our firm and in our partner firm tend to trust each other.	Tu et al. 2005	0.8883	-0.1070	-0.0398
Communications Climate	CC-2	Our firm and our partner firm have a very open communications environment.	Tu et al. 2005	0.8611	-0.1058	0.1126
Communications Climate	CC-3	The employees in our firm and our partner firm are willing to SHARE ideas freely with each other.	Tu et al. 2005	0.6229	0.2802	0.3524
Communications Climate	CC-4	The employees in our firm and our partner firm are willing to ACCEPT new ideas from each other.	Tu et al. 2005	0.6961	0.2925	0.2591
Communications Climate	CC-5	Our firm is confident that our partner firm can maintain commitments without constant reminders or monitoring.	Stuart and McCutcheon, 2000	0.7461	0.0806	-0.0946
Communications Climate	CC-6	The employees in our firm and our partner firm both deal with each other fairly.	Dyer, 1997	0.9271	-0.1317	-0.1318
		Average Variance Extracted		63.66%	64.05%	78.57%
		Composite Reliability		0.9112	0.8408	0.8799

Table A-2. Electronic Integration

Variable	Electronic Integration	Origin of Items in Scale	Factor Structure and Loadings	
			Internal Electronic Integration	External Electronic Integration
IEI-1	Our firm's information systems allow continuous monitoring of order status at various stages in the process (e.g. manufacturing, shipping)	Barua et al. 2004	0.7841	0.1515
IEI-2	Data can be shared easily among various internal systems (e.g. forecasting, production, manufacturing, shipment, finance, accounting, etc.)	Barua et al. 2004	0.8827	0.0622
IEI-3	Order changes are automatically reflected in downstream processes or systems (e.g. inventory, manufacturing resource planning, and manufacturing systems.)	Barua et al. 2004	0.8948	-0.1792
IEI-4	Employees are able to retrieve information from various databases for decision support (e.g. cost information, reporting tools.)	Barua et al. 2004	0.7338	0.1882
E EI-1	Our systems can easily transmit, integrate, and process data from suppliers and/or customers.	Barua et al. 2004	-0.0939	0.8809
E EI-2	Our firm's operational systems can easily be connected to our partner firm's operational systems, allowing data to be shared easily between firms.	New	0.0806	0.8629
E EI-3	Our firm and our partner firm have the technical systems to facilitate information exchange across firm boundaries.	New	0.1389	0.8298
Average Variance Extracted			68.32%	73.63%
Composite Reliability			0.8955	0.8933

Table A-3. Benefits

Variable	Due to our firm's interorganizational cost management practices with our partner firm:	Reference	Factor Structure and Loadings
BEN -1	... our firm has been able to reduce costs associated with day-to-day purchasing or sales transactions.	Barua et al., 2004; Poston Grabski 2001; Mitra and Chaya 1996	0.7618
BEN -2	... our firm has been able to reduce costs through the streamlining of inter-firm processes.	Ramos 2004	0.7554
BEN -3	... our firm has been able to reduce costs through reducing uncertainty about market information.	Barua 2004;	0.8349
BEN -4	... our firm has been able to decrease response time to market changes.	Hartung and MacPherson, 2000	0.7648
BEN -5	... our firm has been able to identify new business opportunities.	Hartung and MacPherson, 2000;	0.6348
BEN -6	... our firm's market share growth has increased.	Marchand, Kettinger, and Rollins, 2001	0.8669
BEN -7	... our firm's financial performance has increased.	Marchand, Kettinger, and Rollins, 2001	0.8280
BEN -8	... our firm has improved our level of product and service innovation.	Marchand, Kettinger, and Rollins, 2001	0.7423
Average Variance Extracted			60.30%
Composite Reliability			0.9234

Table A-4. Interorganizational Cost Management

			Factor Structure and Loadings
Variable	Interorganizational Cost Management	Origin of Items in Scale	IOCM
IOCM-1	Together, our firm and our partner firm engage in processes to create joint sales forecasts and/or order forecasts.	Marquez et al. 2004	0.7308
IOCM-2	Together, our firm and our partner firm engage in joint target costing processes.	Cooper and Slagmulder, 2004; Ramos 2004	0.7227
IOCM-3	Together, our firm and our partner firm engage in the process of "functionality-price-quality trade-offs" analysis to resolve cost problems.	Cooper and Slagmulder, 2004; Ramos 2004	0.5547
IOCM-4	Together, our firm and our partner firm engage in concurrent and continuous cost management processes such as Kaizen.	Cooper and Slagmulder, 1998b	
IOCM-5	Our firm engages in inter-organizational cost investigation techniques when our partner cannot meet target cost objectives.	Cooper and Slagmulder, 2004	0.6251
IOCM-6	Together, our firm and our partner firm have established processes for placing employees at the other firm's location.	Cooper and Slagmulder, 2004	0.5497
IOCM-7	Together, our firm and our partner firm have established processes for sharing common assets or for placing assets at the other firm's location.	Dekker 2003	0.7463
IOCM-8	Together, our firm and our partner firm have established processes for fostering and developing inter-organizational collaboration.	Cooper and Slagmulder, 2004,	0.7703
IOCM-9	Together, our firm and our partner firm have established processes to manage and control inventory levels.	Simchi-Levi et al., 2003	0.7500
IOCM-10	Together, our firm and our partner firm have established automated processes for order entry, shipping, and/or billing.	Simchi-Levi et al., 2003; Barua et al., 2004; Mitra and Chaya 1996; Poston and Grabski, 2001	0.5587
IOCM-11	Together, our firm and our partner firm engage in open book accounting.	Berry and Ahmed, 1996	0.6479
IOCM-12	Together, our firm and our partner firm have established a process for sharing information on future plans such as long-term production plans, capital investments, and capacity utilization plans.	Malhotra et al. 2005	0.7619
IOCM-13	Together, our firm and our partner firm have established a process for sharing information on market demand trends and forecasts.	Malhotra et al. 2005	0.7058
IOCM-14	Information sharing processes that have been established between our firm and our partner firm is very relevant and timely to both our firms' business needs.	Malhotra et al. 2005	0.7953
IOCM-15	Information sharing processes that have been established between our firm and our partner firm include the exchange of proprietary and/or confidential information.	Malhotra et al. 2005	0.5500
IOCM-16	Information sharing processes that have been established between our firm and our partner firm allow for the exchange of information that is not available from other sources.	Malhotra et al. 2005	0.6119
	Average Variance Extracted		45.93%
	Composite Reliability		0.9261

Table A-5. Internal Cost Management

Variable	Interorganizational Cost Management	Origin of Items in Scale	Factor Structure and Loading	
			Internal CM	
ICM-1	When making business decisions, the senior management in our firm relies on cost system information.	Stenzel and Stenzel, 2003	0.7929	
ICM-2	Our firm uses our cost system to help realign resources when our business priorities change.	Stenzel and Stenzel, 2003	0.8533	
ICM-3	Our firm's cost system regularly warns us when unhealthy financial thresholds are approaching. ^d	Stenzel and Stenzel, 2003		
ICM-4	Our firm uses our cost system to hold individuals and groups accountable for reasonable performance standards.	Stenzel and Stenzel, 2003	0.8586	
ICM-5	Our firm uses an activity-based cost system. ^d	Stenzel and Stenzel, 2003		
ICM-6	When trading with our partner firm, standard market prices (e.g. published prices) are used. ^d	New		
Average Variance Extracted			69.80%	
Composite Reliability			0.8738	

Table A-6. Dependency

Variable	Dependency	Reference	Factor Structure and Loadings	
			Partner Dependent On Respondent (PDOR)	Respondent Dependent On Partner (RDOP)
RDOP-1	Our firm is heavily dependent on the partner firm that was considered for this survey.	Andaleeb, 1995	0.9294	-0.0931
RDOP-2	It would be difficult for our firm to replace the partner firm considered for this survey.	Andaleeb, 1995	0.7658	0.1177
RDOP-3	Our firm can easily switch from the partner firm considered in this survey to another partner.	Andaleeb, 1995	0.7707	-0.0022
PDOR-1	The partner firm that was considered for this survey is heavily dependent on our firm.	Andaleeb, 1995	0.3443	0.5807
PDOR-2	It would be difficult for the partner firm considered in this survey to replace our firm.	Andaleeb, 1995	0.2342	0.7707
PDOR-3	The partner considered in this survey can easily switch from our firm to another firm.	Andaleeb, 1995	0.2054	0.7863
Average Variance Extracted			68.14%	51.65%
Composite Reliability			0.8642	0.7591