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Relationships Among Supply Chain Management, Strategic Alliances, and Organizational Performance with Implications for the Construction Industry

DISSERTATION

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By

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Lynn University

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Relationships Among Supply Chain Management, Strategic Alliances, and Organizational Performance with Implications for the Construction Industry

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APPROVAL OF DISSERTATION

Relationships Among Supply Chain Management, Strategic Alliances, and Organizational Performance with Implications for the Construction Industry

By Hai-ping Chang

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ABSTRACT

The purposes of this non-experimental, mixed method, predominantly quantitative, descriptive, comparative (exploratory), and correlational (explanatory and predictive) study are to examine the relationships among supply chain management, strategic alliances, and organizational performance with an emphasis on the construction industry, to investigate whether establishing strategic alliances assists the execution of supply chain management and further enhances organizational performance including competitive advantages for achieving success and benefits of the alliance, and to examine whether alliance manager characteristics, organizational characteristics, and dimensions of alliance influence the success of the alliance by testing six hypotheses. Sources of literature used and data searches are based on the ProQuest database in the Lynn University Library.

Purposive, simple random approach, and snowball sampling plans were designed to obtain a sample of 3,434 construction alliance managers who were engaged in strategic alliances under supply chain management in US-based contractor companies from the *Engineering News Record (ENR)* and the *Blue Book of Building and Construction*—resulting in a valid sample of 150 responses. All scales in this study were examined for reliability and construct validity. Four scales in this study were modified after exploratory factor analysis (EFA). Independent *t*-tests and ANOVA were used to answer the three exploratory research questions. Hierarchical (enter) linear regression analyses tested the six explanatory hypotheses.

Findings indicated that (a) *attributes of the alliance* (trust & coordination and commitment from the most/least successful alliance), *communication behavior*

(information quality from the most successful alliance, information sharing, information participation, and proprietary information sharing), *conflict resolution techniques* (avoidance & constructive and destructive), and *commodity/supplier selection process* explained a range of 65.1% to 80.7% of the variation in the *success of the alliance (total score)*; (b) alliance manager characteristics (education level), organizational characteristics (alliance training programs), *attributes of the alliance* (trust & coordination, commitment from the least/most successful alliance), *communication behavior* (information quality from the most successful alliance, information sharing, information participation, and proprietary information sharing), *conflict resolution techniques* (avoidance & constructive and destructive), and *commodity/supplier selection process* explained a range of 62.8% to 65.8% of the variation in the *success of the alliance (total score)*; (c) Content validity, construct validity, convergent validity, and internal consistency reliability of the new *organizational performance* scale were established; and (d) alliance training programs have a positive influence on *attributes of alliance*, *commodity/supplier selection process*, *dimensions of alliances (total score)*, *satisfaction with the alliance* based on past success, *internal-business-process perspective performance*, and *success of the alliance (total score)*. Future research can explore the relationships among conflict management, strategic alliances, and organizational performance in different industries or countries, and further focus on the effects of negotiation methods and cultural sensitivity on strategic alliances in terms of organizational performance.

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CHAPTER I

INTRODUCTION TO THE STUDY

Introduction and Background to the Problems

Construction is a large, diverse, and fast-growing sector, accounting for approximately 5 % of non-farm payroll employment and 12 % of self-employment in the United States (Simonson, 2005). According to Gross Domestic Product (GDP) statistics by industry released by the Bureau of Economic Analysis (2008), four industry groups (i.e., finance and insurance, construction, real estate and rental and leasing, and mining) did account for the slowing down of the American economic growth in 2007 (http://www.bea.gov/scb/). Cheng, Li, Love, and Irani (2001) have indicated that traditional operation in construction has been criticized for stagnant improvement, because involved parties remained self-sufficient and simply fulfilled the contracts (p. 63). Compared with a 0.6 % decline in 2006, the growth rate in the construction industry declined 12.1 % in 2007 (BEA, 2008). Cost of construction material increased at an annual rate of 19 percent in the first five months in 2008 which was faster than a 17 percent surge in 2004 (Haughey, 2008). In addition to the economy slowing down, soaring oil prices in 2005-2007 also threaten inflation and unemployment in United States and other countries (CIA, 2008). This study identified four problems regarding establishing strategic supplier alliances in the context of the construction industry of the USA-based contractor companies.

The interrelationship among main contractors, subcontractors, and suppliers

The first issue is the interrelationship among main contractors, subcontractors, and suppliers. Supply chain management (SCM) has evolved from manufacturing and

marketing operations to a critical strategic initiative (Gowen & Talion, 2003). Vrijhoef and Koskela (1999) found that the main contractors purchase more labor and material than ever before (Introduction section, ¶ 3, p. 134). In the Dutch construction industry, the proportion of the main contractors to the total national turnover had decreased to 24% in 1994 (Vrijhoef & Koskela, 1999). In other words, suppliers and subcontractors represented about 75% turnover and it is expected to be more hereafter (p. 134). As a result, main contractors have become more and more reliant on other members in the construction supply chain (Vrijhoef & Koskela, 1999, Introduction section, ¶ 4, p. 134).

SCM has also shifted its role from an emphasis on passive cost control to a proactive role in achieving sustainable competitiveness and profitability (Tracey, Lim, & Vonderembse, 2005, p. 179). More and more researchers have emphasized particularly on the "inter-organizational relationships between purchasing organizations and their independent suppliers" (Monczka, Petersen, Handfield, & Ragatz, 1998, p. 553). Gulati (1995), Mohr and Spekman (1994), and Monczka et al. (1998) found that a closer relationship between buyers and suppliers may offer many technical, financial, internal design competencies, and strategic advantages over spot market transactions and vertical integration. It is necessary for contractors to revise their supply strategies and trading relations with subcontractors and suppliers (Vrijhoef & Koskela, 1999).

Bullwhip Effect

The second problem is that most literature on supply chains has addressed logistical issues and information distortion among members of a supply chain (i.e., manufacturers, distributors, wholesalers, and retailers)—a phenomenon named "the bullwhip effect." However, the construction industry is dominated by "one-off projects"

(Ngowi, 2001). Therefore, there are some waste and problems caused by "myopic control" that hinders the application of SCM to construction.

Vrijhoef and Koskela (1999) compared the development of SCM issues, defined by Lin and Shaw in 1998, to the actual practice of construction. These included: (1) order information transparency often finds that the placing of a subcontract or material order is delayed due to price negotiations, (2) a need for reduction of variability because it is usual to have a change in orders from the client, the design team or the main contractor, (3) synchronization of material flows: materials are produced in an order suitable for the supplying factory and delivered to the site in a mode minimizing the transportation costs, (4) management of critical resources: in traditional design-bid-build procurement in construction, where the parties are selected based on price, it is difficult to identify critical resources of the supply chain in advance, and (5) configuration of the supply chain-each project configures a new supply chain, so the continuous and long-term improvement of the supply chain is not in doubt.

Few empirical studies about construction strategic alliances

In response to practical issues in the construction industry when implementing supply chain management, some scholars suggest forming strategic alliances and further enhancing organizational performance. However, the third problem is that there is no study about assessing organizational performance when implementing a strategic alliance in the construction supply chain. Much research has indicated that top managers have recognized that building effective supply chains offers an opportunity to create sustainable competitive advantages (Cooper et al., 1997; Higginson & Alam, 1997; Tracey, Lim, & Vonderembse, 2005). Supply chains integrate complex relationships

between key business processes, from original suppliers to customers, and leverage strategic alliances to deliver value to stakeholders (Lambert, Cooper, & Pagh, 1998; Chan, Qi, Chan, Lau, & Ip, 2003). The need for an integrated network puts an increasingly important emphasis on buyer-supplier relationships as a potential source for efficiency gains, as well as for competitive advantage through strategic alliance arrangements (Narasimhan & Carter 1998; Trent & Monczka 1998; Zaheer, McEvily, & Perrone 1998). Strategic alliances enable buying and supplying firms to combine their individual strengths and work together to reduce nonvalue-adding activities and facilitate improved performance (Whipple & Frankel, 2000).

Brouthers, Brouthers, and Wilkinson (1995) and Whipple and Frankel (2000) explained that these arrangements are often necessary in today's global environment because companies lack the resources (e.g., skills, technology, capital, market access) to achieve sustainable competitive advantages on their own. The advantages are sustainable because success requires the merging of diverse and sometimes conflicting groups within the organization and between organizations to achieve common goals (Tracey, Lim, & Vonderembse, 2005) and develop a "win-win" relationship (Whipple & Frankel, 2000). *Alliances* offer the means to obtain the benefits of vertical integration without the investment in physical and human resources associated with actual ownership (Whipple & Frankel, 2000). Therefore, Schary (1998), Taylor (2004), and Maku, Collins, and Beruvides (2005) concluded that the new competition is between supply chains, forcing companies to constantly seek alliances that create offerings to customers beyond their capabilities. This contributes to the performance of the organization.

High Failure Rate

The fourth problem is high failure rate. Although there are many significant advantages in establishing strategic alliances, Day in 1995 indicated that the failure rate is 70% in joint ventures because of failing to reach expectations of the partners or being terminated (Whipple & Frankel, 2000, p. 22). Much research indicated that only one fifth maintain alliances in the United States (Whipple & Frankel, 2000, p. 22). Why are the benefits of strategic alliances large, but the success rates low? Smith and Barclay (1997) and Whipple and Frankel (2000) articulated that firms recognize there is a need to implement alliances; however, they do not comprehend how to maintain relationships with alliance partners. Whipple and Frankel (2000) reported that it is difficult for many managers in strategic alliances to transform their rivals into a long-term relationship partners, and it is also difficult to adapt their mind-set, culture, and behavior (p. 22).

Based on Mohr and Spekman's (1994) supplier alliance research model, Monczka, Petersen, Handfield, and Ragatz (1998) found several attributes of strategic supplier alliances associated with partnership success: (1) trust and coordination, (2) interdependence, (3) information quality and participation, (4) information sharing, (5) joint problem solving, (6) avoiding conflict resolution strategy, and (7) a formal process of supplier/commodity alliance selection (p. 553). Monczka et al. (1998) also asserted two poor predictors of alliance success, and they are resource commitment and smoothing over problems (p. 553). However, Monczka et al.'s (1998) population setting focuses on the Global Procurement and Supply Chain Benchmarking Initiative (GEBN) member companies, and that of Mohr and Spekman (1994) concentrates on a computer dealer and one manufacturer (supplier).

It appears that establishing strategic alliances assists the execution of supply chain management, and revises the supply strategies and trading relations among the main contractors, subcontractors, and suppliers. In order to enhance organizational performance including sustainable competitive advantages for achieving success of the alliance in today's global environment, dimensions of alliance are the variables that may be regarded as the crucial factors to influence the implementation of strategic alliances efficiently.

Purposes

The topic area of the relationships among supply chain management, strategic alliances, and organizational performance with implications for the construction industry was selected because "actual practice in construction not only fails to address issues of supply chain, but rather follows principles that make supply chain performance worse" (Vrijhoef & Koskela, 1999, p. 144). The problem area in this study is about utilizing strategic alliances in construction supply chain management to overcome previous existent issues (i.e. bullwhip effect). Therefore, the goal of this research is to gain a better understanding of what factors contribute to the success of alliances. In addition, the problem relates to several disciplines, such as cost accounting, management, logistics, and information management.

The overall purposes of this non-experimental, mixed method, predominantly quantitative, descriptive, comparative (exploratory), and correlational (explanatory and predictive) study are to examine the relationships among supply chain management, strategic alliances, and organizational performance with an emphasis on the construction industry, to investigate whether establishing strategic alliances assists the execution of

supply chain management and further enhances organizational performance including competitive advantages for achieving success and benefits of the alliance, and to examine whether the alliance manager characteristics, organizational characteristics, and dimensions of alliance influence the success of the alliance by testing six hypotheses.

Definitions of Terms

The Main Contractors in the Construction Industry

Theoretical Definition

The construction industry is classified into three main segments: (1) building construction contractors, sometimes referred to as general contractors, who build "residential, industrial, commercial, and other buildings;" (2) heavy and civil engineering construction contractors who build "sewers, roads, highways, bridges, tunnels, and other projects;" (3) specialty trade contractors who carry out specialized activities, including carpentry, painting, plumbing, and electrical work" (BLS, 2008). Construction usually is coordinated by general contractors, who specialize in one type of building construction and must take full responsibility for the entire job, excluding specified portions of the work omitted from the general contract (BLS, 2008). In general, general contractors may do a portion of the work and subcontract most of the work to heavy construction or specialty trade contractors within the supply chain (BLS, 2008). On the contrary, specialty trade contractors perform the work depending on only one or more closely related ones without taking any responsibility for a whole structure (BLS, 2008).

Operational Definition

The newly-revised 2007 North American Industrial Classification System (NAICS) using a six-digit code to classify construction of building into two groups: (a)

residential building construction; and (b) nonresidential building construction, including industrial building construction, and commercial and institutional building construction (NAICS, 2007). In this study, the main contractor was considered to be any general contractors under the supply chain management network who establish strategic supplier alliances (or supply chain alliances) from the *Engineering News Record (ENR)* and the the *Blue Book of Building and Construction* member listing in the United States (See Appendix D, Part 1, Filter Questions).

Alliance Managers' Characteristics

Theoretical Definition

In order to utilize organizational resources more efficiently and effectively, organizations typically hire three types of managers (i.e., first-line, middle, and top managers) who are grouped into departments on the basis of their specific job responsibilities (Jones, George, & Hill, 2000), such as marketing managers, manufacturing managers, or alliance managers.

Operational Definition

In this study, the questionnaire, the *Alliances Manager Profiles* developed by the researcher is comprised as an eight-item, self-report checklist to predict how a person might behave in the work setting and understand relationships between alliance managers (or procurement teams) and how they implement alliances to achieve success of the alliance. Items include gender, age, level of education, race, ethnicity, job tenure, job title, yearly income (See Appendix D, Part 2).

Organizational Characteristics

Theoretical Definition

Organizational characteristics are defined to identify, distinguish, or describe organizations (Hsieh, 2007). Many previous studies have revealed that organizational characteristics have the impact on the implementation and adoption of management technologies, such as firm size, ownership, year in operation, sales volume, labor union membership (Laosirihongthong, 2006, p. 730), have the effect on funding sources, such as governance, managerial systems, commercial income, and racial diversity (Stone, Hager, & Griffin, 2001), and on the motivation and performance of selling, such as the culture of the organization and compensation systems (Jaap & Willem, 1993). Yuen and Kee (1993) defined organizational size as the number of persons employed in a firm and established that it can affect personnel policies and practices partly because size has been related to formalization and bureaucratization and partly because large companies have economies of scale.

Operational Definition

In this study, the *Organizational Characteristics Profile* developed by the researcher was used to measure organizational characteristics through a ten-item checklist and fill-in-the-blank formats, including organization name, the most and least successful alliance, number of employees (i.e., organizational size), number of offices in the United States and other countries, region of total revenue (i.e., annual sales in dollars), location (i.e., number of offices in the United States and other countries, region of the United States, and type of location area), new contract, alliance training program(s) (See Appendix D, Part 3).

Dimension of the Alliances (Success Factors)

Theoretical Definition

A strategic alliance is defined as a formal agreement to supply goods or services, as well as to jointly expand knowledge, develop applications and commercialize new products, with rights of co-ownership (Cante, Calluzzo, Schwartz, & Schwartz, 2004) and further to obtain external resources and flexibility and to mitigate environmental uncertainty with extra investments (Sakaguchi et al., 2004). The primary purpose in strategic alliances agreement is to achieve a competitive advantage for each participating company (i.e., partner) through productivity, quality improvements, and significant innovation (Cante et al., 2004).

Operational Definition

A number of individual case studies identify some of the critical attributes associated with strategic alliances, including the existence of trust, co-location, asset specificity, information sharing, and other conflict management factors (Monczka, Petersen, Hanfield, & Ragatz, 1998). In this study, the questionnaire utilizes four major dimensions of the alliance from the *Modified Supplier Alliance Model* (Monczka et al., 1998) to be predictors of success. Five multi-item independent variables were used, and these constructs include (1) trust and coordination, (2) interdependence, (3) commitment, (4) information quality and participation, and (5) information sharing (p. 561).

Among these four areas of alliance dimensions, items related to attributes of the alliance include: (a) commitment, (b) trust and coordination, and (c) independence; items related to communication behavior comprise: (a) quality and participation, and (b) information sharing; five single-item independent variables were used to measure conflict

resolution approaches, containing (a) joint problem solving, (b) persuasive attempts, (c) smoothing over, (d) harsh words, and (e) outside arbitration; items about commodity/supplier selection process include: (a) supplier assessment, and (b) purchase item selection (Monczka et al., 1998). (See Appendix D, Part 5-8).

Success of the Alliance

(Organizational Performance including Competitive Advantages)

Theoretical Definition

The *balanced scorecard* provides the multiple strategic measures from four perspectives (i.e., financial, customer, internal business processes, and learning and growth) and permits a balance between short-term and long-term objectives, and between desired outcomes and the drivers of *organizational performance* (Kaplan & Norton, 1996b; Kaplan & Norton, 1996a; Kaplan & Norton, 2001a). Jones, George, and Hill (2000) defined *competitive advantage* as "the ability of one organization to outperform other organizations because it produces desired goods or services more efficiently and effectively than its competitors" (p. 24).

Operational Definition

Based on Mohr and Spekman's (1994) supplier alliance research model, Monczka, Petersen, Handfield, and Ragatz (1998) concluded five main objectives in forming strategic supplier alliances, including "(1) leverage purchase volume and control total cost (price); (2) improve purchased material quality (quality); (3) gain better access to new product or process technologies (technology); (4) reduce time-to-market (NPD Time); and (5) reduce order cycle times (cycle time)" (p. 561). In fact, those five key

objectives coincided with some measuring items to assess organizational performance in the Kaplan and Norton's (1996c) *Balanced Scorecard.*

In this study, the *Alliance Performance Scale*, the closed-ended questionnaire consisted of 16 items with 7-point Likert-type scales. It was developed by the researcher in generating data from alliance supervisors, managers or procurement specialists of the organization about values and beliefs which relate to not only organizational conditions of implementing alliance, but also the perspective of individual respondents in an effort to strategically enhance the long-term performance and success of the alliance of their company through measuring financial and non-financial perceptions (See Appendix D, Part 9). Simultaneously, Mohr and Spekman (1994) declared that "relationship longevity" may not decide partnership success even though success of strategic alliance might be regarded as "a function of continuation" (p. 136). Therefore, the study employees Monczka et al.'s (1998) three types of modified measures developed by Mohr and Spekman (1994) to assess partnership success which were classified into two indicators—the objective indicator (a set of goals or performance) from the belief and perception about strategic partnerships and the affective indicator (satisfaction) depending on the extent to which the partnership accomplishes the performance expectations (See Appendix D, Part 4).

Assumptions

This study will be built upon the following assumptions:

1. The relationship between alliance manager characteristics (age, gender, ethnicity, level of education, race, ethnicity, job tenure, job title, and yearly income) and dimensions of alliances (attributes of the alliance, communication

behavior, conflict resolution techniques, and commodity/supplier selection process) in the construction industry is important because alliance managers play the leading role in deciding whether it is a need for the main contractor companies to build strategic alliances.

2. The relationship between organizational characteristics (organization name, the most and least successful alliance, number of employees, number of offices in the United States and other countries, region of United States, type of location area, total revenue, new contract, and alliance training programs) and dimensions of alliances (attributes of the alliance, communication behavior, conflict resolution techniques, and commodity/supplier selection process) in the construction industry is important because organizational characteristics may contribute to the execution of strategic alliances.
3. The relationship between dimensions of alliances (attributes of the alliance, communication behavior, conflict resolution techniques, and commodity/supplier selection process) and success of the alliance in the construction industry is critical, partly because a strategic alliance involves not only payments from purchasing organizations in exchange for their suppliers' product or services, but also their suppliers' capabilities and systems, and partly because this cooperation relationship will keep until both parties perceive not obtaining values or mutual benefits (Monczka et al., 1998).
4. The relationships among alliance manager characteristics, organizational characteristics, dimensions of alliance are further significant explanatory variables to influence success of the alliance in the construction industry.

Justification of the Study

Over the past decade, supply chain management (SCM) has received an increased amount of attention from a wide range of audience and different industries around the world. Organizations and academic scholars have believed that SCM has the association with cost savings and service improvement and it is well established that SCM capabilities or logistics capabilities affects organizational performance (Tracey et al., 2005; Lunch et al., 2000). Inevitably, numerous literature on supply chains has addressed logistical issues and information distortion among members of a supply chain—a phenomenon named "the bullwhip effect."

In contrast with repetitive products in manufacturing, the outputs of construction industry vary in their own design and diverse production processes, leading to difficulty in identifying the involved steps (Matthews, Pellew, Phua, & Rowlinson, 2000, Subcontracting section, ¶ 1). Specifically, the construction industry is dominated by "one-off projects" (Ngowi, 2001). Therefore, there are some waste and problems caused by "myopic control" that hinders the application of SCM to construction.

The critical problem of applying SCM in the construction industry causing poor performance (Vrijhoef & Koskela, 1999; Matthews et al., 2000; Kanji &Wong, 1998; Cheng et al., 2001), the strengths (cost saving, service improvement, asset utilization to achieve differentiation; integrating business functions and processes with key members for competitive advantage; communication) and weaknesses in the application of SCM in industries (CSCMP, 2007; Lambert et al., 1998; Chan et al., 2003; Stephens, 2001; Huan et al., 2004), and factors affecting the effectiveness of SCM (Croxton et al., 2001; Huan et al., 2004) are well established in the literature of this study.

It is worth noting that most of the researchers engaged in SCM merely focus on business process reengineering and integration without specifying the processes (Croxton et al., 2001). An SCM theory, the global supply chain forum (GSCF) model by GSCF members in 1994 and the supply chain operation reference (SCOR) model by the SCC in 1997 are conceptual models with little empirical validity supported, as the GSCF model lacks adequate performance metrics (Croxton et al., 2001; Lambert et al., 2005; Tracey et al., 2005) and clear guidelines (Croxton et al., 2001), and the SCOR model employs various metrics at different levels (Huan et al., 2004). As a result, empirical evidence that captures how to measure performance when implementing SCM in practice is relatively scarce and even unknown.

Nobbs in 1993 stated that the contribution proportion of subcontractors to the total construction process is 90 percent of the total value in a construction project (as cited in Matthews et al., 2000, Subcontracting section, ¶ 2) while the main contractors found it necessary to work more closely and develop more intimate relationships with their subcontractors for the sake of better performance in meeting customer needs (Matthews et al., 2000, Introduction section, ¶ 3). In the meanwhile some scholars such as Krippaehen et al. in 1992, Flanagan et al. 1998, Gunasekaran (1999), Barlow et al. (1997), and Holt et al. (2000) suggested forming alliances of construction partners (Cheng et al., 2001; Matthews et al., 2000; Kanji & Wong, 1998). Further, Holt et al. (2000) proposed two kinds of construction alliances: collaborative strategic alliance and co-operative strategic alliance. Hence, Cheng et al. (2001) concluded a common premise of both construction alliances that inter-organizational relationships make it easy to exchange resources and to solve problems or conflicts in organizations (2001, p. 63).

Current peer reviewed and scholarly literature has discussed the advantages of establishing strategic alliances (such as achieving competitive advantage, expanding knowledge, developing applications, commercializing new products, obtaining external resources and flexibility, mitigating uncertainty without investments) (Whipple & Frankel, 2000; Cante et al., 2004; Sakaguchi et al., 2004), the high failure rate (Whipple & Frankel, 2000), and successful factors in strategic alliances (Monczka et al., 1998). Most studies have focused on its large benefits but low success rates and further explored the successful factors in strategic alliances for maintaining long-term relationships (Whipple & Frankel, 2002; Cante et al., 2004; Monczka et al., 1998). However, there is no study about assessing performance when implementing strategic alliances in the construction supply chain.

In addition, several studies have demonstrated a relationship between strategic alliance and supply chain management (Monczka et al., 1998) and partner characteristics (Sakar et al., 2001) to influence organizational performance; however, very few studies were found to verify the relationship between supply chain management and strategic alliance in the construction industry, and no studies were found to examine the successful factors of supply chain alliance in construction industry or in many countries. Ngowi (2001) noticed the private benefits in construction alliance in Botswana, and Hendricks and Singhal (2005) found the negative relationship between supply chain glitches and operating performance in the stock market.

Based on Mohr and Spekman's (1994) supplier alliance research model, Monczka, Petersen, Handfield, and Ragatz (1998) concluded several attributes of strategic supplier alliances associated with partnership success. Monczka et al. (1998) also asserted two

poor predictors of alliance success. However, Monczka et al.'s (1998) population setting focuses on GEBN member companies, and that of Mohr and Spekman (1994) concentrates on a computer dealer and one manufacturer (supplier).

In order to respond to those gaps discussed above, this study attempts to examine the relationships among supply chain management, strategic alliances, and organizational performance with an emphasis on the construction industry, and to investigate whether establishing strategic alliances assists the execution of supply chain management and further enhances organizational performance including competitive advantages for achieving success of the alliance. Moreover, this study also answers the impact of the characteristics of alliance managers and organizations on dimensions of alliance and then the success of the alliance by testing six hypotheses. Therefore, this study is justified on the basis of its significance, feasibility, and researchability.

Delimitations and Scope

This study has the following delimitations.

1. The geographic setting included will be limited to the United States.
2. This study will be restricted to organizations related to the general contractor under the supply chain management who establish strategic alliances. Thus, other types of construction companies, such as building construction engineering contractors, heavy construction, construction special trade contractors, and related services are excluded. The average annual revenue reported by respondents must be $100 million.

3. The target population will consist of an alliance executive/manager, chief executive officer, chief operating officer, or procurement professionals who are in charge of strategic alliances in the main construction industry.
4. Participants will be at least 18 years old or older and were able to read, write, and speak English.
5. Participants must be willing to participate in this study and complete the questionnaire thoroughly.

Organization of the Study

Chapter I provides an introduction and background to the study about several practical issues related to applying SCM the construction industry that leads the main contractors to seek a more beneficial way to achieve sustainable competitiveness and profitability through establishing strategic alliances. The specific purposes of this explanatory (correlational), mixed method design were included. Definitions of terms for this study were theoretically and operationally defined, and delimitations and scope of the study were identified as well. The study was justified on the basis of its significance, researchability, and feasibility.

Chapter II presents the literature review on supply chain management (SCM), strategic alliances, organizational performance, including competitive advantages with an emphasis on the construction industry. Theoretical framework, research questions, and research hypotheses identified for this study about the impact of characteristics of alliance managers and organizations on the dimensions of alliances and success of alliances are provided.

Chapter III describes the research design, population, sampling plan, and instrumentation. The methods of data analysis and evaluation are also explained. Chapter IV will present the results of the study to answers the research questions and tests of the hypotheses. Finally, Chapter V will provide the discussion of the study, including a summary and interpretations, implications, conclusions, limitations, and recommendations for future studies.

CHAPTER II

LITERATURE REVIEW, THEORETICAL FRAMEWORK, RESEARCH QUESTIONS, AND HYPOTHESES

Introduction

Review of the Literature

Construction Industry

In contrast with repetitive products in manufacturing, the outputs of construction industry vary in their design and diverse production processes, leading to difficulty in identifying the involved steps (Matthews, Pellew, Phua, & Rowlinson, 2000, Subcontracting section, ¶ 1). However, an analogy between the construction and manufacturing industries is that construction employs a wide range of suppliers, subcontractors, and consultants (Matthews et al., 2000, Subcontracting section, ¶ 1). The generic configuration of supply chain in the construction industry may become: "owner (i.e. client) —consultants —main contractor —subcontractors —suppliers" (Kanji & Wong, 1998, p. S135). The owner generates a demand for investing in a building project, and employs the consultants (i.e. architects and engineers) to design the project; the main contractor is selected by tendering to construct the project depending on the design, and then will employ many subcontractors (some subcontractors may be nominated by the client) to fulfill the construction work; suppliers will provide the necessary materials either to the main contractor who will hand on them to the subcontractors or to the involved subcontractors directly (Kanji & Wong, 1998, p. S135).

From the standpoint of subcontractors, Nobbs in 1993 stated that the contribution proportion of subcontractors to the total construction process is 90 percent of the total value in a construction project (as cited in Matthews et al., 2000, Subcontracting section, ¶ 2). From the perspective of the main contractors, they found it necessary to work more closely and develop a more intimate relationship with their subcontractors for the sake of better performance in meeting customer needs (Matthews et al., 2000, Introduction section, ¶ 3). Vrijhoef and Koskela (1999) found that the main contractors purchase more labor and material than ever before (Introduction section, ¶ 3, p. 134). In the Dutch construction industry, the proportion of the main contractors to the total national turnover had decreased to 24% in 1994 (Vrijhoef & Koskela, 1999, p. 134). In other words, suppliers and subcontractors represented about 75% turnover and it is expected to be more hereafter (Vrijhoef & Koskela, 1999, p. 134). As a result, main contractors have become more and more reliant on suppliers and subcontractors in the construction supply chain (Vrijhoef & Koskela, 1999, Introduction section, ¶ 4, p. 134). After the main contractors have realized the potential for cost savings associated with subcontractors, Matthews, Tyler, and Thorpe (1996) observed that some issues have arisen, including unfair contract conditions, subcontract auctioning, and other onerous practices. Matthews et al. (2000) indicated that many subcontractors do not have essential expertise to satisfy their clients with desired work (Subcontracting section, ¶ 2). Further, Jamieson, Thorpe, and Tyler in 1996 believed that the increase of using subcontractors will lead to more construction modes using organizational relationships (as cited in Matthews et al., 2000, Subcontracting section, ¶ 2).

There have been various criticisms of the "poor performance on quality, cost, safety and speed" in the construction industry because the owner set the goal of minimizing costs while the contractor and the rest of the parties pursue the profits as their goal (Kanji & Wong, 1998, p. S135). According to Himes (1995) and Kanji and Wong (1998), a confrontational relationship has been inherent among their goals. The likelihood that the owner's goal is not met occurs frequently because the faster the service providers perform, the sloppier workmanship the owner receives (Kanji & Wong, 1998, p. S135). Kanji and Wong (1998) attributed this to two reasons (p. S133). First, the construction industry comprises various parties which perform different parts of the whole project, and the poor performance of one of them will influence the next party (Kanji & Wong, 1998, Introduction section, p. S133). Second, undue modification of the detail in designing a project will affect the construction process, and therefore it is difficult to pledge quality performance (Kanji & Wong, 1998, Introduction section, p. S133). In addition, Cheng, Li, Love, and Irani (2001) indicated that traditional operation in construction has been criticized for stagnant improvement because involved parties remained self-sufficient and fulfilled the contracts to minimum specifications (p. 63).

In addition, there are some problems caused by "myopic control" that hinders the application of SCM to construction (Vrijhoef & Koskela, 1999, Role of supply chain management in construction section, p. 143). Vrijhoef and Koskela (1999) compared the development of SCM issues, defined by Lin and Shaw in 1998, to the actual practice of construction. These included: (1) order information transparency often finds that the placing of a subcontract or material order is delayed due to price negotiations, (2) a need for reduction of variability because it is usual to have a change in orders from the client,

the design team or the main contractor, (3) synchronization of material flows-materials are produced in an order suitable for the supplying factory and delivered to the site in a mode minimizing the transportation costs, (4) management of critical resources: in traditional design-bid-build procurement in construction, where the parties are selected based on price, it is difficult to identify critical resources of the supply chain in advance, and (5) configuration of the supply chain-each project configures a new supply chain, so the continuous and long-term improvement of the supply chain is not in doubt (p. 143).

Krippaehne, McCullouch, and Vanegas (1992) suggested initially that there is a need to form alliances within construction parties for "vertical integration". "Builders merchants" (i.e. suppliers in UK) are the nexus in the construction supply chain and that "partnering" could improve the supply chain and lower costs (Agapious, Flanagan, Norman, & Notman, 1998; Matthews et al., 2000). Under supply chain management (SCM) as long as the involved parties in the construction industry build better partnering relationships, the whole supply chain will work as a single unit easily (Kanji & Wong, 1998, p. S135). In addition, Gunasekaran (1999) suggested that alliances are effective strategies while organizations attempt to improve the production process. The terms "alliance" and "partnering" have been used interchangeably in the construction industry (Cheng, Li, Love, & Irani, 2001, p.63). Furthermore, Barlow, Cohen, Jashapara, and Simpson (1997) indicated that the terms "project partnering" and "strategic partnering" have been accepted individually by researchers. Holt, Love, and Li (2000) proposed that there are two kinds of alliance in the construction industry: collaborative strategic alliance and co-operative strategic alliance, and Cheng et al. (2000, p. 63) found that the

distinction between those two alliances relies on the short term (a single project) or the long term (more than one project).

Collaborative strategic alliances, which transform contractual relationships into "a cohesive project team," are established by "two or more" parties for the benefit of short-term project and for achieving a set of goals (Cheng et al., 2001, p. 63). Since inter-organizational objectives of each party may not be compatible and projects of the construction industry are one-off mode, it is not easy to develop mutual trust and commitment (Cheng et al., 2001, p. 63). Conversely, cooperative strategic alliances refer to long-term relationships between "at least two" companies for achieving a competitive advantage (Cheng et al., 2001, p. 63). Currie (2000) manifested that organizations are stimulated to form alliances by three forces: globalization, deregulation, and consolidation. Ketelholm (1993) reported that competitive advantages can be created by the co-operative alliances, and he further found that co-operation facilitates organizations to obtain lower costs as long as possible, only if they maintain trust in employees internally, and in network members externally. Hence, Cheng et al. (2001) concluded a common premise of both construction alliances that inter-organizational relationships make it easy to exchange resources and to solve problems or conflicts in organizations (2001, p. 63).

Supply Chain Management

Supply Chain Management (SCM) is "an integrating function with primary responsibility for linking major business functions and business processes within and across companies into a cohesive and high-performing business model" (CSCMP, 2007, Supply Chain Management – Boundaries & Relationships section, ¶ 1). SCM has

evolved as "a critical strategic initiative with roots from manufacturing and marketing operations" (Maku, Collins, & Beruvides, 2005, p. 26). With the assumption that "products are available when needed" (EC-Council, 2002), supply chains integrate "complex relationships between key business processes, from original suppliers to customers, and leverage strategic alliances to deliver value to stakeholders" (Lambert, Cooper, & Pagh, 1998; Chan, Qi, Chan, Lau, & Ip, 2003). The supply chain is "not just a chain of businesses with one-to-one, business-to-business relationships, but a network of multiple businesses and relationships" (Lambert, Cooper, & Pagh, 1998, Introduction section, ¶ 2). According to the CSCMP (2007, Definition of Supply Chain Management section, ¶ 1),

> Supply chain management encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all Logistics Management activities. It also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third-party service providers, and customers. In essence, SCM integrates supply and demand management within and across companies (Definition of Supply Chain Management section, ¶ 1).

Based on a review of literature, five main frameworks of SCM were identified. There are five models in supply chain management; however, the GSCM and the SCOR models seemed to be most widely used. Therefore, this review of literature emphasizes discussing these two main models and then summarizing the other three models later.

Historical Development of Supply Chain Management

In 1994, Robins, and Barratt and Oliveira in 2001, indicated that "the first initiative of supply chain integration could be dated back to 1992, when 14 trade association sponsors created a group named Efficient Consumer Response (ECR) Movement" (as cited in Chan, Oi, Chan, Lau, & Ip, 2003, p. 636). "Three years later, five companies, the Benchmarking Partners, Warner-Lambert, Wal-Mart Stores, SAP, and Manaugistics, worked on the collaborative planning, forecasting, and replenishment (CPFR) project" (Chan et al., 2003). "CPFR attempted to bring organizations (retailers and manufacturers) together to make joint plans, including promotion sales, procurement, replenishment, and logistics planning" (Chan et al., 2003).

Some experts distinguished supply chain management from logistics, while others considered these two terms to be interchangeable. According to Rogers and Leuschner's (2004) study, "the origin of the term 'logistics' goes back to 18th century France." "The term 'supply chain management' was coined by consultant Keith Oliver, of strategy consulting firm Booz Allen Hamilton in 1982" (Rogers & Leuschner, 2004, p. 62). Supply chain management was viewed as a synonym for logistics management (Cooper, 1998; Rogers & Leuschner, 2004), operations management, procurement, or a combination of them (Lambert, 2005) by most interested parties. However, Lambert (2004) concluded that there are different elements included in the concept of supply chain management, but not within a logistics department of a firm or in the logistics practitioners' purview: marketing relationships, product development and rollout, and the management of returns.

Tracking the use of the terms *Logistics* and *Supply Chain Management* in the article titles, Rogers and Leuschner (2004, p. 61) observed that "more authors began to support the shift in concept from 'logistics' to 'supply-chain management' in the late 1990's." They also note that "the Council of Logistics Management changed its name in January 2005 to the Council of Supply Chain Management Professionals because of the difference between logistics and supply chain management." "Supply chain management has supplanted the term 'logistics' to some extent" (Rogers & Leuschner, 2004), because of different definitions.

Global Supply Chain Forum (GSCF) Model

The members of the Global Supply Chain Forum (GSCF) developed the definition of SCM in 1994 and modified SCM in 1998 as "the integration of key business processes from end user through original suppliers that provides products, services, and information that add value for customers and other stakeholders" (Lambert, Cooper, & Pagh, 1998, p. 1, Introduction section, ¶ 4). SCM is based on the concept that "integration across business operations is essential to customer satisfaction, value creation, exceptional returns, and long-run competitive advantage" (Tracey, Lim, & Vonderembse, 2005, Introduction section, ¶ 2). "Implementation is carried out through three primary elements: the supply chain network structure, the supply chain business processes, and the supply chain management components" (Lambert et al., 1998; Lambert et al., 2005, p. 28). "The supply chain network structure is comprised of the member firms with whom key processes will be linked" (Lambert et al., 2005). The GSCF framework identified "eight key supply chain management processes that need to be implemented within and across firms in the supply chain, including: (1) Customer

Relationship Management, (2) Customer Service Management, (3) Demand Management, (4) Order Fulfillment, (5) Manufacturing Flow Management, (6) Supplier Relationship Management or Procurement, (7) Product Development and Commercialization, and (8) Returns Management" (Croxton et al., 2001; Lambert et al., 2005). The following describes the eight supply chain management processes that are part of the GSCF framework (Croxton et al., 2001; Lambert et al., 2005):

1. Customer Relationship Management - provides the structure for how relationships with customers are developed and maintained and identifies key customers and customer groups to be targeted as part of the firm's business mission. Cross-functional customer teams tailor product and service agreements (PSA) to meet the needs of key accounts, and segments of other customers (Croxton et al., 2001, p. 15; Lambert et al., 2005, p. 28).
2. Customer Service Management - provides the firm's face to the customer, a single source of customer information, and the key point of contact for administering the product service agreements (Croxton et al., 2001, p. 17; Bolumole, Knemeyer, & Lambert, 2003; Lambert et al., 2005, p. 28).
3. Demand Management – aims to balance the customers' requirements with supply chain capabilities (Lambert et al., 2005, p. 28), and is also concerned with developing and executing contingency plans when operations are interrupted (Croxton et al., 2001, p. 18).
4. Order Fulfillment – requires integration of the firm's manufacturing, logistics, and marketing plans, and enables the firm to meet customer requests while developing partnerships with key members of the supply chain, and minimizing the total

delivered cost to customers (Croxton et al., 2001, p. 20; Lambert et al., 2005, p. 28).

5. Manufacturing Flow Management - includes all activities necessary for managing the product flow through the manufacturing facilities and for obtaining, implementing, and managing flexibility (Croxton et al., 2001, p. 22; Lambert et al., 2005, p. 28).
6. Supplier Relationship Management - provides the structure for how relationships with suppliers are developed and maintained. Cross-functional teams tailor PSAs with key suppliers (Croxton et al. 2001, p. 24; Lambert et al., 2005, p. 28).
7. Product Development and Commercialization - provides the structure for developing and bringing to market new products jointly with customers and suppliers in order to reduce 'time to market' and continue corporate success (Croxton et al., 2001, p. 26; Lambert et al., 2005, p. 28).
8. Returns Management –includes all activities related to returns, reverse logistics, gatekeeping, and avoidance (Lambert et al., 2005, p. 28). This process also "enables the firm to identify productivity improvement opportunities and breakthrough projects" (Croxton et al., 2001, p. 28).

The major propositions in the GSCF model are: "(1) customer relationship management and supplier relationship management form the critical links in the supply chain and the other six processes are coordinated through them; (2) each of the eight processes is cross-functional and cross-firm; (3) each is broken down into a sequence of strategic sub-processes where the blueprint for managing the process is defined, and a sequence of operational sub-processes where the process is actualized; (4) every sub-

process is described by a set of activities; (5) cross-functional teams are used to define the structure for managing the process at the strategic level and implementation at the operational level" (Lambert et al., 2005, p. 28). The GSCF framework also includes the following management components that support these processes: planning and control, work structure, organization structure, product flow facility structure, information flow, management methods, power and leadership structure, risk and reward structure, and culture and attitude (Lambert et al., 2005, p. 29).

Lambert, Cooper, and Pagh (1998) developed a schematic model depicting these eight key business processes in the supply chain management theory, which continues to be examined today. Croxton et al. (2001) proposed that "those eight business processes run the length of the supply chain and cut across firms and functional silos within each firm." Functional silos include "Marketing, Research and Development, Finance, Production, Purchasing and Logistics" (Lambert, Cooper, & Pagh, 1998; Croxton et al. 2001). "Activities in these processes reside inside a functional silo, but an entire process will not be contained within one function" (Croxton et al. 2001).

The GSCF is a conceptual model which has some well-developed propositions, but lacks clear metrics and empirical validity. SCM does "offer the opportunity to capture the synergy of intra- and inter-company integration and management" (Lambert et al., 1998, p. 1). Lambert, Cooper and Pagh's (1998, p. 15) exploratory study finds that "managing the supply chain involves three closely inter-related elements: (1) the supply chain network structure, (2) the supply chain business processes, and (3) the management components." Further, Lambert et al. (1998, p. 15) suggested that "successful SCM requires integrating business processes with key members of the supply chain." Croxton

et al. (2001) confirmed that "the eight business processes, identified by the members of the GSCF, must be implemented within a firm and then linked up, as appropriate, with key supply chain members." However, Maku, Collins, & Beruvides (2005) highlighted issues that "impact supply chains in the real world, from each link having a unique view of the entire supply chain to each firm having its own supply chain" (p. 27).

The GSCF framework is significant addressing essential issues about the eight supply chain management processes in the discipline of marketing, management, finance, and logistics (Lambert et al., 1998; Croxton et al. 2001). With better metrics it could lend itself to further research in "developing a normative model that can guide managers in the effort to develop and manage their supply chains", because it is not easy to implement the generic definition of SCM (Lambert et al., 1998, p. 14). When it comes to social utility, the GSCF is useful in describing the relationships "between key business processes, from original suppliers to customers" (Lambert et al., 1998; Chan et al., 2003). Thus, executives are becoming aware of "the emerging paradigm of inter-network competition" and that "the successful integration and management of key business processes across members of the supply chain will determine the ultimate success of the single enterprise" (Lambert et al., 1998, p. 14). In terms of scope, the GSCF framework covers a variety of activities in the eight processes, such as product development, demand generation, relationship management, and returns avoidance. Thus, the GSCF framework is very broad in its scope (Lambert et al., 2005, p. 37). This provides breadth and global implications for business operations. This is strength because it provides "the opportunities for supply chain management to provide value" (Lambert et al., 2005, p. 37). Since the focus of the framework is to provide a structure to maintain stable

relationships in the supply chain, the model provides direction for all important activities that "need to be managed in order to identify, develop, and maintain key relationships with both customers and suppliers" (Lambert et al., 1998; Lambert et al, 2005). The GSCF framework provides clear definitions and propositions, but more depth in development is needed (Croxton et al., 2001) because it has no clear measurement of the eight business processes. Based on the similarities with other supply chain models, a simpler model could not achieve the same purpose; however, it could be more complex.

Because the GSCF lacks explicit metrics, researchers encountered difficulties to provide empirical validity for the GSCF framework; however, some studies verify the definitions of the model. The supply chain is "not a chain of businesses with one-to-one, business-to-business relationships, but a network of multiple businesses and relationships" (Lambert, Cooper, & Pagh, 1998). Almost every independent manufacturer feels the increasing pressure to reduce inventories and simultaneously improve customer service, partly because reducing its inventory to lower cost hurts service and partly because there is no clear way to calculate properly sized safety stocks to buffer the product line (Davis, 1993). In order to build up service, a company in a supply chain puts more pressure on suppliers to improve their performance (Davis, 1993). Tracey, Lim, and Vonderembse (2005) indicated that "a manufacturing enterprise managed as a value or supply chain is capable of concurrently lowering cost and increasing service to achieve differentiation" (p. 180). "While marketing strategy has always considered internal and external constraints, supply chain management makes the explicit evaluation of these factors even more critical" (Croxton et al., 2001). According to the observations and experiences of Drayer in 1999, superior SCM creates "value for

every member of the chain" (as cited in Tracey et al., 2005, p. 180). In terms of social congruence, the GSCF theory is a method to integrate business functions and business processes within and across companies and achieve win-win condition. Although GSCF research is limited, researchers in many countries do support the global applicability of GSCF. The model fits with reality and is accepted by a number of SCM professionals. It has broad implications for a variety of industries, but its major weakness is in empirical validation.

There are many critiques of the GSCF by other scholars. Croxton et al. (2001) articulated that "since the concept of supply chain management was introduced, there has been a great deal of confusion about what it actually involves." "The published descriptions of these processes in GSCF were limited to one-paragraph summaries that provide little guidance on how to implement a process approach" (Croxton et al., 2001, p. 14). Most of what has been written about supply chain management advocates "business process reengineering and integration without specifying the processes that are to be included in these efforts" (Croxton et al., 2001). Croxton et al. (2001) suggested that "it would be much easier for management to implement a process orientation within their firm if there were clear guidelines as to what the processes ought to be, what sub-processes and activities are included, and how the processes interact with each other and with the traditional functional silos" (p. 32). In addition, Novack, Rinehart, and Langley in 1994 found that "logistics executives do not know exactly how SCM creates value for customers because this phenomenon has not been examined and measured" (as cited in Tracey, Lim, & Vonderembse, 2005, p. 180). In addition, Lambert et al. (2005) indicated that "the GSCF framework is very broad in its scope and this breadth is strength because

it increases the opportunities for supply chain management to provide value." However, "this breadth provides some implementation challenges," partly because "the concept of SCM has grown out of the logistics or purchasing function and it is difficult for some people to shift to the broad view indicated by the GSCF framework" (Lambert et al., 2005, p. 37), and partly because "all functions are involved and interfaces exist among the eight processes which might be difficult to management across firms" (Lambert et al., 2005, p. 38).

Supply Chain Operations Reference (SCOR) Model

The Supply Chain Operations Reference (SCOR) model, developed by the Supply Chain Council (SCC) and created in 1997, is "a comprehensive strategic planning toolset that allows senior managers to simplify the complexity of supply chain management" (Huan, Sheoran, & Wang, 2004) and links "business processes to metrics, best practice and technology" as well (Stephens, 2001, p. 471). The SCC was organized in 1996 by Pittiglio Rabin Todd & McGrath (PRTM) and AMR Research, and initially included 69 voluntary member companies (Stephens, 2001, p. 471).

"The SCC is an independent, not-for-profit, global corporation with membership open to all companies and organizations interested in applying and advancing the state-of-the-art in supply chain management systems and practices" (Stephens, 2001, p. 471; Supply-Chain Council [SCC], 2006). Currently, the Council has over 750 members around the world (Stephens, 2001, p. 471; Lambert, Garcia-Dastugue, & Croxton, 2005, p. 29). "The majority of the Council's members are practitioners and they represent a broad cross-section of industries, including manufacturers, distributors, and retailers" (Stephens, 2001, p. 471). In addition, the rest of the members, such as "technology

suppliers, and implementers, the academicians, and the government organizations," are equally of importance in the development and maintenance of the SCOR in the Council (Stephens, 2001, p. 471).

The SCOR model integrates "the well-known concepts of business process re-engineering, benchmarking, and process measurement into a cross-functional framework" (SCC, 2006, Section 1, p. 1), which contains: "standard descriptions of management processes, a framework of relationships among the standard processes, standard metrics to measure process performance, management practices that produce best-in-class performance, and standard alignment to features and functionality" (SCC, 2006, Section 1, p. 2). "The framework of SCOR Model uses a 'building block' approach based on five distinct management processes to describe supply chains: (1) plan, (2) source, (3) make, (4) deliver, and (5) return" (SCC, 2006, Section 2; Stephens, 2001, p. 472). Each of these five management process is implemented in four levels of detail (SCC, 2006, p. 6; Lambert, Garcia-Dastugue, & Croxton, 2005, p. 29; Stephens, 2001, p. 473).

According to SCC (2006, p. 6) and Lambert et al. (2005), "Level I defines the number of supply chains, as well as what metrics will be used; Level II defines the planning and execution processes in material flow; Level III defines the inputs, outputs, and flow of each transactional element; Level IV the implementation details of the supply chain management processes are defined." "Each process is analyzed and implemented around three components: business process reengineering, benchmarking, and best practices analysis" (SCC, 2006, p. 6, p.; Lambert et al., 2005). In addition, Levels II and III of the SCOR model have support metrics that are keys to these 12 level I metrics, which fall into four categories: "(1) delivery reliability— delivery performance, fill rate,

order fulfillment lead time, perfect order fulfillment; (2) flexibility and responsiveness— supply chain responsiveness, production flexibility; (3) cost— total logistics management cost, value-added employee productivity, warranty costs; (4) assets— cash-to-cash cycle time, inventory days of supply, asset turns" (Huan et al., 2004, p. 25).

Recently, in the *Overview of SCOR Version 8.0* (SCC, 2006), the Council redesigned the Level I metrics by which "an implementing organization can measure how successful they are in achieving their desired positioning within the competitive market space." The model classified 10 performance metrics into two groupings, which fall into five attributes, including: "(1) customer-facing: reliability— perfect order fulfillment; responsiveness— order fulfillment cycle time; flexibility— upside supply chain flexibility, upside supply chain adaptability, downside supply chain adaptability; (2) internal-facing: cost— supply chain management cost, cost of goods sold; assets— cash-to-cash cycle time, return on supply chain fixed assets, and return on working capital" (SCC, 2006).

The following objectives are the five SCOR processes (SCC, 2006, p. 4) and Lambert et al. (2005) identified them further:

1. "Plan— balances aggregate demand and supply to develop a course of action which best meets sourcing, production, and delivery requirements" (Lambert, et al., p. 29).
2. "Source— includes activities related to procuring goods and services to meet planned and actual demand" (p. 29).
3. "Make— includes activities related to transforming products into a finished state to meet planned or actual demand" (p. 29).

4. "Deliver— provides finished goods and services to meet planned or actual demand, typically including order management, transportation management, and distribution management" (p. 29).
5. "Return— deals with returning or receiving returned products for any reason and extends into post-delivery customer support" (p. 29).

"Each process is analyzed and implemented around three components: business process reengineering, benchmarking, and best practices analysis" (SCC, 2006, p. 1). According to *the Overview of SCOR Version 8.0* (2006), the SCOR is a "prescriptive model." It prescribes the use of business process reengineering techniques to capture the 'as-is' state of a process and then determine the 'to-be' future state based on business process templates for plan, source, make, deliver, and return; benchmarking is used to "quantify the operational performance of similar companies and establish internal targets based on 'best-in-class' results;" best practices analysis is used to "characterize the management practices and software solutions that result in 'best-in-class' performance" (SCC, 2006, p. 1). The identification of the best business practices "needed to support the "to-be" state of the processes becomes the roadmap for implementation" (Lambert et al., 2005, p. 29).

The SCOR model uses a building block schematic model depicting the relationships between five management processes to describe supply chain. This schematic model depicts the assembly of a supply chain description across "organizations, internal and external, across industry segments, and geographies" (Stephens, 2001, p. 472). It is "not only easy to model outsourced activities, but also it provides an

invaluable tool for evaluating third party performance and determining the strategic and financial advantage of outsourcing supply chain activities" (Stephens, 2001, p. 472).

Although the SCOR has propositions stated (relationships between the concepts), it does not rise to the level of a theoretical model because it has little empirical support. "As the practitioners attempted to define supply chain practices and describe their supply chains," it has become clear that "common definitions, processes, and measurements were required to communicate between customers and suppliers within a supply chain" (Stephens, 2001, p. 472). Stephens (2001) considered that "the SCOR Model was originally conceived as a standard reference that could be used by organizations in any industry segment for sharing information with supply chain partners." While the SCOR model has "continued to evolve and improve," "certain characteristics remain unchanged" (Stephens, 2001, p. 476).

In order to successfully communicate supply chain goals, performance and objectives among supply chain partners, the SCOR model is socially significant addressing essential issues about coordinating the activities in the supply chain. "Those forward-thinking practitioners, who established the SCC, recognized that coordinating supply chain activities across supplier and customer boundaries promised significant competitive advantage that would translate into increased revenues and cost savings" (Stephens, 2001). The efficacy of this model over other supply chain models in achieving desired outcomes is that the SCOR implementation methodology is straight forward and provides a framework for identifying, evaluating, defining and implementing change products.

The SCOR model, "primarily a tool for implementation, is now being successfully applied to improve business operations in North America, Latin America, Europe, Asia, Australia and New Zealand" (Stephens, 2001). "A large number of universities and colleges are now using the SCOR Model as a framework for undergraduate and graduate curriculum around the world" (Stephens, 2001). In terms of the scope of covered activities, the objective of the SCOR is to "prescribe the activities that are related to the forward and backward movement of the products, and the required planning to efficiently manage these flows, but it does not attempt to describe every business process or activity, including: sales and marketing (demand generation), research and technology development, product development, and some elements of post-delivery customer support" (Lambert et al., 2005).

Although the SCOR model is remarkably simple, "it has proven to be a powerful and robust tool set for describing, analyzing, and improving the supply chain" (Stephens, 2001, p. 472). Thus the SCOR model has a good balance between simplicity and complexity, and there is no other simpler supply chain model achieving the same purpose.

According to *Version 5.0*, "the first implementation project using the SCOR Model typically requires 3-6 months." For example, "one Council member (food industry) documented a $4.15 million dollar return on a $50 thousand investment after approximately 3 months" (Stephens, 2001, p. 475). "Another firm (electronics industry) has reported a $230 million project return after investing $3-5 million after approximately 8 months" (Stephens, 2001, p. 475). "The Department of Defense has been investigating the use of the SCOR Model as a framework for improving and evaluating DOD supply chains because it was work with DOD and aerospace and defense firms that led to the

inclusion of return (initially conceived to support Maintenance, Repair, and Overhaul—MRO)" (Stephens, 2001, p. 475). The SCOR model fits with reality and is accepted by society.

The strength of the SCOR is that "it provides a standard format to facilitate communication" (Huan, Sheoran, & Wang, 2004, p. 25). However, Huan et al. (2004) found that "the problem of implementing the SCOR model in the past has been that different metrics were used to measure the performance at different levels" (p. 25). Furthermore, "market researchers and corporate strategists use entirely different language to describe the marketplace and supply chain activities" (Huan et al., 2004, p. 25). "Because the objective of SCOR is operational efficiency, the drivers of value generation are centered on cost reductions and improvements in asset utilization" (Lambert et al., 2005, p. 36). Thus, Lambert et al. (2005) believed that "this makes the task of measurement easier because it tends to be less subjective to determine how much will be saved by a particular program than to estimate how a segment of customers will respond to a service improvement, a new marketing effort, or a new product" (p. 36). In addition, Huan et al. (2004) argued that "the SCOR model should consider change management and discussed issues related to the use of SCOR performance metrics for decision making" (p. 28).

Other Models

After discussing these two main models, this review continues to discuss the other three models in the supply chain management. The third framework, described by Srivastava, Shervani, and Fahey (1999), includes three business processes: customer relationship management, product development management, and supply chain

management, which includes "many of the activities that are part of the Council of Logistics Management's definition of logistics" (Lambert et al., 2005, p. 30). "This framework does not attain sufficient level of detail for academic future discussion, because Srivastava and his colleagues focused on the role of the marketing function in the three processes and did not address the role of other corporate functions" (Lambert et al., 2005, p. 30).

The fourth framework, published by Bowersox, Closs, and Stank in 1999, is based on "three 'contexts': operational, planning and control, and behavioral" (Lambert et al., 2005, p. 30). This framework was further developed by Melnyk, Stank, and Closs in 2000, including eight business processes: "plan, acquire, make, deliver, product design/redesign, capacity management, process design/redesign, and measurement" (Lambert et al., 2005, p. 30). Further, Lambert et al. (2005) indicated that four of the eight business processes (plan, acquire, make, and deliver) resemble those included in the SCOR framework (plan, source, make, and deliver, respectively) and a detailed description of these processes was not provided.

The fifth supply chain management framework, presented by Mentzer and his colleagues, focuses on "the cross-functional interaction within a firm and on the relationships developed with other supply chain members" (Lambert et al., 2005, p. 30). Lambert et al. (2005) stated that "business processes are mentioned in the literature review supporting the framework; however, the processes that need to be implemented are not delineated" (p. 30).

Factors Affecting the Effectiveness of Supply Chain Management

From the perspective of the Global Supply Chain Forum (GSCF), the objective of supply chain management is to "create the most value for the entire supply chain network, including the end-customer" (Croxton, Garcia-Dastugue, Lambert, & Rogers, 2001, p. 30). Successful supply chain management involves "the coordination of activities within the firm and between members of the supply chain" (Croxton et al., 2001, p. 30). Consequently, the supply chain is a process which "integration and reengineering initiatives should be aimed at boosting total process efficiency and effectiveness across the supply chain" (Croxton et al., 2001, p. 30). Therefore, they concluded that "if the proper coordination mechanisms are not in place across the various functions, the supply chain processes will be neither effective nor efficient" (p. 31). "The increasing use of outsourcing has accelerated the need to coordinate supply chain processes since the organization becomes more dependent on suppliers" (Croxton et al., 2001, p. 31). The requirements for successful implementation of supply chain management include: "(1) executive support, leadership and commitment to change, (2) an understanding of the degree of change that is necessary, (3) agreement on the supply chain management vision and the key processes, and (4) the necessary commitment of resources and empowerment to achieve the stated goals" (Croxton et al., 2001, p. 32).

From the perspective of Supply Chain Operations Reference (SCOR) Model, the strength of the SCOR model is that "it provides a standard format to facilitate communication" (Huan, Sheoran & Wang, 2004, p. 24). The major objective of the SCOR model is to "improve alignment between marketplace and the strategic response of

a supply chain, on the premise that the better the alignment, the better the bottom-line performance" (Huan, Sheoran, & Wang, 2004, p. 24).

Measurement of SCM

Performance metrics refer to measures that indicate the extent to which the mutual objectives have been accomplished (Simatupang & Sridharan, 2002). The specific performance measures that indicate the overall chain performance can be customer satisfaction, supply chain response time, supply chain total costs, total inventory, and assets utilization (Simatupang & Sridharan, 2002). In spite of the importance of performance measurements, there is very little literature available for measurement of supply chain performance, especially dealing with system design and measures selection (Beamon, 1999; Chan, Oi, Chan, Lau, & Ip, 2003). Lambert and Pohlen (2001) pointed out that meaningful performance measures spanning the entire supply chain do not exist. Thus, it is difficult for an audience to differentiate which supply chain attributes are most critical to obtain a competitive advantage via the supply chain, and identify opportunities for improvement (Tracey, Fite, & Sutton, 2004).

However, according to the *Overview of SCOR Version 8.0* (2006), the Council classified 10 performance metrics into two groupings, which fall into five attributes, including: (1) customer-facing: reliability— perfect order fulfillment; responsiveness— order fulfillment cycle time; flexibility— upside supply chain flexibility, upside supply chain adaptability, downside supply chain adaptability; (2) internal-facing: cost— supply chain management cost, cost of goods sold; assets— cash-to-cash cycle time, return on supply chain fixed assets, and return on working capital. In addition, Marien, Gentle, and Curry (n.d.) suggested four categories of SCM Key Result Areas (KRAs) with the

balanced scorecard to measure and recognize SCM performance, including: (1) customer satisfaction, (2) financial returns, (3) supply chain relationships, and (4) business development and productivity.

Customer-facing performance attributes

According to the metrics (SCC, 2006), customer-facing performance attributes are: reliability, responsiveness, and flexibility. According to several studies, reliability and responsiveness are measured by order fulfillment, including customer response time, cycle time, order lead time, customer response time minimization, and fulfillment lead time (Beamon, 1999; Morash, 2001; Gunasekaran et al., 2001; Chan et al., 2003; Taylor, 2004; Maku, Collins, & Beruvides, 2005). Responsiveness relates to the adaptability of the supply chain as a whole to meet emergent customer needs (Simatupang & Sridharan, 2002). The primary role of SCM is to ensure the efficient execution of a company's supply chain strategy, which, in turn, will contribute to improved and stronger customer relationships (Hadley, 2004). Thus, superior supply chain management practices clearly lead to improved corporate performance (Hadley, 2004). In addition, Beamon (1999), Gunasekaran et al. (2001), Chan et al. (2003), and Maku et al. (2005) indicated that flexibility measures how well a system reacts to uncertainty, including volume flexibility, delivery flexibility, and mix flexibility.

Internal-facing performance attributes

Regardless of company size, from multinationals to single-site manufacturers, the core value proposition of supply chain management (SCM) is to improve corporate profitability and return on capital through cost reduction (via reduced inventory, improved throughput, and better procurement) and increased revenues (via reduced time

to market and improved product availability) (Hadley, 2004). These global performance measures are translated into secondary measures for each of the individual members, and then regularly collect, display, transfer, and analyze to determine how well their individual performance (Simatupang & Sridharan, 2002). According to the metrics (SCC, 2006), internal-facing performance attributes are: cost (supply chain management cost and cost of good sold) and assets (cash-to-cash cycle time, return on supply chain fixed assets, and return on working capital). Assets can be measured as cash-to-cash cycle time, inventory days of supply, and changes in both the average volume of inventory held and frequency of inventory turns across the supply chain over time (Simatupang & Sridharan, 2002). Cash-to-cash cycle time is a measure of the time required in days to convert cash paid to suppliers to purchase raw materials into cash received from customers for finished goods (Hoyer, Janner, Mayer, Raus, & Schroth, 2006). Cash-to-cash performance metrics also reflect the flow of material and information through the supply chain (Spekman & Davis, 2004). A metric of cash-to-cash cycle time helps focus all members of the supply chain on a mutually-agreed set of objectives, and the rate at which materials are converted into sold goods is not only a measure of a manufacturer's operating efficiency, but also of financial health (Spekman & Davis, 2004).

Cost of goods sold (COGS) is a generally accepted accounting measure that indicates the cost side of a firm's operations (Zhu & Kraemer, 2002). Purchasing and supply management organizations use many different measures to track their performance including purchase price, on-time delivery, quality, inventory dollars (or forward days supply), etc. (Emiliani, Stec, & Grasso, 2005). In some companies, the measures are appropriately balanced, while in others there is a strong emphasis on

purchase price. According to a study by Emiliani et al. (2005) on purchase price variance (PPV), it is not unusual for purchasing organizations to emphasize price because "purchased production materials can account for 50-80 percent of the cost of goods sold" (p. 151). Chief executive officers (CEO) expect the purchasing organizations to contribute to profitability through price reduction, especially in markets with flat or low top-line growth (Emiliani et al., 2005, p. 151). Emiliani et al. (2005) also indicated that "a year-over-year price reduction target of 3-7 percent for goods purchased is common" (p. 151).

Strategic Alliances

Recently, organizations have perceived the competition shifting from "firm against firm" to "supply chain to supply chain" and the need to strategically evaluate which upstream and downstream members should be incorporated in their supply chain arrangement, such as strategic alliances, for achieving competitive advantage (Whipple & Frankel, 2000, p. 22). A *strategic alliance* is a formal agreement to supply goods/services, and it can "expand knowledge, develop applications, and commercialize new products" and also provide rights of "co-ownership" for the participating companies (Cante, Calluzzo, Schwartz, & Schwartz, 2004, p. 231). The primary purpose in strategic alliances is "to achieve a competitive advantage for each partner through productivity, quality improvements and significant innovation" (Cante et al., 2004, p. 231). Cante et al. (2004) also assessed that strategic alliance agreement is composed of supply processes, technology, intellectual property, legal requirements, and termination or disengagement sub-agreements (Cante et al., 2004, p. 231). Further, Cante in 1998 observed that alliance agreements always last three to five years (Cante et al., 2004, p. 231). According to

Burns in 1990, and Mitchell and Singh in 1996, strategic alliances enable companies to obtain external resources and flexibility and also provide opportunity to mitigate environmental uncertainty without extra investments (Sakaguchi, Nicovich, & Dibrell, 2004, p. 3).

Although there are many significant advantages in establishing strategic alliances, Day in 1995 indicated that the failure rate is 70% in joint ventures because of failing to reach expectations of the partners or being terminated (Whipple & Frankel, 2000, p. 22). Much research has indicated that only one fifth maintain alliances in the United States (Whipple & Frankel, 2000, p. 22). Why are the benefits of strategic alliances large, but the success rates low? Smith and Barclay (1997) and Whipple and Frankel (2000) articulated that firms recognize there is a need to implement alliances; however, they do not comprehend how to maintain relationships with alliance partners. Whipple and Frankel (2000) reported that it is difficult for many managers in strategic alliances to transform their rivals into a long-term relationship partners, and it is also difficult to adapt themselves to mind-set, culture, and behavior (p. 22).

Based on Mohr and Spekman's (1994) supplier alliance research model, Monczka, Petersen, Handfield, and Ragatz (1998) concluded several attributes of strategic supplier alliances associated with partnership success: (1) trust and coordination, (2) interdependence, (3) information quality and participation, (4) information sharing, (5) joint problem solving, (6) avoiding conflict resolution strategy, and (7) a formal process of supplier/commodity alliance selection (p. 553). Monczka et al. (1998) also asserted two poor predictors of alliance success, and they are resource commitment and

smoothing over problems (p. 553). This review will explain two theories of strategic alliances.

Transaction Cost Economics (TCE)

Williamson in 1975 formulated and continuously extended the theory of transaction cost economics (TCE) based on Ronald Coase's transaction governance structure (TGS) in 1937 by applying three distinct governance forms of transactions (i.e. market, hybrid, and hierarchy) and negotiation safeguards between parties (Zhang, 2006, 60; Rahman, 2007, p. 22; David & Han, 2004, p. 41). According to Coase in 1937, the TCE suggests that "firms exist in order to reduce transaction costs incurred in market-based exchanges" (Rahman, 2007, p. 22). Transaction costs include "screening for reliable business partners, negotiating deals, drafting contracts, and monitoring partners' activities" (Rahman, 2007, 22).

This theory identifies three major constructs: asset specificity, uncertainty, and frequency, which affect transaction costs and the selection of TGS (Zhang, 2006, 60). Asset specificity is defined as the dependence of "transaction-specific investments" (Sven-Olof & Rikard, 1993, p. 4), describing that the value or cost occurs when investments are made or terminated by the parties (Sven-Olof & Rikard, 1993, p. 4; Zhang, 2006, 60). Uncertainty interprets that humans are incapable of predicting or anticipating the future because of "bounded rationality" under situations (Sven-Olof & Rikard, 1993, p. 4; Rahman, 2007, p. 22). Finally, frequency refers to "how frequently the transaction occurs" (Sven-Olof & Rikard, 1993, p. 4).

In regard to Williamson's assumptions in 1981 and 1991, the major propositions in the TCE are: opportunism, implying that the transacting parties have a tendency

toward opportunism; and bounded rationality, signifying that decision-makers have constraints in "processing information and solving problems" (Zhang, 2006, p. 60). In other words, the TCE theory is used to answer which governance form provides "the most efficient exchange under conditions of bounded rationality and opportunism" (Sven-Olof & Rikard, 1993, p. 3; Rahman, 2007, p. 22). Williamson in 1991 set up the "discriminating alignment hypothesis" in which transactions are aligned with governance structures in a discriminating way (David & Han, 2004, p.41). Further, Chiles and McMackin in 1996 expounded that a firm selecting to engage in hybrid form (e.g. strategic alliances) rather than choosing market (e.g., non-equity alliance) or hierarchy (e.g., contractual alliances, minority equity alliances, and joint ventures) form depends on "the least costly method" to conduct business (Rahman, 2007, p. 22, 23).

Over the last decades, the theory has been revised and adapted to "alliance structuring behavior of firms" by Dussauge and Garrette in 1995, Hennart in 1988, and Oxley in 1997 and1999 (Rahman, 2007, p. 23). Several empirical studies by testing the relationships between three constructs (independent variables) and governance mechanisms (dependent variables) in the TCE framework, led to abundant empirical applications, especially in marketing phenomena, and also led Ronald Coase to be awarded the Nobel Prize in Economics in 1991 (Rindfleisch & Heide, 1997, p. 41, 30). In addition, Rindfleisch and Heide (1997) pointed out that TCA was similar to Williamson's study in 1975 about Markets and Hierarchies; hence it has been difficult to integrate and evaluate the merit of the development and the important refinement of early versions of the TCA framework (p. 30).

Many researchers utilized survey instruments with multi-item scales to measure the constructs (Rindfleisch & Heide, 1997, p. 42), and this measure seems to have not only high levels of "unidimensionality and internal consistency," but also have "an acceptable degree of convergent and discriminant validity" (p. 42). However, other studies measure the constructs through "secondary data indicants" (p. 42).

Williamson (1991) developed a schematic model depicting that three different "economic organization forms" are distinguished by different "coordinating mechanisms" to "adapt to disturbance" (p. 291), which continue to be examined today. The model interprets that the choice among those three governance mechanisms in the environment relies on asset specificity; however, an increase in the frequency of disturbances will cause an increase in market and hierarchy forms of governance and a decrease in hybrid governance mode in the meanwhile (p. 291).

This theory is socially significant addressing essential issues about "analyzing TGS in human resource management, transportation, airline travel, international trade, strategic alliance, accounting and tax services, SCM" (Zhang, 2006, p. 60), and examining "hierarchies, franchises, multidivisional companies, clans, networks, and market-hierarchy hybrids" (Roberts & Greenwood, 1997, p. 348) in the academic disciplines of "economics, sociology, political science, organization theory, contract law, business strategy, corporate finance, and marketing" (Rindfleisch & Heide, 1997, p. 30). It is also useful in explaining how three characteristics influence transaction costs and discriminating relationships among those three governance structures with asset specificity, uncertainty, and frequency (Zhang, 2006, p. 60). Zhang (2006) concluded that organizations can select either market or hierarchy TGS under the given three

characteristics, and he utilized the conception of Smith in 1776 that "price is the invisible hand" to control supply and demand in market TGS (p. 60). Thus it is a well-developed theory guide to alliance structuring behavior of firms (Rahman, 2007, p. 23). The TCE has a good balance between simplicity and complexity, contributing to its usefulness.

Studies by Anderson (1985), Heide and John (1992), Walker and Weber (1987), and Zhang (2006) verify the propositions of transaction cost theory that market governance structure are more economical when the three characteristics are low; otherwise, hybrid governance structure will lower governance costs. Rahman (2007) found that transaction costs are "the major source of costs in strategic alliances" and alliance selection would induce "substantial cost savings" in economic performance (p. 23); however, Madhok and Tallman (1998), Rahman (2007), and Zajac and Olsen (1993) pointed out that the shortcoming of the TCE is its focus on transaction costs rather than on the organizational goal in maximizing value. Further, Rindfleisch and Heide (1997) argued that many critics of the TCE are focusing on its initial versions and it also lacks an organization of all the empirical evidence about governance problems (p. 30), even though the TCE is popular in the public domain. According to the combination of the TCE studies by Sven-Olof and Rikard (1993), numerous criticisms pointed out that it fails to consider matters of power and trust; it unrealistically employs human behavior to be the assumptions; it lacks a clear definition of the concept of transaction cost; and it involves "a static mode of reasoning" (p. 4). According to Williamson in 1992, Rindfleisch and Heide (1997) asserted that TCE "needs to be refined and extended, it needs to qualified and focused, and it needs to be tested empirically" (p. 51). The theory

has been adapted to the situations of selecting the forms of governance structure under the transaction costs.

Resource Based View (RBV)

Wernerfelt introduced and coined his theory of resource based view in 1984 based on Selznick in 1957 and Penrose's economic theory in 1959 about organizational distinctive competence (Liu, 2004, p. 221; Lowson, 2003, p. 543). Back to the earliest work of firm-specific resources, economist Chamberlin in 1933 pointed out firm heterogeneity and proposed that the unique assets and capabilities of firms were more important than market structures in order to attain imperfect competition and super-normal profits (Fahy, 2000, the development of the resource-based view section, ¶ 1). Subsequently, Penrose in 1959 developed this notion and viewed firms as "a collection of physical and human resources" with heterogeneity (as cited in Dhanaraj & Beamish, 2003, p. 244). Wernerfelt (1984) reiterated "resource and products are two sides of the same coin" within the firm (p. 171). In studies of the resource based view (RBV) of the firm, Barney (1991), Conner and Prahalad (1996), and Dhanaraj and Beamish (2003) reported this theory concentrated on how the unique bundle of resources generate sustained competitive advantage at the core of the firm.

According to Lowson (2003), the RBV identifies three major constructs: (1) (individual) resources, and (2) competencies, and (3) capabilities in the firm (p. 544). Resources are defined by Wernerfelt in 1984 as "anything that can be thought of as strength or weakness" (Dhanaraj & Beamish, 2003, p. 244) that a firm can control to organize its processes (Lowson, 2003, p. 543). Resources used to create competitive advantage include persons, machines, raw material, knowledge, brand image, and a

patent (Lowson, 2003, p. 543). Penrose in 1959 identified three sets of resources of a firm: managerial or organizational resources, entrepreneurial resources, and technological resources (as cited in Dhanaraj and Beamish, 2003, p. 245). Lowson (2003) classified resources into three groups: tangible, intangible, and human (p. 545). While, Fahy and Smithee (1999) integrated extant researches to divide resources into three "distinct sub-groups": tangible assets, intangible assets, and capabilities (p. 7). Resources are used in management while assets are used in accounting. Peteraf (1993) articulated that sustainable advantage depends on how easily the resources can be limited or substituted for. Competencies are referred to as the "fundamental knowledge" in the firm, including knowledge, know-how, experience, innovation, and unique information (Lowson, 2003, p. 543). In the past, capabilities have not defined "property rights" and Itami in 1987 described it as "invisible assets" or "intermediate goods" by Amit and Schoemaker in 1993 (Fahy, 2000, Types of advantage creating resources section, ¶ 4). Recently, Lowson (2003) considers capabilities "dynamic routines" acquired in the firm and the organization can utilize the managerial capacity to improve the effectiveness continuously (p. 544). Collis in 1996 proposed that capabilities express the "collective tacit knowledge of how to initiate or respond to change" in the firm when the organization builds up its processes, procedures and systems (as cited in Lowson, 2003, p. 544). However, the terms *competencies*, *capabilities*, and *skills* are sometimes interchangeable and sometimes preceded by the adjectives, core and distinctive, in the literature (Fahy & Smithee, 1999, p. 5).

The major propositions in the RBV are that: (1) firms are heterogeneous; and (2) resources may be imperfectly mobile between firms (Swain, 1999, Theoretical

frameworks section, ¶ 3). Barney (1991) combined four criteria to evaluate resources that can fulfill sustainable competitive advantages: (1) valuable, (2) rare, (3) imperfectly mobile or inimitable, and (4) non-substitutable (p. 105-106). Further, Collis and Montgomery (1995) argued that the organizational performance and profit-making ability are determined by resource allocation ability; and therefore Fahy and Smithee (1999) proposed five conditions: inimitability, durability, appropriability, substitutability, and competitive superiority (p. 5). Amit and Schoemaker in 1993 listed eight criteria: complementarity, scarcity, low tradability, inimitability, limited substitutability, appropriability, durability, and overlap with strategic industry factors (Fahy & Smithee, 1999, p. 5).

In the last decades, the resource-based view of firm has been revised and adapted to the concept of *dynamic capability* (DC) by Teece, Pisano, and Shuen in 1997 to emphasize the "dynamic nature" of the resource development in uncertain environment (Fahy, 1999, p. 13). Several empirical studies refining the RBV led Wernerfelt to be awarded the "Strategic Management Journal best paper prize" in 1994 because of its "truly seminal" literature (Fahy, 2000, Introduction section, ¶ 2). Currently, the primary contribution of the RBV of the firm has been thought of as the theory of competitive advantage that achieving a sustainable competitive advantage (SCA) enables the firm to earn "economic rents or above-average returns" if the firm deploys internal resources effectively in its "product markets" (Fahy, 2000, The resource-based view and competitive advantage section, ¶ 1).

Following Penrose in 1959, Dhanaraj and Beamish (2003) identified three subgroups of resources (i.e. organizational, entrepreneurial, and technological resources)

to measure firm size, enterprise, and technological intensity (p. 245). Firm size was measured by the number of employees and annual sales; enterprise was measured by a "self-reported score"; technological intensity was measured by a ratio of R&D-to-sales (p. 249). Dhanaraj and Beamish (2003) utilized LISREL instrument to confirm the reliability of the measures and validity of each construct (p. 250).

Based on the studies of Bharadwaj, Varadarajan and Fahy in 1993, Day and Wensley in 1988, and Hunt and Morgan in 1996, Fahy and Smithee (1999, p. 10) developed a schematic model depicting that management plays a strategic role in transforming the firm's key resources into sustainable competitive advantage in order to achieve superior performance in the marketplace (P. 9). In order to establish sustainable competitive advantage, the RBV of the firm provides a "conceptually grounded framework" and the criteria for firms to evaluate strengths and weaknesses, which continues to be discussed (Fahy & Smithee, 1999, p. 10).

The RBV is socially significant as it addresses essential issues about "how superior performance can be attained relative to other firms in the same market and posits that superior performance results from acquiring and exploiting unique resources of the firm" (Dhanaraj & Beamish, 2003, p. 245) in the disciplines of micro-economics, strategic management, and strategic marketing (Fahy & Smithee, 1999, p. 12), and is useful in explaining "the direction of diversification" by utilizing "unused resources" (Pettus, 2003, p. 49). Thus, it is a well-developed theory guide to analyze performance in international markets and to underpin the alternative positioning strategy (Fahy & Smithee, 1999, p. 1). Fahy (2000) pointed out that the RBV has been used to explain why some resources generate more advantage than others and why "resource

asymmetries and competitive advantages" remain in the "conditions of open competition" situations (Evaluating the RBV Section, ¶ 1).

A study by Conner (1991) verified the propositions of the RBV allied to those insights that any theory of the firm must explain the firm's existing reason, size, and scope (i.e., benefit from asset interdependencies within the firm and different performance between firms). Fahy (2000) also indicated that the RBC explains the firm's heterogeneity and mechanisms to meet the requirement specified by Lippman and Rumelt in 1982 for building a theory (Conclusion section, ¶ 2). However, the RBV has not been tested and provided any empirical validity yet. According to Collis in 1991, there has been no consistent body of the RBV theory in summary causing a number of false adoptions by marketing researchers (Fahy & Simthee, 1999, p. 1). Teece, Pisano and Shuen in 1997 observed that some high-quality products are ineffectual in the market place because of "inferior technologies" and proposed that research must identify the "dynamic nature of the resource development process" in the rapidly changing environment (as cited in Fahy, 1999, p. 13). In addition, Fahy and Simthee (1999), Hoskisson et al. (1999), and Wenerfelt (1995) argued that the RBV lacks empirical validation in its core propositions. Further, Dhanaraj and Beamish (2003) indicated that the RBV has been continuously refined and empirically tested (p. 245). Up to now, many fundamental principles of the RBV remain valid because the majority of studies were related to conceptual rather than empirical nature (Fahy, 2000, Evaluating the RBV Section, ¶ 1). Collis in 1994 contended that it is difficult to find the "ultimate source of competitive advantage" which tally with all of Barney's VRIN criteria and researchers must follow the suggestions of Aaker in 1989 and Hall in 1992 to take account of the

importance of the resources (as cited in Fahy & Simthee, 1999, p. 13). And therefore, it is difficult to evaluate the most useful proposition. According to Maijoor and Witteloostuijn in 1996, some empirical research revealed that the RBV theory has been adapted to the populations, such as the strategic group, the industry and the firm (Fahy, 2000, Firm versus industry effects section, ¶ 1).

Dimensions of Alliances

Attributes of the Alliance

A majority of the extant studies have focused on commitment, trust and coordination, interdependence as the important attributes of the buyer-supplier relationship in an attempt to explain alliance success (e.g., Anderson & Narus, 1990; Dwyer, Schurr, & Oh, 1987; Frazier, Spekman, & O'Neal, 1988; Ring & Van de Ven, 1994; Mohr & Spekman, 1994; Monczka et al., 1998; Kauser & Shaw, 2004; Voss, Johnson, Cullen, Sakano, & Takenouchi, 2006). The following sections develop the content and theoretical grounding of the attributes of the alliance.

Commitment. Commitment has received much attention in both management decision literature and marketing channel literature (e.g., Anderson & Weitz, 1992; Morgan & Hunt, 1994; Voss et al., 2006). Commitment usually refers to "an implicit or explicit pledge of relational continuity between exchange partners" (Dwyer et al., 1987, p. 19). Commitment within the strategic alliance literature is typically defined as the willingness of buyers and suppliers to adopt a long-term perspective (Morgan & Hunt, 1994) and to exert effort on behalf of the relationship (Monczka et al., 1998). Commitment has been classified into two dimensions: affective commitment and calculative commitment (Gundlach, Achrol, & Mentzer, 1995; Voss et al., 2006). The

essence of commitment is "stability and sacrifice" within "inter-organizational, intra-organizational, and interpersonal" relationships (Anderson & Weitz, 1992, p. 19). Based on a consideration of the current benefits and costs associated with maintaining the partnership, commitment to a relationship not only entails an enduring desire to develop a stable relationship, but also implies the willingness to make short-term sacrifices which will last long enough to realize the long-term benefits (Dwyer et al., 1987; Anderson & Weitz, 1992; Morgan & Hunt, 1994; Gundlach et al., 1995; Kauser & Shaw, 2004). In sum, the literature cited above suggests that a higher level of commitment between partners who are willing to commit a wide range of assets to a set of future transactions is expected to be associated with strategic alliance success (Angle & Perry, 1981; Mohr & Spekman, 1994; Monczka et al., 1998; Kauser & Shaw, 2004).

Trust and Coordination. Trust has increasingly been found to be important to understand both interpersonal and inter-organizational relationships (Ring & Van de Ven, 1992; Kauser & Shaw, 2004), and to overcome competitive rivals' initial suspicions about opportunistic behaviors through reducing transaction costs under the partners' unequal capacities to carry out their compliance and obligations in the relationship (Kauser & Shaw, 2004; Todeva & Knoke, 2005). However, the definitions of trust lack consistency. From the broad approach, trust refers to "a willingness to rely on an exchange partner in whom one has confidence" (Moorman, Deshpande, & Zaltman, 1993, p. 82); from the specific approach, trust is defined as "the firm's belief that another company will perform actions that will result in positive outcomes for the form, as well as not take unexpected actions that result in negative outcomes" (Anderson & Narus, 1990, p. 45). Todeva and Knoke (2005) contend that experienced partners are more

likely to rely on inter-organizational trust in the repeated strategic alliances than on formal contractual safeguards (i.e., equity-based contracts) to prevent possible partner opportunism once alliance participants gain mutual confidence.

Several studies have also confirmed the importance of the coordination of activities between partners in the strategic alliances (Mohr & Spekman, 1994; Monczka et al., 1998; Kauser & Shaw, 2004). Coordination is defined as the extent to which interdependent parties (or alliance members) arrange people, activities, routines, and assignments to work together for accomplishments of the mutual objectives based on the needs and the requirements of the related parties and the entire system (Georgopoulos & Mann, 1962; Nelson, Armstrong, Buche, & Ghods, 2000; Sivadas & Dwyer, 2000; Standifer & Bluedorn, 2006). Mohr and Spekman (1994) consider coordination as "the set of tasks each party expects the other to perform" (p. 138). Successful coordination among alliance participants facilitates the stability of the alliance in an uncertain environment (Pfeffer & Salancik, 1978; Miner, Amburgey, & Stearns, 1990) can be viewed as a unique asset to provide competitive advantage (Standifer & Bluedorn, 2006), and can save resources and diversify options for growth (Gomes-Casseres, 1998).

Interdependence. The construct of interdependence among alliance members has been found to be a critical determinant for choosing alliance governance structures (Dyer & Singh, 1998; Gulati & Signh, 1998). Interdependence traditionally refers to the extent to which both partners perceive a need to maintain a relationship with the other in order to achieve their goals (Kumar, Scheer, & Steenkamp, 1995; Smith & Barclay, 1999) in terms of each other's contribution, such as skills, investment, resources, and added-value to the relationship (Smith & Barclay, 1999; Kauser & Shaw, 2004), and

acknowledge that this relationship can not be replaced rashly due to each firm's dependence on its existing partner (Kumar et al., 1995; Smith & Barclay, 1999; Kauser & Shaw, 2004). Interdependence exists when a firm is unable to completely control all of the situations to achieve a desired outcome (Monczka et al., 1998). Interdependence, thus, stems from a relationship in which both units join forces for mutual benefits via interaction and in which "any loss of autonomy will be equitably compensated through the expected gains" (Mohr & Spekman, 1994, p. 138). According to social exchange theory, greater interdependence results in lower conflict, greater cooperation, and higher trust (Kumar et al., 1995; Smith & Barclay, 1999). Although several empirical studies have not confirmed a strong association between interdependence of tasks and successful strategic alliances (Mohr & Spekman, 1994; Kauser & Shaw, 2004), no studies investigate this relationship in construction industry. Kumar et al. (1995) add credence to the above and suggest that interdependence does not directly generate trust or commitment; however, trust and commitment can be cultivated because interdependence creates an intra-channel to converge the partners' interests. Moreover, the higher the interdependence between alliance partners, the greater the requisite information they have to process (Gulati & Singh, 1998; Galbraith, 1977).

Communication Behavior

Communication is typically defined as "transmitting, receiving, and processing information" (Clow & Baack, 2004, p. 5). Because communication processes are fundamental to most aspects of channel functioning, communication behavior has been found to lead to organizational success and strategic alliance success as well (Mohr & Nevin, 1990; Mohr & Spekman, 1994; Kauser & Shaw, 2004). In order to elaborate

upon how to ensure partnerships and alliances success and to obtain the most benefits, Masciarelli (1998) created a formula: Relationship = Trust plus Value plus Dialog (or R= T + V + D) in which mutual trust, constant communication with the partners, and providing real value to each partner are viewed as equitably crucial elements within an alliance, and in which communication can also simultaneously create additional value through partners' involvement in the process of joint planning and executing business-to-business objectives (p. 26). Prior published research has shown that effective communication among alliance members plays an essential role in creating and sustaining successful supplier-customer relationships to achieve the maximum benefits of collaboration (Mohr & Spekman, 1994; Kauser & Shaw, 2004; Large, 2005; Standifer & Bluedorn, 2006; Voss et al., 2006). Hence, three aspects of communication behavior identified as the important ingredients to influence the success of strategic alliances are discussed in this study: information quality, extent of information sharing between alliance partners, and participation in planning and goal setting (Mohr & Spekman, 1994; Monczka et al., 1998; Kauser & Shaw, 2004).

Information Quality. Communication of high quality information is viewed as one of the exchange behaviors (Voss et al., 2006). Information quality is based on the content of communication or transmitted message (Mohr & Nevin, 1990) and includes many aspects, including accuracy, relevance, timeliness, adequacy, reliability, and credibility of information exchanged (Mohr & Spekman, 1994; Monczka et al., 1998; Kauser & Shaw, 2004; Large, 2005). The content of communication can be classified into five types of information exchanged among alliance members, including physical inventory, product characteristics, pricing structures, promotional activities, and market

conditions (Mohr & Nevin, 1990). Several pertinent studies have suggested that if the goals within the context of inter-organizational partnership are to be achieved, the exchange of relevant, meaningful, and timely information is an essential behavioral predictor of successful alliance formation (Thomas & Trevino, 1993; Mohr & Spekman, 1994; Kauser & Shaw, 2004; Voss et al., 2006). It is because information quality enables both parties to coordinate their activities (Monczka et al., 1998), and helps purchasing executives realize mutual benefits through building a more trusting relationship between partners and reducing misunderstandings as well (Anderson & Narus, 1991; Mohr & Spekman, 1994; Kauser & Shaw, 2004). Therefore, the higher the quality of information flows, the more substantial performance gains (Voss et al., 2006); the more information quality in strategic alliances, the more satisfaction in buyer-supplier relationships (Mohr & Spekman, 1994).

Information Sharing. Information sharing (both quantity and quality) is defined as the extent to which critical and proprietary information embodied in organizational skills and routines is communicated to one's strategic alliance partner (Mohr & Spekman, 1994; Robson, Skarmeas, & Spyropoulou, 2006). Davis, Large, Halstead-Nussloch, and Kovács in 2003 indicated that purchasing managers and their colleagues spend nearly 30 percent of their working hours on external communication with their suppliers (as cited in Large, 2005, p. 427). Mohr and Nevin (1990) described communication as "the glue that holds together a channel of distribution" (p. 36). Communication with people from different companies captures the utility of the information exchanged (Mohr & Spekman, 1994), and becomes the most important supply chain management skill required by purchasers to perform efficiently in both oral and written communication (Giunipero &

Pearcy, 2000; Gammelgaard & Larson, 2001; Large, 2005). Effective information sharing not only creates information value for people within and across organizations, but also reduces the potential conflict among collaborative relationships (Kauser & Shaw, 2004). Both purchasers and suppliers have perceived that information sharing contributes to operating efficiency and mutual benefit between trading partners in cross-national collaboration, thus improving performance (Myers & Cheung, 2008). In sum, information sharing has emerged as a key construct in area of strategic alliances, and therefore has been found to be an important predictor of alliance success (Mohr & Spekman, 1994; Monczka et al., 1998; Kauser & Shaw, 2004; Large, 2005; Robson et al., 2006; Voss et al., 2006; Myers & Cheung, 2008).

Participation. Information participation is defined as the extent to which alliance partners engage in planning and goal setting together (Mohr & Spekman, 1994). By means of participation, alliance members internalize goals for organizational performance and are motivated to achieve those mutual goals by working together with the suppliers (Anderson, Lodish, & Weitz, 1987). Joint planning allows both partners within an alliance to establish mutual expectations and allocate cooperative efforts (Mohr & Spekman, 1994). Anderson, Lodish, and Weitz (1987) suggested that decision-making and goal formulation are two important facets of participation to reach successful alliances. Extant literature has found that participation between partner firms in planning and goal setting plays an important in determining alliance success (Mohr & Spekman, 1994; Monckza et al., 1998; Kauser & Shaw, 2004).

Conflict Resolution Techniques

Conflict represents the overall degree of disagreement on the basis of frequency, intensity, and duration in the partnership (Anderson & Narus, 1990), and occurs inevitably in a variety of conflict triggers in the areas of interpersonal or inter-organizational relationships over a period of time (Monczka et al., 1998). When companies accede to a strategic alliance with similar but not complementary motivations, conflict is more likely to arise due to the clash of interests between alliance partners, the interference of consequent opportunism, and lack of mutual trust (Sivadas & Dwyer, 2000). Major conflict triggers embrace: (1) ambiguous or overlapping jurisdictions; (2) competition for scarce resources; (3) communication breakdowns; (4) time pressure; (5) unreasonable standards, rules, policies, or procedures; (6) personality clashes; (7) status differentials; and (8) unrealized expectations (Kreitner, 2001, p. 506).

Once conflict triggers fail to stimulate constructive conflict or deteriorate into destructive conflict, conflict resolution techniques will be used (Kreitner, 2001). Conflict resolution is defined as the extent to which such disagreements between alliance partners can be replaced by consensus or agreement without imposing a solution on another party (Robey, Farrow, & Franz, 1989). Monczka et al. (1998) integrated many prevalent taxonomies and classified conflict resolution orientations into five categories: avoiding, accommodating, competing, compromising, or collaboration. This view was in line with the recent work of Kreitner (2001) on conflict management which suggested that conflict resolution techniques exclude the avoidance strategy but contain: problem solving, superordinate goals, compromise, forcing, and smoothing. When managers are confronted by destructive conflict, they may choose an avoidance strategy to run away

from the problem by doing nothing, or may fall back on one or more of the conflict resolution techniques (Kreitner, 2001). Therefore, conflict resolution techniques employed by alliance members imply the success and continuity of the partnership (Mohr & Spekman, 1994; Monczka et al., 1998; Sivadas & Dwyer, 2000; Kauser & Shaw, 2004).

Commodity/Supplier Selection Process

Based on prior studies, Monczka et al. (1998) suggested that the commodity selection process takes precedence over the supplier selection process to increase the likelihood of alliance success because organizations must ensure that strategic alliances are established in proper situations and that the right candidates for alliance are chosen. Monczka et al. (1998) also found a strong correlation between a formal process of purchasing a commodity, followed by a formal supplier assessment and selection process, and successful alliances.

Organizational Performance and Competitive Positioning

Organizational Performance

Traditionally, financial data has been considered as the basis for organizational decision-making for a long time; however, managers have no idea of the utility of non-financial data for improving decision making (Lawrie & Cobbold, 2004, p. 611). The review will introduce Kaplan and Norton's balanced scorecard, the mixed method of assessing organizational performance using both financial and non-financial data.

Balanced Scorecard by Kaplan and Norton

Kaplan and Norton initially introduced their conceptual framework of a balanced scorecard (BSC) in 1992 (Kaplan & Norton, 2001a, p. 87). It is based on the concept of

total quality management (TQM) (Introduction section, ¶ 3). According to the writings of Kaplan and Norton, the development of the BSC design is in three stages. In the first phase, the BSC is introduced as an improved performance measurement system in 1992 which integrates traditional financial performance measures as lag (or outcome) indicators with non-financial measures as lead (or performance drivers) indicators from the remaining three perspectives (Achterbergh, Beeres, & Vriens, 2003, p. 1394; Lawrie & Cobbold, 2004, p. 612). However, Kaplan and Norton provided vague definitions at that time and proposed little about measuring selection activity (Lawrie & Cobbold, 2004, p. 612, 613). In the second phase, using case studies in three companies (Rockwater, Apple Computer, and Advanced Micro Devices) in 1993, Kaplan and Norton (1996b) demonstrated that the contribution of the balanced scorecard is to connect long-term strategic objectives with short-term actions in a company (p. 75) by diagrams illustration called "strategy maps" (Lawrie & Cobbold, 2004, p. 614). In addition, Kaplan and Johnson in 1991 presented four management processes and Kaplan and Norton (1996b) consolidated them as followings: translating the vision, communicating and linking the vision, planning actions to realize the vision, and feedback and learning to adapt the plans for action (p. 75-77). In the third phase, Kaplan and Norton (2001b) expanded five principles of a strategy-focused organization: (1) translate strategy to operational terms, (2) align the organization to the strategy, (3) make strategy everyone's everyday job, (4) make strategy a continual process, and (5) mobilize leadership for change (p. 147).

In order to organize strategic objectives, this theory identifies four perspectives as the major constructs: (1) financial, (2) customer, (3) internal business processes, and (4)

learning and growth (Kaplan & Norton, 2001a, p. 90). The financial perspective refers to the strategy of growth, profitability, and risks; the customer perspective is viewed as the strategy of creating value and differentiation; the internal business processes perspective refers to the priorities by various business processes to create satisfaction of customer and shareholder; the learning and growth perspective is defined as the priorities to support a climate of organizational change, innovation, and growth (Kaplan & Norton, 2001a, p. 90).

The major propositions in the BSC are cause and effect relationships, expressed by "a sequence of if-then statements" (Kaplan & Norton, 1996a, p. 65). Before constructing a scorecard, the measurement system should clarify each relationship (hypothesis) among objectives placed over four perspectives, depending on "the story of the business unit's strategy" (Kaplan & Norton, 1996a, p. 65). In order to measure the organization's activities by translating its vision and strategy into goals, the firms have to ask themselves four questions in turn: (1) "if we succeed, how will we look to our shareholders?" in the financial perspective; (2) "to achieve my vision, how must I look to my customers?" in the customer perspective; (3) "to satisfy my customers, at which processes must I excel?" in the internal business processes perspective; and (4) "to achieve my vision, how must my organization learn and improve?" in the learning and growth perspective (Kaplan & Norton, 2001a, p. 91; Kaplan & Norton, 1996a, p. 54).

In the last decade, the BSC has been revised and adapted to incorporate statements by Guidoum in 2000, Shulver and Antarkar in 2001, Cobbold and Lawrie in 2002, Lawrie et al. in 2004, and Barney et al. in 2004 and strategic linkage model with two perspectives (i.e. activity and outcome) by Lawrie et al. in 2004, and Barney et al. in

2004 (as cited in Lawrie & Cobbold, in 2004, p. 618). Several empirical studies by Kaplan and Norton in 1992, 1993, 1996 and 2001 led to refinement of the BSC. Kaplan and Norton (1996a) provided approximately 25 measures in the BSC, and each of the four perspectives can comprise four to seven separate measures (p.68) to confirm the reliability of the measures and validity of each construct.

Kaplan and Norton (2004) developed a schematic model named "strategy maps" depicting both direct and indirect relationships among four perspectives about the BSC conceptual framework by linking components of the organization's strategy and describing how the organization creates value, which continues to be examined today (p. 11). The strategy map is established in five principles: (1) strategy balances contradictory forces ; (2) strategy is based on a differentiated customer value proposition; (3) value is created through internal business processes (i.e. operations management, customer management, innovation, and regulatory and social); (4) strategy consists of simultaneous, complementary themes; (5) strategic alignment determines the value of intangible assets (i.e. human capital, information capital, and organization capital) (Kaplan & Norton, 2004, p. 11-13). This theory is socially significant addressing essential issues about how to identify all possible non-financial measures in organizations (Lawrie & Cobbold, 2004, p. 611) in the discipline of performance management, and is useful in describing cause-and-effect relationships among those four perspectives. Thus the BSC is a well-developed guide for senior executive teams by offering a framework for describing strategies to create value for its shareholders, customers, and citizens through a strategy map in the organizations (Kaplan & Norton, 2004, p. 10). The BSC

framework has a good balance between simplicity and complexity, contributing to its usefulness.

Since the introduction of the BSC in 1992, the BSC has been adopted by executive teams to design their scorecard programs in various organizations (Kaplan & Norton, 2001a, p. 89). According to Bain & Company, by 2006 over 70% of the global organizations have implemented and tested the BSC (http://www.bain.com/management_tools/tools_balanced.asp?groupCode=2). Studies by Kaplan and Norton (2001b) compared the relationships among the BSC, activity-based costing (ABC), and shareholder value management, and they suggested that organizations should benefit by integrating three of them because they are independent of the others when implemented (p. 156). Studies by Achterbergh, Beeres, and Vriens (2003) verified linking the BSC to other instruments does contribute to organizational viability (p. 1403), and using the BSC alone is not a sufficient condition for organizational viability. Corporate performance management software systems have been considered as a partial solution to information asymmetry about the organizational activities and performance (Lawrie & Cobbold, 2004, p. 619). However, Neely et al. in 2002 argued that the BSC did not pay attention to the demands of multiple stakeholders in "complex ecosystem" (as cited in Marr & Adams, 2004, p. 24). Marr and Adams (2004) argued that it is not adequate and indeed causes confusion to re-define fundamental concepts of intangible assets (p. 24). Speckbacher et al. (2003) divided three types of the BSC users into different stages of its evolution. Moreover, Speckbacher et al. (2003) and Marr and Adams (2004) perceived that many companies use the term BSC as a "generic term" of performance management system rather than framework. The theory has been adapted to

commercial, government, and non-profit organizations and the Balanced Scorecard Institute provides training and consulting services.

Measurement of Organizational Performance

The scorecard provides the multiple strategic measures from four perspectives (Kaplan & Norton, 1996b, p, 76) and permits a balance between short-term and long-term objectives, and between desired outcomes and the performance drivers which are unique in the organization (Kaplan & Norton, 1996a, p. 56).

Financial

The financial perspective defines the long-term objectives of the business unit, and therefore Kaplan and Norton (1996a) identify three different stages: (1) rapid growth—at the early stages of the business life cycle, business units have to make investments on everything (p. 56); (2) sustain—the majority of business units will be in this stage and still need reinvestment (p. 57); (3) harvest—reaching a mature phase of life cycle and waiting for harvest of investment from the preceding two stages (p. 57). In addition, Kaplan and Norton (1996a) also indicated three financial themes to achieve organizational business strategies: (1) revenue growth and mix, (2) cost reduction and productivity improvement, and (3) asset utilization and investment strategy (p. 57). The balanced scorecard can customize financial objects and measures through these three financial themes with any of the three generic business strategies (p. 58).

Internal processes

The internal business process possesses two purposes for business units: (1) value propositions delivered to customers in "targeted market segments," and (2) excellent financial returns to satisfy expectations of shareholders (Kaplan & Norton, 1996a, p. 62).

In addition, the internal-business-process perspective of the balanced scorecard incorporates objects and measures in both "the long-wave innovation cycle" and "the short-wave operations cycle" (p. 63).

Customer

The customer perspective provides several generic measures of the successful outcomes and they are customer satisfaction, customer retention, new customer acquisition, customer profitability, and market and account share in the identified targeted segments (Kaplan & Norton, 1996a, p. 58). In addition, these measures may vary across all kinds of organizations and they should be customized to aim at the targeted customer groups (p. 58).

Innovation and Learning

The innovation and learning perspective sometimes is called learning and growth perspective in the literature. Learning and growth is composed of three sources: people, systems, and organizational procedures (Kaplan & Norton, 1996a, p. 63). The objectives from those three aforementioned perspectives (e.g. financial, customer, and internal-business-process) have gaps among existing capabilities (e.g. people, systems, and procedures) (p. 63). In order to build the infrastructure and close these gaps, organizations have to create long-run growth and improvement, and businesses must invest in "re-skilling employees, enhancing information technology and systems, and aligning organizational procedures and routines" (p. 63).

Employee-based measures are "employee satisfaction, employee retention, employee training, and employee skills"; information systems capabilities measures are: "real-time availability of accurate customer and internal process information to front-line

employees"; organizational procedures can be measured by "employee incentives with overall organizational success factors" (p. 63).

Competitive Positioning (or Competitive Advantage)

Jones, George, and Hill (2000) defined competitive advantage as "the ability of one organization to outperform other organizations because it produces desired goods or services more efficiently and effectively than its competitors" (p. 24). This review will discuss Michael Porter's generic strategies, the widely accepted model of competitive advantage.

Michael Porter's Generic Strategies

Michael Porter, a Harvard University economist, introduced the conceptual framework of the generic strategies based on his five forces analysis in 1979 about yielding competitive advantage in 1980 (Miloservic & Srivannaboon, 2006, p. 99). Porter's generic strategies in 1980 are extensively supported and identified in textbooks and literature (Allen & Helms, 2006, p. 434), though many academics have identified a variety of organizational strategies in the past, such as Miles and Snow's typology (e.g. prospector, defender, and analyzer strategy) in 1978 (Bednall & Valos, 2005, p. 440), and Treacy and Wiersema's typology in 1995 (Miloservic & Srivannaboon, 2006, p. 99).

This model identifies four major constructs: (1) cost leadership, (2) differentiation, and (3) focused low cost, and (4) focused differentiation strategy (Jones, George, & Hill, 2000, p. 253). Cost leadership strategy is defined as a strategy that the organization pursues by driving the costs down below those of its competitors to gain a competitive advantage, such as Wal-Mart Store, Inc (Jones, George, & Hill, 2000, p.253). With a low-cost strategy, "productivity improvement" is a primary priority for managers

(Kreitner, 2001, p. 206) and the organization still yields a profit because of its lower prices (p. 253). Differentiation strategy indicated that managers concentrate their energy on distinguishing the company's product or service from those of the rivals (Jones, George, & Hill, 2000, p. 253). With differentiation strategy, the organization can make "larger profit margins" than the cost leadership strategy because customers are usually willing to pay more for a superior product or service, such as BMW automobiles, Intel, and Caterpillar (Kreitner, 2001, p. 206). Unlike cost leadership and differentiation strategies aiming at the whole market or many segments, cost focus and focused differentiation strategies emphasize a narrow or regional market to achieve a competitive edge. Focused low cost strategy is that a company aims to be the lowest-cost company to serve one narrow or a few segments of the whole market, such as Cott Corporation (Jones, George, & Hill, 2000, p. 254). Focused differentiation strategy is that a company aims to be the most differentiated company to serve the limited audience, such as Toyota Camry, Toyota Tercel, and Lexus (Jones, George, & Hill, 2000, p. 255).

The major propositions in 1980 Porter's generic strategies are that managers must select one of the two primary ways to increase the products' value in an organization: differentiating the product to create value or lowering the costs of adding value and that managers must choose to serve the whole market or part of a market (Jones, George, & Hill, 2000, p. 253). Porter asserted that differentiation and cost-leadership are "mutually exclusive" (Allen & Helms, 2006, p. 436). According to Porter's framework, if managers and organizations simultaneously choose both a low-cost and a differentiation strategy, they will be "stuck in the middle" (Jones, George, & Hill, 2000, p. 254).

Over the last two decades, the generic strategies model has been revised and adapted to many exceptions, and therefore, a hybrid generic strategy is generated by studies of Gupta in 1995, Wright et al. in 1991, Miller in 1992 and 1998, Slocum et al. in 1994, Johnson and Scholes in 1993, Fuerer and Chaharbaghi in 1997, and Hlavacka et al. in 2001 (as cited in Allen & Helms, 2006, p. 436). Several empirical studies testing propositions in the theory, showed that it is possible to pursue both a low-cost and a differentiated strategy as a combination strategy in an organization (Allen & Helms, 2006, p. 436) and there are many contemporary cases, such as Toyota, McDonald's, and Compaq (Jones, George, & Hill, 2000, p.254). Traditionally, return on assets (ROA), return on equity (ROE), new product success, and sales growth are used to examine the relationship between strategy and performance (Kumar, Subramanian, & Yauger, 1997, p. 50-51). Porter's generic strategies are measured by multi-item scales instruments, developed by Narver and Slater in 1990 and they have reported satisfactory reliability and evidence of validity (Kumar, Subramanian, & Yauger, 1997, p. 52). Multi-item scales instruments and USER scale measure the Porter's four strategy types and performance metrics (Bednall & Valos, 2005, p. 439, 442).

Porter in 1990 developed a schematic model depicting these relationships among concepts about the theory, which continues to be examined today (Kreitner, 2001, p. 205). These four generic strategies are composed of two variables: competitive advantage and competitive scope (Kreitner, 2001, p. 205). Competitive advantage is on the horizontal axis: low cost or differentiation, and competitive scope are on the vertical axis: broad or narrow target market of the firm (Kreitner, 2001, p. 205). Managers and

organizations may choose one of the competitive advantages to achieve and aim at the broad or narrow market segment to serve their products or services.

This model is socially significant addressing essential issues about generalizing the linkage between strategy and performance across industries (Allen & Helms, 2006, p. 437) in the discipline of strategic management, and is useful in explaining relationships between "long-term earnings growth and a good strategy fit" (Kreitner, 2001, p. 206). Thus, it is well-developed model guiding to help managers think strategically (Kreitner, 2001, p. 206). This conceptual framework has a good balance between simplicity and complexity, contributing to its usefulness.

Studies by Allen and Helms (2006) verify the propositions of Porter's generic strategies highly associated with the linkage between organizational performance and the listed strategic practices in his exploratory study (p. 434), providing empirical validity to this conceptual framework. However, the major proposition with conflicting results in empirical studies is the orientation "stuck in the middle." Studies by Karnani in 1984, Miller and Friesen in 1986, White in 1986, Hill in 1988, Mathur in 1988, Murray in 1988, Cross in 1999, Miller in 1992, Dess and Miller in 1993, Johnson and Scholes in 1993, Fuerer and Chaharbaghi in 1997, Hlavacha et al. in 2001 argued that combining those strategies may be the best way to achieve a competitive advantage for an organization (as cited in Allen & Helms, 2006, p. 434). According to Allen and Helms (2006), a study by Helms in 1997 found that organizations have higher returns on investment when choosing low cost and differentiation strategies (p. 437). A study by Kumar et al. in 1997 purported that the hospital industry displays much higher performance when following the focused cost leadership hybrid approach than those following a single strategy (Allen

and Helms, 2006, p. 436). A study by Richardson and Dennis in 2003 indicated that the best strategy for niche segment was the hybrid focused differentiation strategy (p. 437). Therefore, many research and practitioners named this single combination of generic strategies the "best-cost strategy" (Milosevic & Srivannaboon, 2006, p. 99). Porter's conceptual framework of generic strategies has been applied principally to manufacturing industries and a few in services (Lindahl & Beyers, 1999, p. 3) for pursuing a competitive advantage.

Measurement of Competitive Advantage

Measurement by Dess and Davis in 1984

Traditionally, researchers measure organizational performance through return on investments (ROI), return on assets (ROA), net profit margin, general profitability, and overall competitive position (Lynch, Keller, & Ozment, 2000, p. 55). Lynch, Keller, and Ozment (2000) utilized measurement scales developed by Dess and Davis in 1984 to assess cost leadership and differentiation strategies because these scale items empirically supported Porter's three generic strategies: cost leadership, differentiation, and focus (p. 55). It is found that the Cronbach's α of cost leadership strategy and differentiation strategy are 0.83 and 0.92, respectively (p. 55, 56). Convergent validity was established because all items loaded significantly ($t > 1.96$) (p. 56).

Relationships Between Strategic Alliances and Supply Chain Management

Research with General Industries

Monczka, Petersen, Handfield, and Ragatz (1998) conducted both qualitative and quantitative survey research design concerning success factors in strategic supplier alliances. Monczka et al.'s (1998) literature review was thorough in comparing and

contrasting theories about inter-organizational relationships (IORs) between purchasing organizations and their independent suppliers, strategic alliances, and strategic supplier alliances. Empirical studies about the important attributes associated with strategic alliances were examined in many case studies, leading to the major gap in the literature about the benefits of strategic supplier alliances in a wide range of industries (p. 554). This resulted in Monczka et al.'s (1998) study testing the magnitude of these measurement scales (e.g. attributes of the relationship, communication behavior, conflict resolution techniques, and commodity and supplier selection processes) on partnership success, developed by Mohr and Spekman (1994).

An expert sampling plan, selecting respondents from the Global Procurement and Supply Chain Benchmarking Initiative (GEBN) member companies in the United States, Canada, Mexico, Western Europe, and Australia, resulted in the final data producing sample of 84 usable questionnaires, and a response rate of 41 %. In addition, a snowball sampling was used to yield two independent observations (i.e., customers-suppliers in strategic alliance) with 154 alliances. Reliability estimates were $\alpha \geq .70$ for all of the multi-item measures (i.e. trust and coordination, interdependence, commitment, information quality and participation, and information sharing) and convergent validity of the variables were assessed by principal components factor analysis with varimax rotation (p. 561, 562). Criterion validity was established by calculating bivariate correlations between two measures of success (success and success difference) and five measures of alliance performance (i.e. price, quality, cycle time, technology, and NPD time) and all correlations were significant at the $\rho < .10$ level (except for the correlations

of success difference and NPD time) (p. 563). Data collection procedures were described clearly, and there was not a report that the study was IRB approved.

All hypotheses were measured by progression analysis (p. 563). Findings of H1 were that successful strategic supplier alliances are associated with high levels of (b) trust and coordination, and (c) interdependence, but did not support (a) commitment. Findings for H2 were that successful strategic supplier alliances are associated with high levels of (a) information sharing, and (b) information quality and participation, partially supporting H2. Findings for H3 were that successful strategic supplier alliances are associated with (a) high use of constructive conflict resolution techniques (i.e., joint problem solving and persuasion), (b) low use of conflict avoidance technique (i.e., avoiding issues), and (c) low use of destructive conflict resolution technique (i.e., harsh words, outside arbitration), and partially supported H3. Findings of H4 were successful strategic supplier alliances are associated with the existence of a formalized commodity/supplier alliance selection process, and supported H4.

Monczka et al.'s (1998) interpretation of these findings was as follows. Findings of industrial purchasing alliances confirmed propositions of marketing channel partner relationships with three major exceptions (i.e., interdependence, commitment, and information sharing) by Mohr and Spekman in 1994 (p. 565, 566). These findings led to Monczka et al. (1998) developing the following conclusions that the results of supplier-manufacturer parallel the findings of Nohr and Spekman's findings of a manufacturer-distributor sample. Implications for practice were that building a successful supplier alliance is to "foster and nurture" trust with the supplier via task coordination; "the use of formal commitments of time and money" is not a predictor to assess alliance success;

"bilateral communication behavior," a formal purchasing commodity strategy and supplier assessment and selection process are important to alliance success. Strengths of the study were analyzing both qualitative and quantitative data through over 200 companies engaging in procurement and SCM. Limitations are difficult to interpret the results and the reduced sample (Monczka et al., 1998, p. 564). Finally, Monczka et al. (1998) recommended merging conflict management and supplier alliances for future study (p. 570).

Internal validity strengths are proper deployment relationships between independent and dependent variables, the reliability of each item scale, validity of measures of variables, and adequate size sample to conduct the statistical analyses. An internal validity weakness is not clearly defined procedures allowing replication. The external validity strength is the sufficient sampling plan representing the target population. A limitation is in the small sample size. Future studies should extend the population setting to more countries and different industries.

Research with Construction Industry

Ngowi (2001) conducted a qualitative semi-structured interview research about the impact of "private benefits" on construction alliance performance in Botswana (p. 245). The literature review was thorough in comparing and contrasting theories about governance structure of alliances, private and common benefits, and alliance performance. Empirical studies about high failure rates of alliances were examined, leading to the major gap in the literature about the likelihood that firms translate resources from the alliance for private benefits. This resulted in the influence of "private aspirations" on construction industrial performances.

A purposive sampling plan resulted in the final data producing sample of 5 alliances, executing projects from 1980 to 2001, in Botswana with both sides of their partner companies. The eight interview questions were used to measure the behavior of the firms in the alliance (p. 246). Reliability estimates were from the information and records kept at the Ministries of Works, Transport and Communication (MWTC); Local Government, Lands and Housing (MLGLH); Financial and Development Planning (MFDP) (p. 246). Validity was not established. Data collection procedures were via telephone and one by fax (p. 245), and there was not a report that the study was IRB approved.

Ngowi's (2001) interpretation of these findings was as follows. Findings were that the reasons for establishing alliances are acquisition of know-how and risk-sharing in uncertain market segments (p. 248). Findings were that firms in Botswana try to learn skills from their partners and apply them for private activities (p. 248). Other findings were that the incentives to maintain the alliances often terminate once the partner's incomes from private activities is higher than those from common activities by applying the learned skills of the former in Botswana. These findings led to Ngowi (2001) developing the following conclusions that it is necessary to form alliances for companies to "pool their resources together and compete favorably" (p. 248). Implications for practice were that it is a need to develop an elaborate framework of building alliance processes in Botswana when the Government plans to promote the construction industry by transferring know-how in alliances.

Internal validity strengths of this study are the quality of the theory and clearly described data collection conditions. An internal validity weakness is insufficient sample

size. The external validity strength is that the sample closely represents the target population in long-term alliances of construction industry. The external validity weakness is the limited population setting to generalize the results of the study. A limitation is in the small sample size. Future studies should extend explaining the reasons why firms terminate the alliance in different countries.

Relationships Among Supply Chain Management, Organization Performance, and Competitive Advantage

Research with General Industries

Tracey, Lim, and Vonderembse (2005) conducted an explanatory (correlational) survey research design about the supply chain management, the strategic role of SCM in achieving customer value, competitive advantages, and the impact of a firm's SCM capabilities on perceived product value, customer loyalty, market performance, and financial performance. A systematic sample of 474 manufacturing managers from the USA-based manufacturing firms with from 50 to 1,000 employees across four SIC codes participated with a 14.5 % response rate. The literature review was thorough in comparing and contrasting theories about SCM capabilities which classified into three capabilities: outside-in (physical supply), inside-out (physical distribution), and spanning processes. Empirical studies about those three SCM capabilities were examined, leading to the major gap in the literature about the impact of customer-oriented SCM issues on the firm's competitive position and performance. This resulted in Tracey et al.'s study of the impact of SCM capabilities on four business performances metrics, testing the proposition of the linkage between those three capabilities and exceptional profitability developed in 1994 by Day.

A five-point rating scale was developed and the pilot tested to measure those three SCM Capabilities (with three dimensions: OIC, IOC, and SC), four types of performance (i.e., perceived value, customer loyalty, market performance, and financial performance), were measured with a Likert scale. Reliability estimates were 0.79 to 0.89. Content validity was established by four steps before survey items generation. Data collection procedures were clearly described, and there was not a report that the study was IRB approved.

Using LISREL results supported the measurement model and supported hypothesis H1 of the direct effect of the OIC on the IOC (path coefficient = 0.61 with t-value = 7.71~8.87). Findings were path coefficient = 0.15~16 with t-value = 3.22~3.39 and supported hypotheses H2a, H2b, H2c, and H2d that IOC has a direct positive effect on perceived product value, customer loyalty, market performance, and financial performance. Findings were path coefficient = 0.75 with significant t-value and supported hypothesis H3 that SC has a direct positive effect on OIC. Findings were path coefficient = 0.33 with t-value = 4.19~5.76 and supported hypothesis H4 of the direct effect of SC on IOC. Findings were path coefficients = 0.25, 0.26, and 0.16, respectively with t-value < 2 and supported hypotheses H5a, H5b, and H5c of the direct effect of SC on the perceived product, customer loyalty, and market performance. However, findings were path coefficient = 0.10 with t-value = 1.62 and did not support hypothesis H5d that SC has a direct effect on financial performance. Other findings were the ratios of chi-square to degrees of freedom, Goodness-of-fit index (GFI), adjusted-goodness-of-fit index (AGFI) are all above 0.90, and all four root mean square residuals (RMSR) were less than 0.016, supporting that the conceptual model is a good fit to the data.

Tracey's et al.'s (2005) interpretations of these findings were as follows. Findings of supply chain management capabilities on business performance confirmed propositions by Day in 1994 that companies must sustain certain types of capabilities regardless of industry to remain competitive. Findings of the importance of having SCM capabilities in manufacturing firms supported studies by previous researchers. These findings led to Tracey et al. developing the following conclusions that SCM capabilities is an important competitive advantage and is an important determinant of a firm's business performance. Implications for practice were that strategically developing SCM capabilities enables a manufacturing firm to identify and take advantage of opportunities in the global marketplace. A limitation reported by Tracey et al. (2005) was that the sample was selected from manufacturing firms in the USA across four SIC codes. The following recommendations for areas of future study were: (1) collect more extensive data to confirm, refine, and expand on the model presented, (2) examine associated construct measures utilizing confirmatory factor analysis, and (3) extend the research to additional industries and firms from outside of the USA.

The internal validity strengths of this study are the reliability of each scale, validity of measures of variables, the five hypotheses testing of propositions based on Day's three SCM capabilities framework in 1994 and a sufficiently large sample for data analysis by utilizing LISREL to test a causal model. The internal validity weaknesses are inadequate sample size and not clearly defined procedures allowing replication. The external validity strengths are probability sampling plan and large-scale data collection. The external validity weaknesses are the findings in this study may not be used across multiple organizations and additional industries outside of the USA. The limitations in

the study are in limiting sample size to four SIC codes and focusing on manufacturing firms within 50 to 1,000 employees. Future studies should extend sample size by utilizing more SIC codes in different countries and different types of organizations. Furthermore, future study can use hierarchal linear modeling (HLM) to test the model as well.

Wisner (2003) used a three phase, correlational (explanatory) survey research design to examine the relationships between strategies focusing on immediate suppliers and customers, supply chain management, and firm performance, using structural equation modeling, with senior managers in U.S. and European manufacturing and service organizations between December 1998 and October 1999. Wisner's (2003) literature review was thorough in comparing and contrasting theories about SCM, supplier management strategy, and customer relationship strategy. Empirical studies about the linkages between SCM practices or strategies and firm performance were examined, leading to the major gap in the literature about defining the role of external relationship activities in the development of supply chain management strategy, identifying the specific linkages between supplier management and customer relationship strategies and supply chain strategy, and the corresponding impact these strategies have on firm performance (p. 6). This resulted in Wisner's (2003) study using a structural equation model of supply chain management strategies and firm performance testing the proposition of the performance expectations of successful SCM implementations developed in 1998 by Lambert, Cooper, and Pagh.

A probability sampling plan, selecting respondents from the American Production and Inventory Control Society (APICS) and the National Association of Purchasing

Management (NAPM) databases, resulted in the final data producing sample of 556 usable surveys, and a response rate of 10.2%. The close five-point rating scale was used to measure supplier management strategy, customer relationship strategy, supply chain management strategy, and performance. Reliability estimates using Cronbach's alpha ranged from 0.7136 to 0.8784. Content validity was established by using 30 senior purchasing managers to revise the questionnaire. Data collection procedures were clearly described and there was not a report that the study was IRB approved.

Findings for a modified hypothetical model (i.e., supplier management strategy measure model, customer relationship strategy measurement model, and supply chain management strategy measurement model) using LISREL8-SIMPLIS supported the structural equation model. Thus, all findings indicated the modified model fits the sample data well, and supported hypotheses H3-H6, namely, that the supplier management and customer relationship strategies significantly impacted supply chain management strategy, supply chain management strategy significantly influenced firm performance, and that supplier management and customer relationship strategies significantly impacted each other (p. 18). Wisner (2003) did not mention whether H1 and H2, namely the impact of supplier management and customer relationship strategy on firm performance, were supported. However, he indicated that there was a bi-directional relationship existing between supplier management and customer relationship strategy (p. 18).

Wisner's (2003) interpretations of these findings were as follows. Findings of the positive impact of both supplier management and customer relationship strategy on supply chain management strategy and on firm performance supported the studies by

Cooper, Lambert, and Pagh in 1997 and Stank, Keller, and Daugherty in 2001. Findings of significant impact of immediate and second-tier supply chain management strategies on firm performance either directly or indirectly confirmed Carter and Narasimhan in 1996 and Christopher in 1998. These findings led to Wisner (2003) developing the following conclusions that these relationships among supplier and customer strategies, supply chain management strategy, and firm performance may well be the key to sustained competitive advantage (p. 19). Implications for practice were that firms should not view or evaluate their supplier or customer practices independently and that increasing information and coordination capabilities with suppliers tends to increase those same capabilities with customers as well. Strengths of the study reported by Wisner (2003) were the broader view of SCM, including the focal firm and integrative activities (p. 1). Limitations reported by Wisner (2003) were that results were generated only from the NAPM and APICS and a slight time lag problem (p. 19). Further, firm performance data were not collected due to receiving the qualitative assessments from managers (p. 19). Wisner (2003) identified an assessment of the type of performance measurements used among firms practicing SCM and the triads of suppliers-buyers-customers in interactions and practices (p. 20), as areas of future study.

The internal validity strengths of this study are the reliability between survey questions and the validity of the measuring instruments, such as a pre-tested survey and the structural equation modeling, used to obtain the adequate sample data. The internal validity weaknesses are the long time period for data collection and inadequate sample size. The external validity strength is a probability random sampling plan easily accessing the target population. The external validity weakness is a limited population

setting to generalize the results of the study. The limitation in the study is in limiting the sample size from the NAPM and NAPM databases. Future studies should extend the population setting to abroad and not focus on manufacturing and service organizations.

Research with Construction Industry

Hendricks and Singhal (2005) conducted a quantitative secondary research study about the association between supply chain glitches (e.g., production or shipment delay, or both) and operating performance (e.g., operating income, sales, cost structure, assets and inventories) to examine how the impact of glitches varies by the reasons and the source of responsibility, industry, firm size, and the calendar time when glitches occurred. They used an ex post facto research design, based on a sample of 885 glitches announced by publicly traded firms during 1992-1999, and data from quarterly financial reports around the time of glitches. Hendricks and Singhal's (2005) literature review is current and brief in comparing and contrasting concepts about the negative consequences of supply chain glitches, which indicate a mismatch between demand and supply. Empirical studies about supply chain management strategy and practices on operating performance were examined, leading to the major gap in the literature about the relationship between supply chain effectiveness and financial performance, and the impact of supply chain glitches on both the shareholder value and risk. This resulted in Hendricks and Singhal's (2005) study on the association of glitches with operating performance (p. 696) testing their previous proposition of the stock market reaction to glitches developed in 2003 and 2005 by Hendricks and Singhal.

A purposive sampling plan resulted in the final data producing sample of 885 supply chain glitch announcements, via *Wall Street Journal* and the *Dow Jones News*

Service, and set up the sample firms to compare against a sample of control firms of similar size and from similar industries as well. Further, they used the COMPUSTAT database for quarterly data from the period 1991-2001. The change in operating income and return on assets were used to test the association between supply chain glitches and profitability in H1. Change in net sales and changes in total costs were used to measure net sales and costs associating with supply chain glitches respectively in H2 and H3. Total assets and total inventories were used to test the relationships among assets, inventory performance, and supply chain glitches. Reliability estimates were improved by using the approaches advocated by Barber and Lyon in 1996, comparing the characteristics of the matched sample and control firms for the three control samples. Criterion-related validity was established because the financial indices were relevance, freedom from bias, reliability, and availability.

Findings from H1 to H4 were analyzed using the t-statistic to compare means with variables (i.e. profitability, net sales, costs, and asset and inventory performance), Wilcoxon sign rank test Z-statistic for the median, and the binomial sign test Z-statistic for the percentage negative. And the prior performance-based matched portfolio approach advocated by Barber and Lyon in 1996 for another sensitivity test also was used. The result indicated that the glitches are negatively associated with operating performance, all significantly different from zero ($p \leq 0.01$), and support H1, H2, H3, and H4. Other findings were that firms do not quickly recover from the negative economic consequences of glitches during the two-year period after the glitch announcement.

Hendricks and Singhal's (2005) interpretation of these findings were as follows. Findings of the significant negative association of glitches with operating performance

confirmed propositions by Hendricks and Signhal's (2003, 2005) study on stock market reaction to supply chain glitches. These findings led to Hendricks and Singhal's (2005) conclusions that the market is reacting to the actual and anticipated drop in profitability due to glitches and not just some overreaction to "bad news" or "market over-exuberance" (p.710). Implications for practice were that firms need to develop the capability to predict glitches, though good supply chain management practices can prevent glitches. Strengths of the study reported by Hendricks and Singhal (2005) are reflected in the measuring concepts. Limitations reported by Hendricks and Singhal (2005) were that the glitches may occur in a specific business unit of a firm, but their analyses are based on the performance of the firm as a whole, and that they focused on the association of glitches with operating performance of the announcing firms. Hendricks and Singhal (2005) recommended estimating the impact on upstream and downstream supply chain partners for future study.

The internal validity strength of this study is an adequate size sample and data collection. The internal validity weakness is using a lower level of data analysis. The external validity strength is the large-scale sampling plan representing the target population. The limitation in the study is in the COMPUSTAT database providing quarterly data for only a 12-year time period. Future studies should use different data sources, alternate methodologies, and higher levels of data analysis.

Relationships Among Supply Chain Management, Strategic Alliances, Organizational Performance and Competitive Advantage

Research with General Industries

Lynch, Keller, and Ozment (2000) conducted a key information survey research design about the relationships among distinctive logistics capabilities, Porter's generic strategies, and overall firm performance. Lynch et al.'s (2000) literature review was brief in comparing and contrasting theories about generic business strategies, resource-based theory with empirical evidence about capabilities. Empirical studies about the relationship between strategy and performance and between firm resources (capabilities) and performance were examined but results were mixed, leading to the major gap in the literature about integrating strategy and both capabilities into firm performance in the same study. This resulted in Lynch et al.'s study testing the mix proposition of achieving superior performance when a firm pursues a given strategy with proper resources and capabilities (p. 47).

A purposive sampling plan resulted in the final data producing sample of 480 CEOs and vice presidents of the retail grocery industry in the United States and Canada through *The Marketing Guidebook* with a response rate of 16%. The measurement scales developed by Dess and Davis in 1984 were used to measure cost leadership and differentiation strategies (p. 55). Thirty-two logistics performance capability measures from the Michigan State University research were filtered by experts and were used to assess distinctive logistics capabilities (i.e. process capabilities and value-added service capabilities) (p. 53, 54). Reliability estimates were $\alpha = .87$ in value-added service, $\alpha = .90$ in process, $\alpha = .83$ in cost leadership, $\alpha = .92$ in differentiation, and $\alpha = .95$ in performance

for internal consistency. Content validity was established by literature review and questionnaire items with a pretest view via academic, experts, and several CEOs in the logistics and strategy areas. Convergent validity was established by confirmatory factor analysis (CFA) via LISREL 8, and all items loaded significantly ($t>1.96$) (p. 56). In addition, the average vaiance extracted exceeded the shared variance for all construct pairs, resulting in discriminant validity for each construct was established as well. Data collection procedures were clearly described, and there was not a report that the study was IRB approved.

All hypotheses were tested by LISREL 8 and each construct was assessed for statistical significance of the path coefficient. Findings were positive relationships between process capabilities and cost leadership strategy ($\gamma= .74$, $t=3.96$), between value-added service capabilities and differentiation strategy ($\gamma= .30$, $t=2.33$), between process capabilities and differentiation strategy ($\gamma= .25$, $t=1.82$), between cost leadership strategy and performance ($\beta=.54$, $t=3.05$), and between differentiation strategy and performance ($\beta=.33$, $t=2.61$), supporting H1, H2, H3, H5, and H6. Findings reveal no significant relationships between value-added service capabilities and cost leadership strategy ($\gamma= .20$, $t=1.65$), between process capabilities and firm performance ($\gamma= -.27$, $t=-1.47$), and between value-added service capabilities and firm performance ($\gamma= .21$, $t=1.68$), not supporting H4, H9, and H10. Findings were that both the cost leadership and differentiation strategies lead to good organizational performance ($\chi=857.44$, $df=316$, $p=.00$), and did not support H7. Findings were that the path from process capabilities to cost leadership strategy is stronger than the path from value-added service to differentiation strategy ($\chi=870.06$, $df=316$, $p=.00$), and support H8. Finally, findings

were that the path to performance from matched capabilities and strategy are expected to be stronger than the paths to performance from mismatched capabilities and strategy (χ=878.24, df=318, p=.00), supporting H11 (p. 58-61).

Lynch et al.'s (2000) interpretation of these findings was as follows. Findings of significant linkage logistics capabilities with strategy confirmed the proposition by Barney in 1991 and others that resources or capabilities are essential for companies to achieve a given strategy (p. 61). Findings were contradictory about the importance of cost-saving measures and low-price strategy to overall firm performance and did not support conventional wisdom. In addition, findings were that only two strategies (i.e. cost leadership and differentiation) emerge in the retail grocery industry and did not confirm Porter's 1980 three generic strategies which a firm may pursue (p. 62). These findings led to Lynch et al. (2000) developing the following conclusion that the more properly matched capabilities and strategies, the more superior is the firm performance (p. 61). Implications for practice were that both strategies (cost-leader and differentiation) are equally important to firm performance and the use of logistical capabilities in pursuing a given strategy becomes more intriguing (p. 62). Strengths of the study were examining the absence of empirical evidence in both capabilities and strategy in firm performance (p. 47). Limitations were the small sample size in the retail grocery study, ignoring extraneous variables (e.g., marketing and finance), and generalizing from only one industry to other contexts. Lynch et al. (2000) reported that future study should determine the extraneous variables and the degree to which mismatching capabilities and strategies may suppress firm performance (p. 62).

Internal validity strengths of this study are the reliability and internal consistency of each construct scale, the validity of measure analysis tested by CFA via LISREL8, easy replicating procedures to other industries, and the eleven hypotheses testing of propositions based on Porter's generic strategies and resource-based view. The internal validity weakness is insufficient sample size. The external validity strength is a purposive sampling plan, focusing on one single industry with extraneous variables control. External validity weaknesses are that the findings in only one setting may not generalize to other industries, and the target population. The limitation is the limited sample size from the USA and Canada. Future studies should extend the population to other countries or industries.

Research with Construction Industry

Sakar, Echambadi, Cavusgil, and Aulakh (2001) conducted an explanatory (correlational) survey research design about the impact of partner characteristics on the performance of alliances in construction contracting industry (p. 358). Sakar et al.'s (2001) literature review was thorough in comparing and contrasting theories about inter-organizational collaborations. Empirical studies about the association between structural aspects of partners, sociopsychological issues (i.e. relationship capital), and effective collaborations (i.e. alliance performance) were examined, leading to the major gap in the literature about the interrelationships between those mentioned variables and their impacts on performance (p. 359). This resulted in Sakar et al.'s (2001) study testing the proposition of inter-firm diversity (Type I: complementary resources and capability profiles; Type II: social dimensions) developed in 1991 by Parkje (p. 359).

A purposive sampling plan resulted in the final data producing sample of 561 firms in the international construction contracting industry from the United States and other 18 countries through *Engineering News Record (ENR)* with a response rate of 12.3 % (p. 365). The closed-ended questionnaire with 5-point Likert-type scales was used to measure each construct (p. 365). Partial Least Squares (PLS) version 3.0 was also used to estimate the causal model (p. 365). Reliability estimates were $\alpha > .7$ for internal consistency (p. 366). Convergent validity was established. Data collection procedures were clearly described, and there was not a report that the study was IRB approved.

There are 9 hypotheses (1-3 and 7-9 with a-b; 4-6 with 1-c). Findings were that resource complementarity is related to project performance (β=.22, ρ<.05), but not to strategic performance (β=.09, ρ>.05), supporting H1a but not H1b. Findings were that the direct effect of cultural compatibility on strategic performance (β=.50, ρ<.05), but not on project performance (β=.03, ρ>.05), supporting H2b but not H2a. Findings were that operational compatibility is not related to project performance (β=.13, ρ>.05) and the impact of operational compatibility reveals no significant on strategic performance (β=-.25, ρ<.05), not supporting H3a, and H3b. Findings were that resource complementarity is associated with reciprocal commitment (β=.27, ρ<.05), but is not related to trust (β=.07, ρ>.05) or bilateral information exchange (β=.01, ρ>.05), thereby supporting H5a but not supporting H4a and H6a. Findings were that cultural compatibility is related to mutual trust (β=.40, ρ<.05), reciprocal commitment (β=.42, ρ<.05), and bilateral information exchange (β=.39, ρ<.05), supporting H4b, H5b and H6b. Findings were that operational compatibility is related to trust (β=.37, ρ<.05), and commitment (β=.19, ρ<.05), but not to bilateral information exchange (β=-.02, ρ>.05), thereby supporting H4c and H5c, but not

supporting H6c. Findings were that trust is related to project performance (β=.17, ρ<.05), but not to strategic performance (β=-.15, ρ>.05), thus supporting H7a but not supporting H7b. Findings were that commitment is related to project performance (β=.39, ρ<.05) and strategic performance (β=.30, ρ<.05), supporting H8a and H8b. Findings were that reciprocal information exchange is related to strategic performance (β=.18, ρ<.05), but not to project performance (β=.07, ρ>.05), thereby supporting H9b but not H9a.

Sakar et al.'s (2001) interpretation of these findings was as follows. Findings that different types of interfirm diversity affect performance differently confirmed propositions of interfirm diversity (Type I and II) by Parkhe in 1991 (p. 369). These findings led to Sakar et al. (2001) developing the following conclusions that complementary resource and capability profiles intensify the value created in alliances and in the social institutions of the partners (p. 369). Implications for practice were that alliance partners can enhance organizational performance when combining complementary resources and capabilities (p. 369). Strengths of the study were integrating extant international alliance literature and developing a theoretical framework. Limitations reported by Sakar et al. (2001) were data collection through a cross-section approach, information collected from only one side of the dyad, using single informants, and small sample size. Finally, they reported the recommendations for future study to consider various contingencies existing in the relationship between partner characteristics and performance (p. 370).

Internal validity strengths of this study are the reliability and validity of measurement of variables, nine hypotheses testing based on Parkje's 1991 interfirm diversity, and the high level data analysis via PLS. The internal validity weakness is

deficient data collection conditions. The external validity strength is the proper sampling plan focusing on the global construction contracting companies in international alliances. The external validity weakness is the limited population setting to generalize the results of the study. The limitation in the study is ignoring the temporal aspects of the relationship. Future study should investigate the alliance performance when firms use SCM.

Synopsis of the Review

The configuration of supply chains in the construction industry is well established in the literature (Matthews et al., 2000; Kanji & Wong, 1998). The critical problem of applying supply chain management (SCM) in the construction industry causing poor performance (Vrijhoef & Koskela, 1999; Matthews et al., 2000; Kanji &Wong, 1998; Cheng et al., 2001), the strengths (e.g., cost saving, service improvement, asset utilization to achieve differentiation; integrating business functions and processes with key members for competitive advantage; communication), weaknesses in the application of SCM in industries (CSCMP, 2007; Lambert et al., 1998; Chan et al., 2003; Stephens, 2001; Huan et al., 2004), and factors affecting the effectiveness of SCM (Croxton et al., 2001; Huan et al., 2004) are well established in the literature.

Two SCM theories, the global supply chain forum (GSCF) model by GSCF members in 1994 and the supply chain operation reference (SCOR) model by the SCC in 1997 are conceptual models with little empirical validity support. The GSCF model lacks adequate performance metrics (Croxton et al., 2001; Lambert et al., 2005; Tracey et al., 2005) and clear guidelines (Croxton et al., 2001). The SCOR model employs various metrics at different levels (Huan et al., 2004). In addition, the definition of the GSCF

model has become the most frequently quoted or cited by scholars in the field (Lambert et al., 1998; Lambert et al., 2005; Wisner, 2003; Tracey et al., 2005). The SCOR model has been a tool for industries for improving business operations and in university curricula around the world (Stephens, 2001). The proposition of SCM theory has been applied in practices around the world (SCC, 2006; Stephens, 2001; CSCMP, 2007). However, most of the researchers engaged in SCM focus on business process reengineering and integration without specifying the processes (Croxton et al., 2001). As a result, it is difficult to know how to measure performance when implementing SCM in practice.

Some scholars such as Krippaehen et al. in 1992, Flanagan et al. in 1998, Barlow et al. (1997), Gunasekaran (1999), and Holt et al. (2000) suggested forming alliances of construction partners (Cheng et al., 2001; Matthews et al., 2000; Kanji & Wong, 1998). Further, Holt et al. (2000) proposed two kinds of construction alliances. The advantages of establishing strategic alliances (such as achieving competitive advantage, expanding knowledge, developing applications, commercializing new products, obtaining external resources and flexibility, mitigating uncertainty without investments) (Whipple & Frankel, 2000; Cante et al., 2004; Sakaguchi et al., 2004), the high failure rate (Whipple & Frankel, 2000), and successful factors in strategic alliances (Monczka et al., 1998) are well established in the literature. However, there is no study about assessing organizational performance when implementing a strategic alliance in the construction supply chain.

Transaction cost economics (TCE) by Williamson in 1975 is used to answer which transaction governance structures (TGS; market, hybrid, and hierarchy) provide

the most efficient exchange which affected asset specificity, uncertainty, and frequency under two assumptions (bounded rationality, opportunism) is fairly well-developed in models and is well established in the literature (Zhang, 2006; Rahman, 2007; David & Han, 2004; Sven-Olof & Rikard, 1993; Roberts & Greenwood, 1997). Several studies seem to support empirical validity in the TCE by Anderson (1985), Heide and John (1992), Walker and Weber (1987), and Zhang (2006) and led to abundant empirical applications in many fields or academic disciplines. For his work in this area, Ronald Coase was awarded the Nobel Prize in Economics in 1991 (Rindfleisch & Heide, 1997). Many researchers utilized survey instruments with multi-item scales to measure the constructs in TCE and others use secondary data indicators (Rindfleisch & Heide, 1997).

The resource based view (RBV) by Wernerfelt in 1984 is used to explain how the unique bundle of resources (resources, competencies, and capabilities) generates sustained competitive advantage and results in superior performance (Dhanaraj & Beamish, 2003; Conner & Prahalad, 1996; Barney, 1991; Fahy, 2000), and even to explore unused resources (Pettus, 2003). RBV is a well-developed model with significant empirical validity through the LISREL instrument (Dhanaraj & Beamish, 2003; Conner, 1991), and has been viewed as the theory of competitive advantage if the firm deploys internal resources effectively (Fahy, 2000). The RBV has been continuously refined and empirically tested (Dhanaraj & Beamish, 2003; Fahy & Simthee, 1999; Fahy, 2000; Hoskisson et al., 1999; Wenerfelt, 1995).

Among organizational performance theories, the balanced scorecard (BSC) by Kaplan and Norton in 1992 through three stages is a fairly well-developed model (i.e., financial, customer, internal-business-process, and learning and growth perspectives)

with significant empirical validity by Kaplan and Norton in 1992, 1993, 1996, and 2001, utility, and significance, and has been considered as a strategic management system by providing proximately 25 measures (Kaplan & Norton, 1996; Achterbergh et al., 2003). However, several scholars suggest integrating other instruments with the BSC while implementing it (Kaplan & Norton, 2001b; Achterbergh et al., 2003).

Michael Porter's generic strategies in 1980 (cost leadership, differentiation, focused low cost, and focused differentiation strategy) is a widely accepted competitive advantage model with significant empirical validity (Allen & Helms, 2006; Narver & Slater, 1990; Kumar et al., 1997), utility and significance. Criticism is in its proposition "stuck in the middle" (Jones et al., 2000) and it has been revised and adapted to generate a hybrid strategy by Gupta in 1995, Wright et al. in 1991, Miller in 1992 and 1998, Slocum et al. in 1994, Johnson and Scholes in 1993, Fuerer and Chaharbaghi in 1997, and Hlavacka et al. in 2001 (as cited in Allen & Helms, 2006), with numerous contemporary cases by Jones et al. (2000), and Helms in 1997, Kummar et al. in 1997, and Richardson and Dennis in 2003. Multi-item scales instruments and the USER scale measure Porter's four strategy types and performance metrics (Bednall & Valos, 2005, p. 439, 442).

In sum, SCM has been shown to be associated with cost savings and service improvement and it is well established that supply chain management capabilities or logistics capabilities affects organizational performance (Tracey et al., 2005; Lunch et al., 2000). Several studies have demonstrated a relationship between strategic alliance and SCM (Monczka et al., 1998) and partner characteristics (Sakar et al., 2001) to influence organizational performance. Ngowi (2001) noticed the private benefits in construction

alliance in Botswana, and Hendricks and Singhal (2005) found a negative relationship between supply chain glitches and operating performance in the stock market. However, very few studies were found to verify the relationship between SCM and strategic alliance in the construction industry, and no studies were found to examine the successful factors of supply chain alliance in construction industry or in many countries. Some problems and limitations are found in these studies such as relatively small sample size (Monczka et al., 1998; Wisner, 2003; Hendricks & Singhal, 2005; Tracey et al., 2005; Lynch et al., 2000; Sakar et al., 2001), focus on one side of the dyad (Sakar et al., 2001), and focus on only one or two industries (Lynch et al., 2000; Tracey et al., 2005; Wisner). In general, the strengths of these studies are properly identified, measured and contributed to the knowledge of understanding relationship among the supply chain management, strategic alliances, organizational performance, and competitive advantage in general and construction industries.

Theoretical Framework

The theoretical framework that guides this research about the success of strategic alliances integrates theories of dimensions of alliance and success factors of the alliance, which consist of the Mohr and Spekman model (1994), the Monczka et al.'s model (1998), and the Kauser and Shaw model (2004). This framework is based on the premise that behavioral characteristics (i.e., dimensions of alliance), which distinguish business relationships with more intensity than less successful partnerships, have influence on successful strategic alliances.

The Mohr and Spekman (1994) model identified the constructs of behavioral characteristics, including attributes of the partnership (i.e., commitment, coordination,

interdependence, and trust), communication behavior (i.e., communication quality, information sharing, and participation), and conflict resolution techniques (joint problem solving, persuasion, smoothing, domination, harsh words, and arbitration). The model indicated that these three dimensions of alliance were related to satisfaction with profit and dyadic sales (i.e., the successful partnership). It also argued, however, that interdependence is not related to any dependent variables, and the use of constructive conflict resolution techniques rather than that of destructive ones is positively related to successful alliances.

Monczka et al.'s model (1998) recognized the original concepts of attributes of the alliance (i.e., commitment, trust and coordination, and interdependence), communication behavior (i.e., information quality and participation, and information sharing), conflict resolution techniques (i.e., joint problem solving, persuasion, smoothing, domination, harsh words, and outside arbitration), and identified commodity/supplier selection process (i.e., supplier assessment and selection, and commodity/purchase item selection) as the fresh constructs in the study. In addition, there are seven measurement items for success of the alliance, including satisfaction, adjusted satisfaction, price, quality, cycle time, technology, and new product development time (NPD). The model confirmed that those four major dimensions of alliance were related to the success of alliances. However, it contended that the use of formal commitments of time and money fail to become a predictor of alliance success.

In the Kauser and Shaw model (2004), the behavioral characteristics focused on attributes of the partners (i.e., coordination, interdependency, commitment, trust), communication attributes (i.e., quality of information, information sharing, participation

in planning and goal setting), and conflict resolution techniques (i.e., extent of conflict, and conflict resolution). The organizational characteristics concentrated on structural attributes (i.e., formalization, centralization, and complexity) and control attributes (i.e., focus of control, control mechanisms, and extent of control). There are three measurement areas regarding international strategic alliance success: financial and market success (i.e., profitability, market share, and sales growth), satisfaction with relationship (i.e., coordination of activities, interaction between managers, compatibility of activities, participation in decision making, level of commitment, management of activities, and level of honesty), and satisfaction with goals of alliances (i.e., profitability, market share, and sales growth). But, the model indicated that both structure and control among organizational characteristics were not related to the alliance performance and managers' satisfaction.

Theories and models are woven together to guide this study in explaining the relationship among supply chain management, strategic alliances, dimensions of alliance, success factors of the alliance, characteristics of alliance managers and organizations, and organizational performance including competitive advantages for achieving success of the alliance. In addition, the profiles of alliance managers and organizational characteristics in the context of the construction industry are also examined in this study to determine their influence on successful strategic alliances. A hypothesized successful strategic alliance model (see Figure 2-1) integrates and depicts the relationships among the major theories and variables in this study.

Research Questions

Q1: What are alliance manager characteristics, organizational characteristics, dimensions of alliances, and success factors of alliances in the construction industry of USA-based contractor companies?

Q2: Are there differences in dimensions of alliances and success factors of the alliances in the construction industry of USA-based contractor companies according to alliance manager characteristics?

Q3: Are there differences in dimensions of alliance and success factors of the alliance in the construction industry of USA-based contractor companies according to organizational characteristics?

Research Hypotheses

H1: Alliance manager characteristics (gender, age, level of education, race, ethnicity, job tenure, job title, and yearly income) are significant explanatory variables of dimensions of alliances (attributes of the alliance, communication behavior, conflict resolution techniques, and commodity/supplier selection process) in the construction industry.

H_{1a}: Alliance manager characteristics are significant explanatory variables of *attributes of the alliance* in the construction industry.

H_{1b}: Alliance manager characteristics are significant explanatory variables of *communication behavior* in the construction industry.

H_{1c}: Alliance manager characteristics are significant explanatory variables of *conflict resolution techniques* in the construction industry.

H_{1d}: Alliance manager characteristics are significant explanatory variables of *commodity/supplier selection process* in the construction industry.

H_{1e}: Alliance manager characteristics are significant explanatory variables of *dimensions of alliances (total score)* in the construction industry.

H2: Alliance manager characteristics (gender, age, level of education, race, ethnicity, job tenure, job title, and yearly income) are significant explanatory variables of the success of alliances (satisfaction, adjusted satisfaction, financial perspective, customer perspective, internal-business-process perspective, and learning and growth perspective) in the construction industry.

H_{2a}: Alliance manager characteristics are significant explanatory variables of *satisfaction with the alliance* in the construction industry.

H_{2b}: Alliance manager characteristics are significant explanatory variables of *adjusted satisfaction with the alliance* in the construction industry.

H_{2c}: Alliance manager characteristics are significant explanatory variables of *financial perspective with the alliance* in the construction industry.

H_{2d}: Alliance manager characteristics are significant explanatory variables of *customer perspective with the alliance* in the construction industry.

H_{2e}: Alliance manager characteristics are significant explanatory variables of *internal-business-process perspective with the alliance* in the construction industry.

H_{2f}: Alliance manager characteristics are significant explanatory variables of *learning and growth perspective with the alliance* in the construction industry.

H_{2g}: Alliance manager characteristics are significant explanatory variables of *success of the alliance (total score)* in the construction industry.

H3: Organizational characteristics (organization name, the most and least successful alliances, number of employees, number of offices in the United States and other countries, region of United States, type of location area, total revenue, new contract, and alliance training programs) are significant explanatory variables of the dimensions of alliances (attributes of the alliance, communication behavior, conflict resolution techniques, and commodity/supplier selection process) in the construction industry.

H_{3a}: Organizational characteristics are significant explanatory variables of *attributes of the alliance* in the construction industry.

H_{3b}: Organizational characteristics are significant explanatory variables of *communication behavior* in the construction industry.

H_{3c}: Organizational characteristics are significant explanatory variables of *conflict resolution techniques* in the construction industry.

H_{3d}: Organizational characteristics are significant explanatory variables of *commodity/supplier selection process* in the construction industry.

H_{3e}: Organizational characteristics are significant explanatory variables of *dimensions of alliance (total score)* in the construction industry.

H4: Organizational characteristics (organization name, the most and least successful alliances, number of employees, number of offices in the United States and other countries, region of United States, type of location area, total revenue, new contract, and alliance training programs) are significant explanatory variables of

success of the alliance (satisfaction, adjusted satisfaction, financial perspective, customer perspective, internal-business-process perspective, and learning and growth perspective) in the construction industry.

H_{4a}: Organizational characteristics are significant explanatory variables of the *satisfaction with the alliance* in the construction industry.

H_{4b}: Organizational characteristics are significant explanatory variables of the *adjusted satisfaction with the alliance* in the construction industry.

H_{4c}: Organizational characteristics are significant explanatory variables of the *financial perspective with the alliance* in the construction industry.

H_{4d}: Organizational characteristics are significant explanatory variables of the *customer perspective with the alliance* in the construction industry.

H_{4e}: Organizational characteristics are significant explanatory variables of the *internal-business-process perspective with the alliance* in the construction industry.

H_{4f}: Organizational characteristics are significant explanatory variables of the *learning and growth perspective with the alliance* in the construction industry.

H_{4g}: Organizational characteristics are significant explanatory variables of *success of the alliance (total score)* in the construction industry.

H5: Dimensions of alliance (attributes of the alliance, communication behavior, conflict resolution techniques, and commodity/supplier selection process) are significant explanatory variables of the success of the alliance (satisfaction, adjusted satisfaction, financial perspective, customer perspective, internal-

business-process perspective, and learning and growth perspective) in the construction industry.

H_{5a}: Dimensions of alliance are significant explanatory variables of *satisfaction with the alliance* in the construction industry.

H_{5b}: Dimensions of alliance are significant explanatory variables of the *adjusted satisfaction with the alliance* in the construction industry.

H_{5c}: Dimensions of alliance are significant explanatory variables of the *financial perspective with the alliance* in the construction industry.

H_{5d}: Dimensions of alliance are significant explanatory variables of the *customer perspective with the alliance* in the construction industry.

H_{5e}: Dimensions of alliance are significant explanatory variables of the *internal-business-process perspective with the alliance* in the construction industry.

H_{5f}: Dimensions of alliance are significant explanatory variables of the *learning and growth perspective with the alliance* in the construction industry.

H_{5g}: Dimensions of alliance are significant explanatory variables of the *success of the alliance (total score)* in the construction industry.

H6: Alliance manager characteristics (gender, age, level of education, race, ethnicity, job tenure, job title, and yearly income), organizational characteristics (organization name, the most and least successful alliance, number of employees, number of offices in the United States and other countries, region of United States, type of location area, total revenue, new contract, and alliance training programs), dimensions of alliances (attributes of the alliance, communication behavior,

conflict resolution techniques, and commodity/supplier selection process) are significant explanatory variables of success of the alliance in the construction industry.

H_{6a}: Alliance manager characteristics, organizational characteristics, dimensions of alliance are significant explanatory variables of the *satisfaction with the alliance* in the construction industry.

H_{6b}: Alliance manager characteristics, organizational characteristics, dimensions of alliance are significant explanatory variables of the *adjusted satisfaction with the alliance* in the construction industry.

H_{6c}: Alliance manager characteristics, organizational characteristics, dimensions of alliance are significant explanatory variables of the *financial perspective with the alliance* in the construction industry.

H_{6d}: Alliance manager characteristics, organizational characteristics, dimensions of alliance are significant explanatory variables of the *customer perspective with the alliance* in the construction industry.

H_{6e}: Alliance manager characteristics, organizational characteristics, dimensions of alliance are significant explanatory variables of the *internal-business-process perspective with the alliance* in the construction industry.

H_{6f}: Alliance manager characteristics, organizational characteristics, dimensions of alliance are significant explanatory variables of the *learning and growth perspective with the alliance* in the construction industry.

H_{6g}: Alliance manager characteristics, organizational characteristics, dimensions of alliance are significant explanatory variables of the *success of the alliance (total score)* in the construction industry.

Hypothesized Model

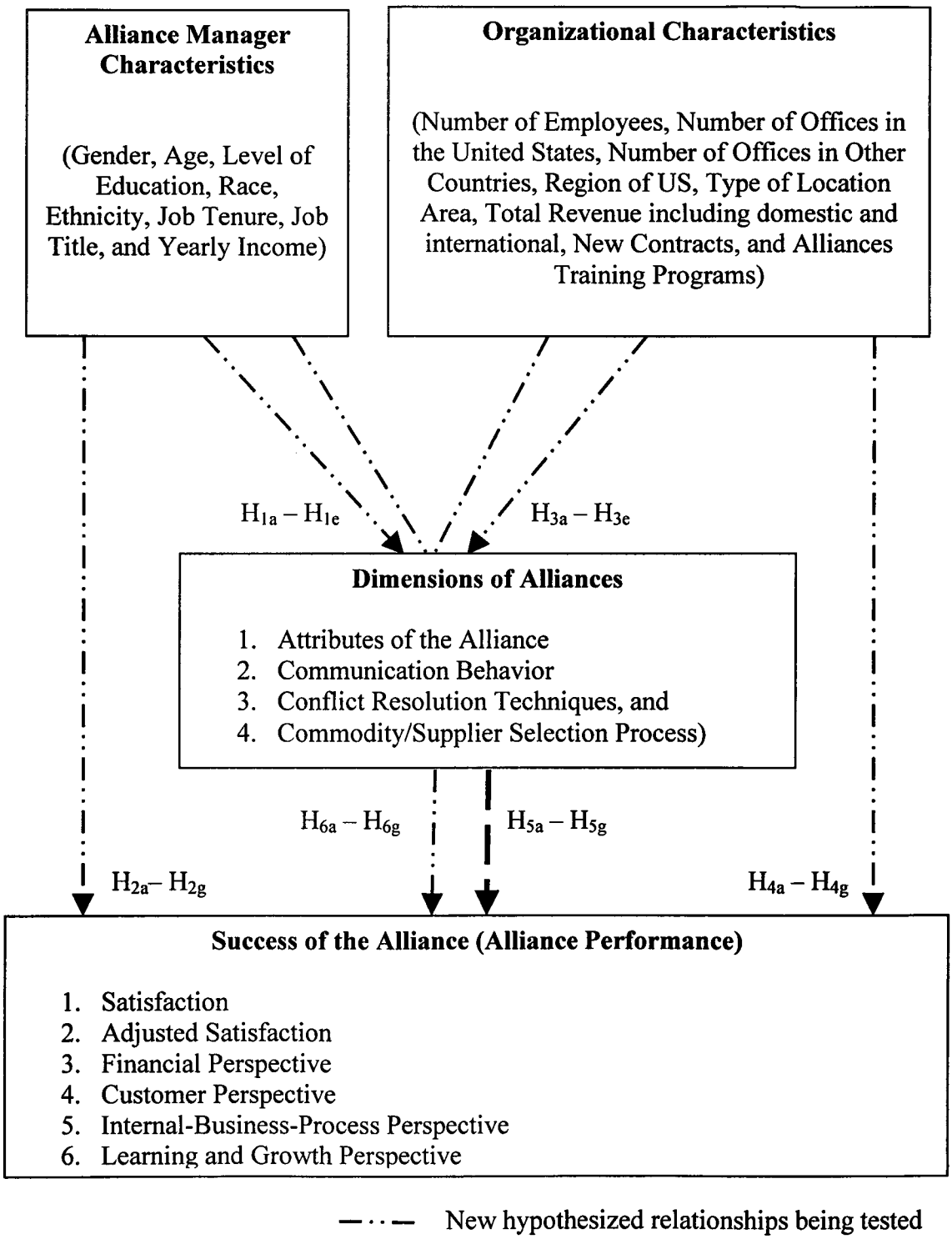


Figure 2-1. Hypothesized Model.

CHAPTER III

RESEARCH METHODOLOGY

This chapter presents the methodology to explore the relationships among supply chain management, strategic alliances, and organizational performance with an emphasis on the construction industry to answer whether establishing strategic alliances assists the execution of supply chain management and further enhances organizational performance including competitive advantages for achieving success of the alliance. The study further investigates the impact of alliance manager characteristics, organizational characteristics, and dimensions of alliance on the success of the alliance through testing six hypotheses. In addition, the chapter discusses the research design, the population and sampling plan, instrumentation, ethical considerations and data collection procedures, and the methods of data analysis. Eventually, the chapter also evaluates the research methodology in terms of reliability and validity.

Research Design

This non-experimental, quantitative research design was conducted via correlational (explanatory) and a causal-comparative survey to answer the three research questions and examine the six hypotheses. For Hypotheses H_{1a} to H_{1e}, the independent variables are alliance manager characteristics, and the dependent variables are dimensions of alliances (attributes of the alliance, communication behavior, conflict resolution techniques, and commodity/supplier selection process) in the construction industry. For Hypotheses H_{2a} to H_{2g}, the independent variables are alliance manager characteristics, and the dependent variables are success of alliances (satisfaction, adjusted satisfaction, financial perspective, customer perspective, internal-business-process

perspective, and learning and growth perspective) in the construction industry. For Hypotheses H_{3a} to H_{3e}, the independent variables are organizational characteristics, and the dependent variables are dimensions of alliances (attributes of the alliance, communication behavior, conflict resolution techniques, and commodity/supplier selection process) in the construction industry. For Hypotheses H_{4a} to H_{4g}, the independent variables are organizational characteristics, and the dependent variables are success of alliances (satisfaction, adjusted satisfaction, financial perspective, customer perspective, internal-business-process perspective, and learning and growth perspective) in the construction industry. For Hypotheses H_{5a} to H_{5g}, the independent variables are dimensions of alliances (attributes of the alliance, communication behavior, conflict resolution techniques, and commodity/supplier selection process), and the dependent variables are success of the alliances in the construction industry. For Hypotheses H_{6a} to H_{6g}, the independent variables are alliance manager characteristics (gender, age, level of education, race, ethnicity, job tenure, job title, and yearly income), organizational characteristics (organization name, the most and least successful alliance, number of employees, number of offices in the United States and other countries, region of United States, type of location area, total revenue, new contract, and alliance training programs), and dimensions of alliances (attributes of the alliance, communication behavior, conflict resolution techniques, and commodity/supplier selection process), and the dependent variables are success of the alliance in the construction industry.

In this study, a non-probability, purposive sampling frame was used from 3,000 general contractor companies provided by the *Blue Book of Building and Construction* and the 2008 list of the top 225 international contractors and the top 400 U.S. contractors,

published by *Engineering News Record (ENR)*, the McGraw-Hill Construction. ENR releases nine Top Lists annually and ranks different types of companies in the construction industry based on construction revenue. The names and e-mail addresses of the alliance managers in the USA-based contractor companies were obtained from the Blue Book of Building and Construction (http://www.thebluebook.com) and ENR's 2008 Top 400 Contractors Sourcebook and the Top Global Sourcebook on the Web site of McGraw-Hill Construction (http://www.construction.com). The names and e-mail addresses of the alliance managers in the USA-based contractor companies were obtained from both web sites. Later, the study coded the potential respondents found on the list of the web site of the Blue Book. A simple random sampling approach was used to create the sample number through running every five potential respondents by a computer-generated random number table. Each respondent randomly provided data of the most and least successful strategic alliances as the referent to yield two independent observations (i.e. alliances between the main contractor and its suppliers) while answering the questionnaire, and then a snowball sampling was used to forward the e-mail invitation to other people who might be in charge of strategic alliances. Although it is desirable to collect data from both the general contractor and supplier to generate generalized knowledge, the study was necessitated to focus on one side of the dyad after considering time and expense. The most and least successful alliances data were used to explain and compare why those alliances are successful or fail. Data collection was via an online survey.

The context selected for this study was the construction industry. A purposively selected sample of managers and alliance teams from contractor companies located in the

U.S. was invited to answer the research questions and test the hypotheses. Each participant responded to a nine-part survey (See Appendix D). Both the 8-item *Alliance Manager Characteristic Profile* and the 10-item *Organizational Characteristics Profile* were developed by the researcher to measure socio-demographic data of strategic alliance managers and their teams (procurement specialists). *Dimension of Alliances* comprising 35 items in four areas on a 7-point sale was used to measure success factors and an additional 7 items about indicators of success was used to measure alliance performance. The items were adapted from Monczka, Petersen, Handfield, and Ragatz's (1998) modified questionnaire of strategic supplier alliance's dimensions, developed by Mohr and Spekman's (1994) measurement system of the factors on partnership success. Alliance performance was assessed by 16 items, developed by the researcher, and based on Kaplan and Norton's (1996) Balanced Scorecard.

A research design with descriptive statistics (frequency distribution, measures of central tendency, and measures of variability) was used to answer the research questions about both the characteristics of the alliances managers/executives and the organizations from construction companies, their dimensions of alliances, and success elements in construction alliances. In addition, the USA-based contractor companies always contain many subsidiaries located in many countries, including Canada, Latin America, Caribbean Islands, Europe, Middle East, Asia/Australia, North Africa, Central and Southern Africa, and Antarctic/Arctic. A correlational (explanatory) research design using a hierarchical multiple regression (HMR) was used to test Hypotheses H1 to H6 about the relationship between dimensions of alliances (i.e. attributes of the alliance, communication behavior, conflict resolution techniques, and commodity/supplier

selection process) and success factors of the alliances in the construction industry (i.e. satisfaction, adjusted satisfaction, financial perspective, customer perspective, internal-business-process perspective, and learning and growth perspective), and the relationships among the characteristics of alliances managers, organizational characteristics, dimensions of alliances, and success factors of the alliance in the construction industry.

Population and Sampling Plan

Target Population

A target population, called the sampling frame, is a group of people or organizations with certain common characteristics that the researcher wants to study and identify (Creswell, 2005, p. 145). Managers or executives are those people who are responsible for administering how to use an organization's resources effectively and efficiently in order to achieve its goals (Jones, George, & Hill, 2000, p. 5). The alliance managers play important roles in achieving successful alliance relationships with multiple suppliers. Therefore the target population in this study was top managers and alliance managers/executives in contractor companies in the United States.

The construction industry is classified into three main segments: building construction contractors, heavy and civil engineering construction contractors, and specialty trade contractors (BLS, 2008). The newly-revised 2007 North American Industrial Classification System (NAICS) used a six-digit code to classify construction of building into two groups: residential and nonresidential building construction (NAICS, 2007). In this study, the main contractor was considered to be any general contractors under the supply chain management network who establish strategic supplier alliances in the United States.

In this study, an alliance executive/manager is a chief executive officer, chief operating officer, alliance managers/executives, strategy directors, purchasing directors, or contract/procurement professionals who are in charge of strategic alliances or partnership in the main construction industry. According to the statistics of the U.S. Census Bureau in May 2007, there were 6,708,200 employees in the construction industry in the United States of which chief executives were 6,280, general and operations managers were 32,800 and purchasing managers were 1,330 (http://www.bls.gov/data/home.htm). Consequently, the estimated number of executives in the USA-based construction industry is 40,410 (i.e. 6,280+ 32,800 + 1,330).

Table 3-1

Target Population Generated for This Study from the U.S. Department of Labor

http://data.bls.gov/oes/search.jsp

Industry: Construction of Buildings (NAICS code 236000) **Period: May 2007**	
Occupation (SOC code)	**Employment(1)**
Chief Executives(111011)	6280
General and Operations Managers(111021)	32800
Purchasing Managers(113061)	1330
Footnotes: (1) Estimates for detailed occupations do not sum to the totals because the totals include occupations not shown separately. Estimates do not include self-employed workers.	
SOC code: Standard Occupational Classification code -- see http://www.bls.gov/soc/home.htm NAICS code: North American Industry Classification System code -- see http://www.bls.gov/bls/naics.htm Data extracted on November 11, 2008	

Accessible Population

In this study, the accessible population was limited to "executives" from USA-based general contractors. A non-probability, purposive sample of 434 construction companies in the construction industry was selected from the *Engineering News Record (ENR)* and 3,000 general contractor companies from the *Blue Book of Building and Construction* online directory. The name and e-mail addresses of those alliance executive/managers and procurement professionals at general construction companies were available from the ENR's 2008 top lists on the Web site of McGraw-Hill Construction and *Blue Book of Building and Construction.* Table 3-2 shows the complete distribution of general contractors companies by regions of the United States. The total number of construction companies related to general contractors in the United States was 45,225. However, the study eliminated identical companies and excludes non USA-based contractor companies. This resulted in the final data producing sample of 3,434 firms in both the local and international construction contracting industry from the United States. This represented 7.5% of the target population (3,434/45,225).

Table 3-2

Distribution of General Contractor Companies in the United States

State	Number of General Contractor Companies	State	Number of General Contractors Companies
Northeast Region		Midwest Region	
Connecticut	685	Illinois	1535
Delaware	1116	Indiana	450
Maryland	1175	Kansas	340
Massachusetts	1952	Michigan	1075
New Hampshire	1267	Minnesota	781
New Jersey	1398	Missouri	671
New York	1602	Ohio	2272
Pennsylvania	1551	Wisconsin	613
Rhode Island	1267		
Wash., D.C.	1175	Southwest Region	
		Arizona	1035
Southeast Region		Texas	2352
Florida	4365		
Georgia	1674	West Region	
Kentucky	615	California	7019
Louisiana	475	Colorado	607
North Carolina	1870	Nevada	344
South Carolina	1870	Oregon	594
Virginia	854	Washington	626
Total number of general contractor companies			45,225

Sampling Plan

This study adopted three steps of sampling design. First, a non-probability, purposive sampling frame was used to access the target population in the 625 USA-based contractor companies from the 2008 top lists of *Engineering News Record (ENR)* and the 45,225 firms in the online regional construction directories from the *Blue Book of Building and Construction.* The names and e-mail addresses of the construction alliance

managers were obtained from the *ENR*'s top lists on the Web site of McGraw-Hill Construction (http://www.construction.com/) and the *Blue Book of Building and Construction* (http://www.thebluebook.com/). In order to avoid repetition, the study eliminated identical companies and excluded non-USA-based firms from the *ENR*'s 2008 Top 400 Contractors Sourcebook and the Top 225 Global Sourcebook, yielding the 434 firms in both the local and international construction contracting industry.

Second, a simple random sampling approach was implemented to code 45,225 general contractor companies and generate 3,000 sample numbers by a computer-generated random number table after the names and e-mail addresses of the construction alliance managers were obtained from the web site of the *Blue Book*. It is important to generalize impersonally the results of the construction industry setting by using the simple random sample, even if it is time consuming. Third, a snowball sampling was carried out by each respondent to provide referent data of its most and least successful strategic alliances and to forward the e-mail invitation by using the Blind Carbon Copy (BCC) to other people who might be in charge of strategic alliances.

Setting

The sources from which data were collected were limited to general contractors in the United States, as these firms require the existence of strategic alliances. Executives completed the survey within their respective firm settings.

Sample Size

Green (1991) proposes two rules of thumb for calculating the minimum acceptable sample size. One conventional formula designed for testing the overall fit of the regression model (R^2) is $n > 50 + 8k$, where k is the number of predictors, and n is a

minimum sample size. The other is $n > 104 + k$, used for testing the individual predictors within the model. Field (2005) highlights that "the bigger the sample size the better" (p. 172) and Green (1991) also recommends using the one that has the largest value.

Number of explanatory variables in this study:

Part 2: Alliance manager characteristics = 8

Part 3: Organizational characteristics = 8

Part 5: Attributes of the alliance (trust and coordination, commitment, and interdependence) = 3

Part 6: Communication behavior (information sharing, and information quality and participation) = 2

Part 7: Conflict resolution techniques (smoothing/avoiding issues, joint problem solving and persuasion, and harsh words and outside arbitration) = 3

Part 8: Commodity/Supplier selection process total score = 1

The sample size needed was $n > 50 + 8(25) = 250$ or $n > 104 + 25 = 129$. Thus, the sufficient sample size must be more than 250 to conduct a regression analysis of each scale in this study.

Eligibility Criteria and Exclusion Criteria

The eligibility criteria of the sample are:

1. Respondents' organizations must be related to the general contractor under the supply chain management who establish strategic alliances. Thus, other types of construction companies, such as building construction engineering contractors, heavy construction, construction special trade contractors, and related services were excluded.

2. The average annual revenue reported by respondents must be $100 million.
3. Respondents must be an alliance executive/manager, chief executive officer, chief operating officer, or procurement professional who are in charge of strategic alliances in the main construction industry.
4. Respondents were listed in the *ENR* web site of McGraw-Hill Construction (http://www.construction.com/) and the *Blue Book of Building and Construction* (http://www.thebluebook.com/).
5. Respondents were 18 years old or older.
6. Respondents must have the capability of reading and writing English.
7. Respondents must have experience as a customer in building alliances relationships with their suppliers, and provided both the most and the least successful strategic alliances.
8. Respondents must be willing to participate in this study and complete the questionnaire thoroughly.

Instrumentation

This study integrated two specific instruments into a nine-part, self-report survey in Appendix D for data collection. Part 1 ensured that respondents meet the eligibility requirements. Parts 2-8 measured the independent variables, and Part 9 measured the dependent (outcome) variables. Part 2 and Part 3 identified the *Alliances Manager Characteristics* and *Organizational Characteristics Profiles* by using a checklist and fill in the blank format. Part 2 measured *Alliance Manager Characteristics* as the independent variables for examining the relationship with dimensions of alliances (i.e., success factors) and success of the alliance (i.e., alliance performance) in strategic

alliances. Part 3 measured *Organizational Characteristics* as the independent variables. It must be completed by the alliance managers and procurement teams for describing and comparing the influence of demographic characteristics and working environment. *Indicators of Success* (Part 4) was used to measure satisfaction by using a 7-item survey with a seven-point rating scale. Parts 5-8 used a seven-point semantic differential scale to examine the impacts of *Dimensions of Alliances* on *Success Factors in Strategic Alliances* (i.e. partnerships): Attributes of the Alliance (Part 5), Communication Behavior (Part 6), Conflict Resolution Techniques (Part 7), and Commodity/Supplier Selection Process (Part 8). Part 9 measured *Success of the Alliance* (i.e., alliance performance) as the dependent variables. The combined 91-questions of the online survey should take approximately 25 minutes to complete. Table 3-3 shows the constructs, instrument developers, measures, and number of items and score range for the *Construction Strategic Alliance Survey*.

Table 3-3

Constructs of the Construction Strategic Alliance Survey

Part	Latent Variables/Construct	Instrument Developers	No. of Items	Type of Scale
1	Filter Questions	Researcher	3	Yes/No
2	Alliance Manager Characteristics Profile	Researcher	9	Checklist and fill in the blank
3	Organizational Characteristics Profile	Researcher	10	Checklist and fill in the blank
4	Indicators of Success Past Success Success Difference	Monczka et al. (1998), based on Mohr and Spekman (1994)	8	7-point semantic differential scale
5	Attributes of the Alliance Trust and Coordination Commitment Interdependence	Monczka et al. (1998), based on Mohr and Spekman (1994)	16	7-point semantic differential scale
6	Communication Behavior Information Quality Information Participation Information Sharing	Monczka et al. (1998), based on Mohr and Spekman (1994)	22	7-point semantic differential scale
7	Conflict Resolution Techniques	Monczka et al. (1998), based on Mohr and Spekman (1994)	5	7-point semantic differential scale
8	Commodity/Supplier Selection Process	Monczka et al. (1998), based on Mohr and Spekman (1994)	2	7-point semantic differential scale
9	Alliance Performance Scale Financial Perspective Customer Perspective Internal Business Perspective Learning and Growth Perspective	Researcher, based on Kaplan & Norton (1996c)	16	7-point semantic differential scale

Part 1 : Filter Questions

In the study, Part 1 serves as filter questions with 3 items which were designed to ensure that the participants were eligible to respond the survey: employeed by a building construction contractor, 18 years old or older, having the capability of reading and writing English, and having been employed at their companies for at least the past six months. All questions required yes/no responses.

Part 2 : Alliance Manager Characteristics Profile

Part 2 of the survey was designed to identify the Profiles of *Alliance Manager Characteristics* by using a checklist format developed by the researcher. The parameters of *Alliance Manager Characteristics* consisted of 9 items to report respondents' gender, age in years, level of education, race, ethnicity, job tenure, job title, and yearly income. The purposes of *Alliance Manager Characteristics Profile* were to predict how a person from all levels of the organization (procurement teams, supervisor, and manager) who were engaged in strategic supplier alliance might behave in their work setting, to understand relationships among the basic manager profile and success factors of alliances and success of the alliances (i.e., alliance performance), and to assist in career counseling for construction contractor companies' personnel selection in the future.

Part 3 : Organizational Characteristics Profile

In this study, the *Organizational Characteristics Profile* developed by the researcher was used to measure organizational characteristics through checklist and fill-in-the-blank formats, containing ten parameters: organization name, asking participants

to provide the most and least successful strategic supplier alliances, number of employees (i.e., organizational size), region of total revenue (i.e., annual sales in dollars), location (i.e., number of offices in the United States and other countries, region of the United States, and type of location area), whether receiving a new contract currently, and whether the respondents' companies offer or develop alliance training programs.

The purpose of Part 3 was to identify the profiles of *Organizational Characteristics* of the respondents' companies, and to understand whether a general construction contractor might influence dimension of alliances and success of the alliance. Among these parameters, region of United States, type of location area, and whether the respondents' companies offer or develop alliance training programs were all measured with a checklist. A fill in the blank format was used to ask respondents to report their firm's name, the most and least successful strategic supplier alliances based on the perspective of individual respondents.

Part 4 : Indicators of Success

Description

Monczka et al. (1998) used three types of measures consisting of 8 items to assess success of alliances. The first measure assessed how well the partners work together in the alliance or help the other in an emergency, the flexible extent to which the alliance partners can make requests of one another, the likelihood that the alliance partners fill a requirement hinging on an agreement and the overall satisfaction in the alliance (p. 561). The second measure evaluated the satisfaction of the purchasing company in the alliance (p. 561). The third type of measure of alliance success asked respondents to indicate why they formed strategic alliances with suppliers (p. 561).

Reliability

Consistent with the requirements of Cook and Campbell in 1979, all multiple-item measures had to have $\alpha > 0.70$ as an indicator of sufficient reliability (Monczka et al., 1998, p. 562). The coefficient alpha was .911 for past success (Monczka et al., 1998, p. 567).

Validity

Criterion validity was also assessed via the bivariate correlations between two perceptual measures of success (i.e., indicators of success) and the five objectives measures of alliance performance (i.e., price, quality, cycle time, technology, and NPD time). The factor loadings reported by Monczka et al. (1998) in the exploratory factor analysis ranged from .858 to .901 in past success.

Parts 5-8 : Modified Success Factors in Strategic Alliances (Dimensions of Alliances)

Description

In order to measure success factors in strategic alliances, Parts 5-8 scales of this study adapted Monczka et al.'s modified model of successful strategic supplier alliance developed by Mohr and Spekman's (1994) measurement system. Mohr and Spekman (1994) developed and validated a measurement system from the perspective of the customer in the alliance to test successful strategic supplier alliance within a computer dealer and one manufacturer (supplier) channel transaction. Monczka et al. (1998) further used a two-item scale to measure the existence of a formal commodity and supplier selection process. Five multi-item independent variables will be used, and these constructs include (1) trust and coordination, (2) interdependence, (3) commitment, (4) information quality and participation, and (5) information sharing (p. 561). Another five

single-item independent variables will be used to measure conflict resolution approaches, including (1) joint problem solving, (2) persuasive attempts, (3) smoothing over, (4) harsh words, and (5) outside arbitration (p. 561).

The *Dimension of Alliances Scales* were divided into four parts of measurement: *Attributes of the Alliance* (Part 5) with 16 items on a 7-point scale ranging from strongly disagree to strongly agree in the constructs of trust and interdependence, from very poorly to extremely well in coordination, and from significantly less to significantly more in commitment; *Communication Behavior* (Part 6) with 22 items on a 7-point scale from strongly disagree to strongly agree in the constructs of information participation and information sharing, and from not at all to very much in information quality; *Conflict Resolution Techniques* (Part 7) with 5 single items (smoothing over, persuasive attempts, joint problem solving, harsh words, and outside arbitration) on a 7-point scale from never to occasionally; and *Commodity/Supplier Selection Process* (Part 8) with 2-item questions on a 7-point scale. In order to counter social desirability, some items were written in the negative.

Reliability

Consistent with the requirements of Cook and Campbell in 1979, all multiple-item measures had to have $\alpha > 0.70$ as an indicator of sufficient reliability (Monczka et al., 1998, p. 562). The coefficient alpha was .711 for commitment, .811 for trust and coordination, .712 for interdependence, .849 for information sharing, and .935 for information quality and participation (Monczka et al., 1998, p. 567).

Validity

All measures were examined by industry executives and subject-area experts for face validity (Monczka et al., 1998). Convergent validity was established through principal components factor analysis with varimax rotation to assess constructs of attributes of the alliance (i.e., trust and coordination, interdependence, and commitment) and communication behavior (i.e., information quality and participation, and information sharing). The factor loadings reported by Monczka et al. (1998) in the exploratory factor analysis (EFA) ranged from .761 to .856 in trust and coordination, from .660 to .878 in interdependence, from .608 to .838 in commitment, from .670 to .890 in information quality and participation, from .524 to .836 in information sharing, and .914 in supplier/commodity selection (Monczka et al., 1998, p. 566).

Part 9 : Alliance Performance (Success of Alliances)

Description

Strategic alliances enable buying and supplying firms to combine their individual strengths and work together to reduce nonvalue-adding activities and facilitate improved performance (Whipple & Frankel, 2000); however, there is no study about assessing organizational performance when implementing a strategic alliance in the construction supply chain. Based on Mohr and Spekman's (1994) supplier alliance research model, Monczka, Petersen, Handfield, and Ragatz (1998) concluded five main objectives in forming strategic supplier alliances, including "(1) leverage purchase volume and control total cost (price); (2) improve purchased material quality (quality); (3) gain better access to new product or process technologies (technology); (4) reduce time-to-market (NPD Time); and (5) reduce order cycle times (cycle time)" (p. 561), after asking respondents

to provide and identify why they formed strategic alliances with suppliers. In fact, those five key objectives coincided with some measuring items to assess organizational performance in the Kaplan and Norton's *Balanced Scorecard* which provides the multiple strategic measures from four perspectives and permits a balance between short-term and long-term objectives, and between desired outcomes and the drivers of *organizational performance* (Kaplan & Norton, 1996b; Kaplan & Norton, 1996a; Kaplan & Norton, 2001a).

In this study, the *Alliance Performance Scale* in Part 9, the closed-ended questionnaire was developed by the researcher in generating data from alliance supervisors, managers or procurement specialists of the organization about values and beliefs which relate to not only organizational conditions of implementing alliance but also the perspective of individual respondents in an effort to strategically enhance the long-term performance and success of the alliance of their company through measuring financial and non-financial perceptions. The four performance indicators consisted of the financial perspective (revenue growth, return on investment, profitability, and cost), the customer perspective (market share, customer acquisition, customer satisfaction, customer retention), the internal business perspective (order cycle time, contract schedule, quality, costs of processes, new product introduction), and the learning and growth perspective (employee satisfaction, employee retention, and employee productivity) (Kaplan & Norton, 1996c). Each performance indicator was rated on a 7-point semantic differential scale with anchors of "strongly disagree" (1) and "strongly agree" (7) as the response categories. The score range for the 16-item scale was from 16 to 112, and therefore high scores were associated with better alliance performance.

Reliability

Cronbach's alpha (α) reliability analysis was examined to provide estimates of internal consistency reliability for each construct on the alliance performance scale based on Kaplan and Norton's (1996c) description of organizational performance.

Validity

Content validity of the scale was established by literature review of Kaplan and Norton's (1996c) Balanced Scorecard. Correlation analysis and principal components factor analysis were conducted to establish construct validity in this study.

Procedures: Ethical Considerations and Data Collection Methods

1. Obtaining permission to use measuring scales adopted in this study through e-mail was the first requirement before data collection. The survey questionnaire consisted of nine sections in four areas, including organizational and alliance manager characteristics profiles in Part 2 and Part 3, dimension of alliances in Parts 5-8, and success of the strategic alliances in Part 4 and Part 9.
2. An online survey was created and posted on a web site. The web site contained consent information, research purpose, procedure, possible risks and benefits to participants, assurance of anonymity, access to consent form, instructions, and the survey instrument.
3. An application for the IRB was submitted. The web site was not accessible until receiving approval from the Institutional Review Board (IRB) of Lynn University. Data collection was initiated following approval by the IRB. IRB approval was granted on March 11, 2009 (see Appendix A — IRB Approval for Research and Appendix B — Authorization for Informed Consent).

a. IRB Form 1 — Application and Research Protocol for Review of Research Involving Human Subjects in a New Project IRB

b. Form 3 — Request for Expedited Review

4. Following IRB approval, an e-mail invitation was sent by the researcher to each of the selected alliance executives from the *Engineering News Record (ENR)* and the *Blue Book of Building and Construction* online directory listing with a consent form and the link of the online survey.

    a. In order to protect the privacy and anonymity of the potential participants, the invitation e-mail was sent by using Outlook's Blind Carbon Copy (BCC) feature. Therefore, the recipients were unable to know who has received the e-mail.

    b. The e-mail was sent in a plain-text format without attachments to avoid being blocked by recipients' mail servers because of spam or virus concerns.

    c. If the subjects assented to participate in this online survey, they clicked the link of the online survey link contained in the invitation e-mail, and then clicked the "Yes, I agree to participate in this study" button at the end of the consent form page (see Appendix B).

    d. The first page of the online survey appeared only if the respondents clicked the "Yes, I agree to participate in this study" button on the consent form page.

e. The consent form described the research purpose, procedures, and duration of the survey. In addition, the consent form informed participants of the potential risk and benefits related to this study.

f. The estimated time needed for completing the online survey was approximately 25 minutes.

g. The respondents clicked the "Submit" button after completing the survey. The online survey was voluntary and anonymous, and therefore the researcher did not know who completes the survey.

h. Reminder e-mails were sent to potential participants after one to two weeks, and a final reminder e-mail was sent out in the last week of data collection.

5. The start date (March 16, 2009) was the date after this research is approved by the IRB and the completion date (May 10, 2009) was eight weeks after the date for beginning data collection.
6. The Lynn University IRB Report of Termination of Project (Form 8) was submitted after the data collection was completed.
7. The online survey was removed at 11:59 pm Eastern Time on the last day of data collection, Sunday, May 10, 2009.
8. Data was analyzed using SPSS version 17.0 for Windows (student version).
9. The online survey data and electronic file will be kept confidential and stored electronically on a "password protected" computer, and then destroyed after five years.

Methods of Data Analysis

The data collection from the online survey was analyzed by using the statistical software of EXCEL, and SPSS for Windows version 17.0. The methods of data analysis was used to answer the three research questions and examine the six hypotheses include descriptive statistics, and multiple regression. Those statistical procedures included descriptive statistics, reliability analyses, exploratory factor analyses (EFA), Chi-Square, two-tailed independent *t*-tests, one-way analysis of variance (ANOVA) with post hoc comparison tests, and multiple regression analyses.

Principal Components Factor Analysis and Coefficient Alpha

All variables in the hypothesis model were measured by means, standard deviations, and correlation coefficients. Principal components factor analysis with varimax rotation was used to assess the construct validity for five subcategories of dimensions of alliances: 1) Indicators of Success; 2) Attributes of the Alliance; 3) Communication Behavior; 4) Conflict Resoultion Techniques; and 5) Commodity/Supplier Selection Process (consistent with the research methodology developed by Monczka et al., 1998). Cronbach's α was used to measure the reliability of all constructs in this study, and all of the multi-item measures must have $\alpha \geq 0.70$ to provide sufficient reliability (Nunnaly, 1978).

Research Questions

Research Question 1

Descriptive statistics was used to describe responses to each question in the data, including general tendencies (mean, mode, median), the spread of scores (variance,

standard deviation, and range), or a comparison of how one score relates to all others (z-scores, percentile rank) (Creswell, 2005, p. 181).

For Question 1, these procedures of descriptive statistics were used to describe the *alliance manager characteristics* (i.e. gender, age, level of education, race, ethnicity, job tenure, job title, and yearly income), *organizational characteristics* (i.e. number of employees, number of offices in the United States and other countries, region of United States, type of location area, total revenue, new contract, and alliance training programs), the dimensions of alliances: 1) *attributes of the alliance* (i.e. trust and coordination, commitment, and interdependence); 2) *communication behavior* (information quality and participation, and information sharing); 3) *conflict resolution techniques* (i.e. joint problem solving, persuasive attempts, smoothing over, harsh words, and outside arbitration); and 4) *commodity/supplier selection process*, and success factors of the alliance in the construction industry: a) *alliance performance* (i.e., financial perspective, customer perspective, internal-business-process perspective, and innovation and learning perspective); and b) two subscales from *indicators of success* (i.e., satisfaction and adjusted satisfaction) in the USA-based contractor companies respectively.

Research Question 2

In order to answer Question 2, independent *t*-tests were used to compare the *attributes of the alliance*, *communication behavior*, *conflict resolution techniques, commodity/supplier selection process,* the executives of the USA-based contractor companies' *alliance performance*, and *indicators of success* (dependent variables) according to the alliance manager characteristics of "gender" and "ethnicity." ANOVA with post hoc comparisons was conducted to compare differences in the same dependent

variables according to grouped data of age, education, race, job tenure groups, primary job title within a firm, and yearly income.

Research Question 3

In Question 3, multiple ANOVA with post hoc comparisons were conducted to compare differences in the executives of the USA-based contractor companies' *attributes of the alliance*, *communication behavior*, *conflict resolution techniques, commodity/supplier selection process,* , *indicators of success* and *alliance performance* according to *organizational characteristics* (number of employees, number of offices in the United States and other countries, region of United States, type of location area, total revenue). Independent *t*-tests were used to compare differences in the same variables according to the USA-based contractor companies' "new contract," and "alliance training programs."

Psychometric Qualities of Instrumentation

Before testing hypotheses, analyses of the psychometric qualities of the scales and related subscales in this study were conducted to assure that the instruments consistently measure the constructs. Estimates of internal consistency reliability expressed by Cronbach's coefficient alpha were conducted for the *indicators of success* scale, *attributes of the alliance* scale, *communication behavior* scale, *conflict resolution techniques* scale, *commodity/supplier selection process* scale, and *alliance performance* scale. Though the generally accepted value for cognitive tests is that Cronbach's alpha should be .8, for ability tests a cut-off point of .7 is more appropriate (Field, 2005).

Exploratory factor analysis (EFA) using varimax rotation was conducted on the *indicators of success* scale, *attributes of the alliance* scale, *communication behavior*

scale, *conflict resolution techniques* scale, *commodity/supplier selection process* scale, and *alliance performance* scale to identify the clusters of variables in those scales and establish construct validity. For the total sample, all data had corrected item-total correlations above .3 (Field, 2005).

Intercorrelations using Pearson *r* correlation coefficients between the *attributes of the alliance* scale, *communication behavior* scale, *conflict resolution techniques* scale, and *commodity/supplier selection process* scale were reported to establish convergent and divergent validity of the scales and subscales.

Hypotheses Testing: Hypotheses H1 to H6

Hierarchical multiple regression (HMR), sometimes called multiple correlation, will be used to examine the combined relationship of multiple independent variables with a single dependent variable (Creswell, 2005, p. 336). This study implements multiple regression analysis to test the relationships between each of the explanatory constructs (independent variables) identified in the Hypothesized Model (see Figure 3-1) and dependent variables.

Numerically, multiple regression is described by the general equation:

$$y_i = (\beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \cdots + \beta_n x_{in}) + \varepsilon_i \qquad (i = 1, 2, 3\cdots, n)$$

In addition, *t*-statistics were conducted to test the significance level (p-value < 0.05) for each independent variable (Patten, 2004, p. 107).

Four sets of regression analysis involved in dimensions of alliance will be administrated: (1) attributes of the alliance, (2) communication behavior, (3) conflict resolution techniques, and (4) commodity/supplier selection process (Mohr & Spekman, 1994; Monczka et al., 1998). Using notation, the multiple regression models tested in

Hypothesis 1 and related sub-hypotheses (H_{1a}- H_{1e}) to explain the relationship between the alliance manager characteristics (attribute and independent variables) and the dimensions of alliances (dependent variables) in the construction industry are as follows:

Hypothesis H_{1a}:

$$y_{1a} = (\beta_0 + \beta_1 x_{11} + \beta_2 x_{12} + \beta_3 x_{13} + \beta_4 x_{14} + \beta_5 x_{15} + \beta_6 x_{16} + \beta_7 x_{17} + \beta_8 x_{18} + \beta_9 x_{19}) + \varepsilon_i$$

Hypothesis H_{1b}:

$$y_{1b} = (\beta_0 + \beta_1 x_{11} + \beta_2 x_{12} + \beta_3 x_{13} + \beta_4 x_{14} + \beta_5 x_{15} + \beta_6 x_{16} + \beta_7 x_{17} + \beta_8 x_{18} + \beta_9 x_{19}) + \varepsilon_i$$

Hypothesis H_{1c}:

$$y_{1c} = (\beta_0 + \beta_1 x_{11} + \beta_2 x_{12} + \beta_3 x_{13} + \beta_4 x_{14} + \beta_5 x_{15} + \beta_6 x_{16} + \beta_7 x_{17} + \beta_8 x_{18} + \beta_9 x_{19}) + \varepsilon_i$$

Hypothesis H_{1d}:

$$y_{1d} = (\beta_0 + \beta_1 x_{11} + \beta_2 x_{12} + \beta_3 x_{13} + \beta_4 x_{14} + \beta_5 x_{15} + \beta_6 x_{16} + \beta_7 x_{17} + \beta_8 x_{18} + \beta_9 x_{19}) + \varepsilon_i$$

Hypothesis H_{1e}:

$$y_{1e} = (\beta_0 + \beta_1 x_{11} + \beta_2 x_{12} + \beta_3 x_{13} + \beta_4 x_{14} + \beta_5 x_{15} + \beta_6 x_{16} + \beta_7 x_{17} + \beta_8 x_{18} + \beta_9 x_{19}) + \varepsilon_i$$

Where,

y_1 = Dimensions of Alliances (y_{11} = attributes of the alliance; y_{12} = communication behavior; y_{13} = conflict resolution techniques; y_{14} = commodity/supplier selection process; and y_{15} = dimensions of alliances total score)

x_1 = Alliance Manager Characteristics (x_{11} = gender; x_{12} = age; x_{13} = educational level; x_{14} = race ; x_{15} = ethnicity; x_{16} = job tenure with the organization ; x_{17} = primary job title within the firm ; x_{18} = job title for the alliance relationship; x_{19} = yearly income)

β_0 = constant

β = Beta (Standardized Regression Coefficient)

ε_i = error

Using notation, the multiple regression models tested in Hypothesis 2 and related sub-hypotheses (H_{2a}- H_{2g}) to explain the relationship between the alliance manager characteristics (attribute and independent variables) and success of the alliances/alliance performance (dependent variables) in the construction industry are as follows:

Hypothesis H_{2a}:

$$y_{2a} = (\beta_0 + \beta_1 x_{11} + \beta_2 x_{12} + \beta_3 x_{13} + \beta_4 x_{14} + \beta_5 x_{15} + \beta_6 x_{16} + \beta_7 x_{17} + \beta_8 x_{18} + \beta_9 x_{19}) + \varepsilon_i$$

Hypothesis H_{2b}:

$$y_{2b} = (\beta_0 + \beta_1 x_{11} + \beta_2 x_{12} + \beta_3 x_{13} + \beta_4 x_{14} + \beta_5 x_{15} + \beta_6 x_{16} + \beta_7 x_{17} + \beta_8 x_{18} + \beta_9 x_{19}) + \varepsilon_i$$

Hypothesis H_{2c}:

$$y_{2c} = (\beta_0 + \beta_1 x_{11} + \beta_2 x_{12} + \beta_3 x_{13} + \beta_4 x_{14} + \beta_5 x_{15} + \beta_6 x_{16} + \beta_7 x_{17} + \beta_8 x_{18} + \beta_9 x_{19}) + \varepsilon_i$$

Hypothesis H_{2d}:

$$y_{2d} = (\beta_0 + \beta_1 x_{11} + \beta_2 x_{12} + \beta_3 x_{13} + \beta_4 x_{14} + \beta_5 x_{15} + \beta_6 x_{16} + \beta_7 x_{17} + \beta_8 x_{18} + \beta_9 x_{19}) + \varepsilon_i$$

Hypothesis H_{2e}:

$$y_{2e} = (\beta_0 + \beta_1 x_{11} + \beta_2 x_{12} + \beta_3 x_{13} + \beta_4 x_{14} + \beta_5 x_{15} + \beta_6 x_{16} + \beta_7 x_{17} + \beta_8 x_{18} + \beta_9 x_{19}) + \varepsilon_i$$

Hypothesis H_{2f}:

$$y_{2f} = (\beta_0 + \beta_1 x_{11} + \beta_2 x_{12} + \beta_3 x_{13} + \beta_4 x_{14} + \beta_5 x_{15} + \beta_6 x_{16} + \beta_7 x_{17} + \beta_8 x_{18} + \beta_9 x_{19}) + \varepsilon_i$$

Hypothesis H_{2g}:

$$y_{2g} = (\beta_0 + \beta_1 x_{11} + \beta_2 x_{12} + \beta_3 x_{13} + \beta_4 x_{14} + \beta_5 x_{15} + \beta_6 x_{16} + \beta_7 x_{17} + \beta_8 x_{18} + \beta_9 x_{19}) + \varepsilon_i$$

Where,

y_2 = Success of Alliances/Alliance Performance (y_{2a} = past success/satisfaction; y_{2b} = success difference/adjusted satisfaction; y_{2c} = financial perspective; y_{2d} = customer perspective; y_{2e} = internal-business-process perspective; y_{2f} = learning and growth perspective; and y_{2g} = success of the alliances total score)

x_1 = Alliance Manager Characteristics (x_{11} = gender; x_{12} = age; x_{13} = educational level; x_{14} = race ; x_{15} = ethnicity; x_{16} = job tenure with the organization ; x_{17} = primary job title within the firm ; x_{18} = job title for the alliance relationship; x_{19} = yearly income)

β_0 = constant

β = Beta (Standardized Regression Coefficient)

ε_i = error

Using notation, the multiple regression models tested in Hypothesis 3 and related sub-hypotheses (H_{3a}- H_{3e}) to explain the relationship between the organizational characteristics (attribute and independent variables) and the dimensions of alliances (dependent variables) in the construction industry are as follows:

Hypothesis H_{3a}:

$$y_{3a} = (\beta_0 + \beta_1 x_{11} + \beta_2 x_{12} + \beta_3 x_{13} + \beta_4 x_{14} + \beta_5 x_{15} + \beta_6 x_{16} + \beta_7 x_{17} + \beta_8 x_{18}) + \varepsilon_i$$

Hypothesis H_{3b}:

$$y_{3b} = (\beta_0 + \beta_1 x_{11} + \beta_2 x_{12} + \beta_3 x_{13} + \beta_4 x_{14} + \beta_5 x_{15} + \beta_6 x_{16} + \beta_7 x_{17} + \beta_8 x_{18}) + \varepsilon_i$$

Hypothesis H_{3c}:

$$y_{3c} = (\beta_0 + \beta_1 x_{11} + \beta_2 x_{12} + \beta_3 x_{13} + \beta_4 x_{14} + \beta_5 x_{15} + \beta_6 x_{16} + \beta_7 x_{17} + \beta_8 x_{18}) + \varepsilon_i$$

Hypothesis H_{3d}:

$$y_{3d} = (\beta_0 + \beta_1 x_{11} + \beta_2 x_{12} + \beta_3 x_{13} + \beta_4 x_{14} + \beta_5 x_{15} + \beta_6 x_{16} + \beta_7 x_{17} + \beta_8 x_{18}) + \varepsilon_i$$

Hypothesis H_{3e}:

$$y_{3e} = (\beta_0 + \beta_1 x_{11} + \beta_2 x_{12} + \beta_3 x_{13} + \beta_4 x_{14} + \beta_5 x_{15} + \beta_6 x_{16} + \beta_7 x_{17} + \beta_8 x_{18}) + \varepsilon_i$$

Where,

y_3 = Dimensions of Alliance (y_{3a} = attributes of the alliance; y_{3b} = communication behavior; y_{3c} = conflict resolution techniques; y_{3d} = commodity/supplier selection process; and y_{3e} = dimensions of alliances total score)

x_1 = Organizational Characteristics (x_{11} = number of employees; x_{12} = number of offices in the US; x_{13} = number of offices in other countries; x_{14} = located region; x_{31} = type of area; x_{16} = total revenue; x_{17} = new construction contract(s) receiving; x_{18} = alliance training program(s) offering)

β_0 = constant

β = Beta (Standardized Regression Coefficient)

ε_i = error

Using notation, the multiple regression models tested in Hypothesis 4 and related sub-hypotheses (H_{4a}- H_{4g}) to explain the relationship between the organizational characteristics (attribute and independent variables) and success of the alliances (dependent variables) in the construction industry are as follows:

Hypothesis H_{4a}:

$$y_{4a} = (\beta_0 + \beta_1 x_{11} + \beta_2 x_{12} + \beta_3 x_{13} + \beta_4 x_{14} + \beta_5 x_{15} + \beta_6 x_{16} + \beta_7 x_{17} + \beta_8 x_{18}) + \varepsilon_i$$

Hypothesis H_{4b}:

$$y_{4b} = (\beta_0 + \beta_1 x_{11} + \beta_2 x_{12} + \beta_3 x_{13} + \beta_4 x_{14} + \beta_5 x_{15} + \beta_6 x_{16} + \beta_7 x_{17} + \beta_8 x_{18}) + \varepsilon_i$$

Hypothesis H_{4c}:

$$y_{4c} = (\beta_0 + \beta_1 x_{11} + \beta_2 x_{12} + \beta_3 x_{13} + \beta_4 x_{14} + \beta_5 x_{15} + \beta_6 x_{16} + \beta_7 x_{17} + \beta_8 x_{18}) + \varepsilon_i$$

Hypothesis H_{4d}:

$$y_{4d} = (\beta_0 + \beta_1 x_{11} + \beta_2 x_{12} + \beta_3 x_{13} + \beta_4 x_{14} + \beta_5 x_{15} + \beta_6 x_{16} + \beta_7 x_{17} + \beta_8 x_{18}) + \varepsilon_i$$

Hypothesis H_{4e}:

$$y_{4e} = (\beta_0 + \beta_1 x_{11} + \beta_2 x_{12} + \beta_3 x_{13} + \beta_4 x_{14} + \beta_5 x_{15} + \beta_6 x_{16} + \beta_7 x_{17} + \beta_8 x_{18}) + \varepsilon_i$$

Hypothesis H_{4f}:

$$y_{4f} = (\beta_0 + \beta_1 x_{11} + \beta_2 x_{12} + \beta_3 x_{13} + \beta_4 x_{14} + \beta_5 x_{15} + \beta_6 x_{16} + \beta_7 x_{17} + \beta_8 x_{18}) + \varepsilon_i$$

Hypothesis H_{4g}:

$$y_{4g} = (\beta_0 + \beta_1 x_{11} + \beta_2 x_{12} + \beta_3 x_{13} + \beta_4 x_{14} + \beta_5 x_{15} + \beta_6 x_{16} + \beta_7 x_{17} + \beta_8 x_{18}) + \varepsilon_i$$

Where,

y_4 = Success of Alliances/Alliance Performance (y_{4a} = past success/satisfaction; y_{4b} = success difference/adjusted satisfaction; y_{4c} = financial perspective; y_{4d} = customer perspective; y_{4e} = internal-business-process perspective; y_{4f} = learning and growth perspective; and y_{4g} = success of the alliances total score)

x_1 = Organizational Characteristics (x_{11} = number of employees; x_{12} = number of offices in the US; x_{13} = number of offices in other countries; x_{14} = located region; x_{15} = type of area; x_{16} = total revenue; x_{17} = new construction contract(s) receiving; x_{18} = alliance training program(s) offering)

β_0 = constant

β = Beta (Standardized Regression Coefficient)

ε_i = error

Using notation, the multiple regression models tested in Hypothesis 5 and related sub-hypotheses (H_{5a}- H_{5g}) to explain the relationship between the dimensions of the alliance (attribute and independent variables) and success of the alliances (dependent variables) in the construction industry are as follows:

Hypothesis H_{5a}:

$$y_{5a} = (\beta_0 + \beta_1 x_{11} + \beta_2 x_{12} + \beta_3 x_{13} + \beta_4 x_{14} + \beta_5 x_{15}) + \varepsilon_i$$

Hypothesis H_{5b}:

$$y_{5b} = (\beta_0 + \beta_1 x_{11} + \beta_2 x_{12} + \beta_3 x_{13} + \beta_4 x_{14} + \beta_5 x_{15}) + \varepsilon_i$$

Hypothesis H_{5c}:

$$y_{5c} = (\beta_0 + \beta_1 x_{11} + \beta_2 x_{12} + \beta_3 x_{13} + \beta_4 x_{14} + \beta_5 x_{15}) + \varepsilon_i$$

Hypothesis H_{5d}:

$$y_{5d} = (\beta_0 + \beta_1 x_{11} + \beta_2 x_{12} + \beta_3 x_{13} + \beta_4 x_{14} + \beta_5 x_{15}) + \varepsilon_i$$

Hypothesis H_{5e}:

$$y_{5e} = (\beta_0 + \beta_1 x_{11} + \beta_2 x_{12} + \beta_3 x_{13} + \beta_4 x_{14} + \beta_5 x_{15}) + \varepsilon_i$$

Hypothesis H_{5f}:

$$y_{5f} = (\beta_0 + \beta_1 x_{11} + \beta_2 x_{12} + \beta_3 x_{13} + \beta_4 x_{14} + \beta_5 x_{15}) + \varepsilon_i$$

Hypothesis H_{5g}:

$$y_{5g} = (\beta_0 + \beta_1 x_{11} + \beta_2 x_{12} + \beta_3 x_{13} + \beta_4 x_{14} + \beta_5 x_{15}) + \varepsilon_i$$

Where,

y_5 = Success of Alliances/Alliance Performance (y_{5a} = past success/satisfaction; y_{5b} = success difference/adjusted satisfaction; y_{5c} = financial perspective; y_{5d} = customer perspective; y_{5e} = internal-business-process perspective; y_{5f} = learning and growth perspective; and y_{5g} = success of the alliances total score)

x_1 = Dimensions of Alliance (x_{11} = attributes of the alliance; x_{12} = communication behavior; x_{13} = conflict resolution techniques; x_{14} = commodity/supplier selection process; and x_{15} = dimensions of alliances total score)

β_0 = constant

β = Beta (Standardized Regression Coefficient)

ε_i = error

Using notation, the multiple regression models tested in Hypothesis 6 and related sub-hypotheses (H_{6a}- H_{6g}) to explain the relationship among the organizational characteristics (attribute and independent variables), organizational characteristics (attribute and independent variables) and success of the alliances (dependent variables) in the construction industry are as follows:

Hypothesis H_{6a}:

$$y_{6a} = \beta_0 + (\beta_1 x_{11} + \beta_2 x_{12} + \beta_3 x_{13} + \beta_4 x_{14} + \beta_5 x_{15} + \beta_6 x_{16} + \beta_7 x_{17} + \beta_8 x_{18} + \beta_9 x_{19}) + (\beta_{10} x_{21} + \beta_{11} x_{22} + \beta_{12} x_{23} + \beta_{13} x_{24} + \beta_{14} x_{25} + \beta_{15} x_{26} + \beta_{16} x_{27} + \beta_{17} x_{28}) + (\beta_{18} x_{31} + \beta_{19} x_{32} + \beta_{20} x_{33} + \beta_{21} x_{34} + \beta_{22} x_{35}) + \varepsilon_i$$

Hypothesis H_{6b}:

$$y_{6b} = \beta_0 + (\beta_1 x_{11} + \beta_2 x_{12} + \beta_3 x_{13} + \beta_4 x_{14} + \beta_5 x_{15} + \beta_6 x_{16} + \beta_7 x_{17} + \beta_8 x_{18} + \beta_9 x_{19}) + (\beta_{10} x_{21} + \beta_{11} x_{22} + \beta_{12} x_{23} + \beta_{13} x_{24} + \beta_{14} x_{25} + \beta_{15} x_{26} + \beta_{16} x_{27} + \beta_{17} x_{28}) + (\beta_{18} x_{31} + \beta_{19} x_{32} + \beta_{20} x_{33} + \beta_{21} x_{34} + \beta_{22} x_{35}) + \varepsilon_i$$

Hypothesis H_{6c}:

$$y_{6c} = \beta_0 + (\beta_1 x_{11} + \beta_2 x_{12} + \beta_3 x_{13} + \beta_4 x_{14} + \beta_5 x_{15} + \beta_6 x_{16} + \beta_7 x_{17} + \beta_8 x_{18} + \beta_9 x_{19}) + (\beta_{10} x_{21} + \beta_{11} x_{22} + \beta_{12} x_{23} + \beta_{13} x_{24} + \beta_{14} x_{25} + \beta_{15} x_{26} + \beta_{16} x_{27} + \beta_{17} x_{28}) + (\beta_{18} x_{31} + \beta_{19} x_{32} + \beta_{20} x_{33} + \beta_{21} x_{34} + \beta_{22} x_{35}) + \varepsilon_i$$

Hypothesis H_{6d}:

$$y_{6d} = \beta_0 + (\beta_1 x_{11} + \beta_2 x_{12} + \beta_3 x_{13} + \beta_4 x_{14} + \beta_5 x_{15} + \beta_6 x_{16} + \beta_7 x_{17} + \beta_8 x_{18} + \beta_9 x_{19}) + (\beta_{10} x_{21} + \beta_{11} x_{22} + \beta_{12} x_{23} + \beta_{13} x_{24} + \beta_{14} x_{25} + \beta_{15} x_{26} + \beta_{16} x_{27} + \beta_{17} x_{28}) + (\beta_{18} x_{31} + \beta_{19} x_{32} + \beta_{20} x_{33} + \beta_{21} x_{34} + \beta_{22} x_{35}) + \varepsilon_i$$

Hypothesis H_{6e}:

$$y_{6e} = \beta_0 + (\beta_1 x_{11} + \beta_2 x_{12} + \beta_3 x_{13} + \beta_4 x_{14} + \beta_5 x_{15} + \beta_6 x_{16} + \beta_7 x_{17} + \beta_8 x_{18} + \beta_9 x_{19}) + (\beta_{10} x_{21} + \beta_{11} x_{22} + \beta_{12} x_{23} + \beta_{13} x_{24} + \beta_{14} x_{25} + \beta_{15} x_{26} + \beta_{16} x_{27} + \beta_{17} x_{28}) + (\beta_{18} x_{31} + \beta_{19} x_{32} + \beta_{20} x_{33} + \beta_{21} x_{34} + \beta_{22} x_{35}) + \varepsilon_i$$

Hypothesis H_{6f}:

$$y_{6f} = \beta_0 + (\beta_1 x_{11} + \beta_2 x_{12} + \beta_3 x_{13} + \beta_4 x_{14} + \beta_5 x_{15} + \beta_6 x_{16} + \beta_7 x_{17} + \beta_8 x_{18} + \beta_9 x_{19}) + (\beta_{10} x_{21} + \beta_{11} x_{22} + \beta_{12} x_{23} + \beta_{13} x_{24} + \beta_{14} x_{25} + \beta_{15} x_{26} + \beta_{16} x_{27} + \beta_{17} x_{28}) + (\beta_{18} x_{31} + \beta_{19} x_{32} + \beta_{20} x_{33} + \beta_{21} x_{34} + \beta_{22} x_{35}) + \varepsilon_i$$

Hypothesis H_{6g}:

$$y_{6g} = \beta_0 + (\beta_1 x_{11} + \beta_2 x_{12} + \beta_3 x_{13} + \beta_4 x_{14} + \beta_5 x_{15} + \beta_6 x_{16} + \beta_7 x_{17} + \beta_8 x_{18} + \beta_9 x_{19}) + (\beta_{10} x_{21} + \beta_{11} x_{22} + \beta_{12} x_{23} + \beta_{13} x_{24} + \beta_{14} x_{25} + \beta_{15} x_{26} + \beta_{16} x_{27} + \beta_{17} x_{28}) + (\beta_{18} x_{31} + \beta_{19} x_{32} + \beta_{20} x_{33} + \beta_{21} x_{34} + \beta_{22} x_{35}) + \varepsilon_i$$

Where,

y_6 = Success of Alliances/Alliance Performance (y_{6a} = past success/satisfaction; y_{6b} = success difference/adjusted satisfaction; y_{6c} = financial perspective; y_{6d} = customer perspective; y_{6e} = internal-business-process perspective; y_{6f} = learning and growth perspective; and y_{6g} = success of the alliances total score)

x_1 = Alliance Manager Characteristics (x_{11} = gender; x_{12} = age; x_{13} = educational level; x_{14} = race ; x_{15} = ethnicity; x_{16} = job tenure with the organization ; x_{17} = primary job title within the firm ; x_{18} = job title for the alliance relationship; x_{19} = yearly income)

x_2 = Organizational Characteristics (x_{21} = number of employees; x_{22} = number of offices in the US; x_{23} = number of offices in other countries; x_{24} = located region; x_{25} =

type of area; x_{26} = total revenue; x_{27} = new construction contract(s) receiving; x_{28} = alliance training program(s) offering)

x_3 = Dimensions of Alliance (x_{31} = attributes of the alliance; x_{32} = communication behavior; x_{33} = conflict resolution techniques; x_{34} = commodity/supplier selection process; and x_{35} = dimensions of alliances total score)

Evaluation of Research Methods

Internal Validity

Strengths

1. Non-experimental designs and level of data analysis using multiple regression result in a high level of data quality.
2. Clearly defined procedures used to answer the research questions and examine the research hypotheses allow replication by future studies.
3. Two instruments adopted in this study contribute to the reliability of each item scale and validity of measures of the variables.

Weakness

1. In contrast with experimental research design, both control and experimental groups will not be assigned randomly within the non-experimental design.

External Validity

Strengths

1. Proper sampling plan in three steps focuses on USA-based construction contractor companies in international alliances.
2. The survey will be conducted in a natural setting which is stronger in external validity than lab settings.

3. A probability, simple random sampling plan provides the appropriate results to fairly generalize the population selected in this study and to lessen bias.

Weaknesses

1. A limited population setting in only USA-based contractor companies will not allow generalizing the results of the study.
2. The potential bias generated because the names and e-mail addresses of the participants were selected from one web site with payment.
3. The deployment of a personnel system in a firm or the number of survey items may reduce the response rate.

CHAPTER IV

DATA ANALYSES AND RESULTS

Chapter IV presents the results of final data producing sample, the examination of research questions, hypotheses testing, and other findings related to this study about the relationships among supply chain management, strategic alliances, and organizational performance in USA-based contractor companies. The data collected from the online survey were analyzed using the statistical software of SPSS 17 .0. Hierarchical multiple regression analyses were used as methods of data analyses to answer the three research questions and to test the six research hypotheses. Other statistical data analysis procedures included descriptive statistics, causal comparative data analyses, calculation of Cronbach's coefficient alphas, and exploratory factor analysis.

Final Data-Producing Sample

The multi-stage sampling plan included three stages. In the first stage, the 434 USA-based contractor companies were found in the 2008 Top Lists of *Engineering News Record (ENR)* and 45,225 firms in the *Blue Book of Building and Construction* online directory. In the second stage, a simple random sample of firms was selected to code 45,225 general contractor companies from which to draw 3,000 sample numbers according to their average annual revenue (must be over $100 million). It is necessary to obtain the adequate number of respondents. Therefore, in the third stage, the invitations to participate in the online survey were forwarded by the sample firms to other employees who might be in charge on strategic alliances.

A total of 3,434 invitation e-mails were sent to selected general contractors companies focusing on strategic alliances and 197 responses were received (5.7%

response rate). Among the 197 respondents who participated in the online survey, 35 respondents whose companies were not building construction contractors, had not been employed at their companies for the past six months, or did not work for companies with annual revenues of more than $100 million. An additional 12 respondents did not finish the online survey. This resulted in a total of 150 valid responses used in the data analysis procedures.

The companies were located in the United States. The individual respondents were alliance executives including procurement professionals who provided data on their companies' most and least successful strategic alliance, yielding two independent observations (the final sample size was 300 alliances).

Validity and Reliability of Measurement Scales

Exploratory Factor Analysis and Internal Consistency Reliability Analysis of the Indicators of Success Scale

Principal components analyses using varimax rotation were conducted to establish the construct validity of the *Indicators of Success Scale*. The number of factors actually extracted was determined by the number of items with eigenvalues greater than 1. For missing values, cases were excluded listwise. To ease interpretation, factor loadings less than .4 were suppressed. The lower threshold was used to ensure that every item loaded onto a factor. Initial output was reviewed for singularity and multicollinearity in the data. There were no highly correlated items ($r > .9$), and the determinant of the correlation matrix was .004 which is greater than the necessary value of .00001. The original *Indicators of Success Scale* had two dimensions, "past success" and "success difference."

For the total sample, eigenvalues indicated two factors, explained 72.907 % of the total variance, while the scree plot depicted two dimensions.

The original item SU5, "please indicate the overall degree of results satisfaction with your most/least successful strategic supplier alliance/partnership" was divided into two new items. One of the two factors, Factor I, "past success," loaded as originally specified with five items, including SU5a, "overall results with your most successful strategic supplier alliance/partnership." The Factor I item factor loadings ranged from .790 to .897. However, item SU5a would cause the new Factor I alpha to improve to .933 if deleted.

The original Factor II, "success difference," contained two items that loaded onto the same factor as expected. The new Factor II retained two of the original items, but added an additional item SU5b "overall results with your least successful strategic supplier alliance/partnership" from the researcher, with a factor loading of .861. When item SU5b was included in the new Factor II, the Cronbach's alpha was .604. When item SU5b was removed, the Cronbach's alpha was .752. Table 4-1 shows factor item loadings of the total sample for the modified *Indicators of Success Scale*. The highest loading for each item in the factor is displayed in rank order from high to low. All factor loadings of the eight items after rotation were more than .40, representing substantive values. Therefore, the results mean that construct validity was acceptable, according to Field (2005). Table 4-2 shows the calculated Cronbach's alphas for new factors of the *Indicators of Success Scale*.

Table 4-1

Factor Item Loadings of the Total Sample for the Modified Indicators of Success Scale

Item#	Indicators of Success Scale	Component 1	Component 2
Factor 1: Past Success (5 items)			
SU3	This strategic supplier makes an effort to help us during emergencies.	.897	
SU2	This strategic supplier is flexible in response to requests we make.	.893	
SU1	In this strategic supplier alliance/partnership relationship, the parties work together to solve problems.	.874	
SU4	When an agreement is made, we can always rely on the strategic supplier to fulfill the requirements.	.837	
SU5a	Overall results with your most successful strategic supplier alliance/partnership –**dropped**.	.790	
Factor 2: Success Difference (3 items)			
SU6a	Your business unit's overall degree of satisfaction with strategic supplier alliances/partnerships.		.491
SU5b	Overall results with your least successful strategic supplier alliance/partnership –**dropped**.		.861
SU6	Your satisfaction with this strategic supplier alliance/partnership.		.713

Notes: Measured on a 7-point scale: 1 = strongly disagree (poorly satisfied) and 7 = strongly agree (extremely satisfied); KMO = .848; Bartlett's Test of Sphericity = 804.180

Table 4-2

Cronbach's Alphas for the New Factors of the Modified Indicators of Success Scale

Factor	Number of items	Cronbach's Alphas
1. Past Success		
With Item SU5a	5	.921
Without Item SU5a	4	.933
2. Success Difference		
With Item SU5b	3	.604
Without Item SU5b	2	.752

The internal consistency reliability of the *Indicators of Success Scale* was calculated by Cronbach's coefficient alpha. Nunnaly (1978) indicated that Cronbach's α needed to reach an acceptable value of 0.7, the minimum thresholds for internal

consistency reliability used in the literature. For the total sample, only one had a corrected item-total correlation below .3. Item SU5b would cause the new Factor II alpha to increase from .604 to .752 if deleted. The remaining items were all greater than .30 for the total sample. In addition, item SU5a would cause the new Factor I alpha to improve to .933 if deleted. As shown in Table 4-2, the overall Cronbach's α was .933 for past success and .752 for success difference. The overall Cronbach's alphas for the two factors also indicated good reliability. Table 4-3 shows corrected item-total correlations for new factors of the *Indicators of Success Scale*. With satisfactory factor and reliability analysis, the *Indicators of Success Scale* was used to answer research questions and in the regression models that tested the hypotheses.

Table 4-3

Corrected Item-total Correlations for New Factors of the Indicators of Success Scale: Total Sample

Dimension/Item#		Corrected Item-Total Correlation	Alpha if Item Deleted
Factor 1: Past Success			
SU1	In this strategic supplier alliance/partnership relationship, the parties work together to solve problems.	.829	.898
SU2	This strategic supplier is flexible in response to requests we make.	.877	.888
SU3	This strategic supplier makes an effort to help us during emergencies.	.861	.890
SU4	When an agreement is made, we can always rely on the strategic supplier to fulfill the requirements.	.797	.904
SU5a	Overall results with your most successful strategic supplier alliance/partnership –**dropped**.	.631	.933
Factor 2: Success Difference			
SU5b	Overall results with your least successful strategic supplier alliance/partnership –**dropped**.	.283	.752
SU6	Your satisfaction with this strategic supplier alliance/partnership.	.567	.300
SU6a	Your business unit's overall degree of satisfaction with strategic supplier alliances/partnerships.	.446	.471

Exploratory Factor Analysis and Internal Consistency Reliability Analysis of the Attributes of the Alliance Scale

Principal components analyses using varimax rotation were used to establish the construct validity of the *Attributes of the Alliance Scale*. The number of factors actually extracted was determined by the number of items with eigenvalues greater than 1. For missing values, cases were excluded listwise. To ease interpretation, factor loadings less than .4 were suppressed. The lower threshold was used to ensure every item loaded onto a factor. Initial output was reviewed for singularity and multicollinearity in the data. There were no highly correlated items ($r > .9$), and the determinant of the correlation matrix was greater than the necessary value of 0.00001.

The original *Attributes of the Alliance Scale* had four factors, "trust," "coordination," "commitment," and "interdependence." But Factor I and II were combined into a single construct, and so were named "trust and coordination" (Monczka et al., 1998). Therefore, there were three factors in the original *Attributes of the Alliance Scale*. The new *Attributes of the Alliance Scale* was thought to represent four distinct constructs, because the study divided commitment into two groups: one was from the most successful alliance and the other was from the least successful alliance. For the total sample, eigenvalues indicated four factors (compared with the three currently identified), explained 65.962 % of the total variance, while the scree plot depicted three dimensions.

One of the four factors, Factor IV, "interdependence," loaded as originally specified (Monczka et al., 1998) with three items. Factor IV item factor loadings ranged from .559 to .894. In addition, three of the specified five total items belonging to Factor I,

"trust and coordination," loaded as expected, with factor loadings ranging from .749 to .873. An addition item, item CM1 (least), "time commitment of your business unit's key personnel," loaded on to Factor I with a factor loading of .632.

The original Factor III, "commitment," consisted of four items. The new Factor III divided commitment into two groups with the same items and loaded as two separate factors, named by the researcher. The first new factor contained five items: a) item CM4 (least) "direct dollar investment in the supplier;" b) item CM3 (least) "capital investment in the supplier;" c) item CM 2 (least) "supplier training;" d) new item TC 4b from original Factor I "least successful strategic supplier alliance/partnership;" and e) negatively-worded item TC 2 "we do not get an equitable deal from our strategic supplier in this alliance." Factor loadings for the five items ranged from .431 to .860. All five items appeared to assess respondents' perception of commitment toward the least favorable strategic construction alliance, and so were named "commitment from the least successful alliance" by the researcher. The second new factor consisted of four positively-worded items: a) item CM 4 (most) "direct dollar investment in the supplier;" b) item CM 3 (most) "capital investment in the supplier;" c) item CM 1 (most) "time commitment of your business unit's key personnel;" and d) item CM 2 (most) "supplier training." Factor loadings ranged from .565 to .866. All four items appeared to assess respondents' attitudes toward the most favorable strategic construction alliance, and so were named "commitment from the most successful alliance" by the researcher. Table 4-4 displays factor item loadings of the total sample for the *Attributes of the Alliance Scale*. The highest loading for each item in the factor is displayed in rank order from high to low.

All factor loadings of the sixteen items after rotation were more than .40, representing substantive values. Therefore, the results means that construct validity was acceptable.

Table 4-4

Factor Item Loadings of the Total Sample for the Modified Attributes of the Alliance Scale

Item#	Attributes of the Alliance Scale	Component 1	2	3	4
Factor 1: Trust and Coordination (4 items)					
TC4a	Most successful strategic supplier alliance/partnership.	.873			
TC1	We trust that our strategic supplier alliance/partnership will be beneficial to our business unit.	.840			
TC3	This strategic supplier alliance/partnership relationship is marked by a high degree of harmony.	.749			
CM1(least)	Time commitment of your business unit's key personnel.	.632	.501		
Factor 2: Commitment for the Least Successful Alliance (5 items)					
CM4(least)	Direct dollar investment in the supplier.		.860		
CM3(least)	Capital investment in the supplier.		.841		
CM2(least)	Supplier training.		.735		
TC4b	Least successful strategic supplier alliance/partnership.		.642		
TC2	We do not get an equitable deal from our strategic supplier in this alliance.		-.431		
Factor 3: Commitment for the Most Successful Alliance (4 items)					
CM4(most)	Direct dollar investment in the supplier.			.866	
CM3(most)	Capital investment in the supplier.			.865	
CM1(most)	Time commitment of your business unit's key personnel.	.434		.610	
CM2(most)	Supplier training.	.533		.565	
Factor 4: Interdependence (3 items)					
ID3	The cost to establish another strategic supplier alliance/partnership for this commodity/purchase family would be extremely high.				.894
ID2	The time to establish another strategic supplier alliance/partnership for this commodity/purchase family would be extremely long.				.867
ID1	It would be very easy to terminate the most or least successful strategic supplier alliance/partnerships and establish another strategic supplier.				-.559

Notes: Measured on a 7-point scale: 1 = strongly disagree (very poorly coordinated or significantly less) and 7 = strongly agree (extremely well coordinated or significantly more); KMO = .729; Bartlett's Test of Sphericity = 1151.511

The reliability of the modified *Attributes of the Alliance Scale* was expressed by Cronbach's coefficient alpha. The coefficient alpha values exceeded the minimum standard of .7 (Nunnaly, 1978), providing good estimates of internal consistency reliability. The original *Attributes of the Alliance Scale* had three factors (Monczka et al., 1998). Four factors emerged as a result of the exploratory factor analysis conducted on the *Attributes of the Alliance Scale* items for this study. The original Factor I, "trust and coordination," consisted of five items, and had a Cronbach's alpha of .704 for the total sample. The new Factor I retained three of the original five items, but added an additional item from Factor II, item CM 1 (least). When item CM 1 (least) was removed in the new Factor I, the Cronbach's alpha would improve from .796 to .853.

The original Factor II items, which divided into two groups with the same items in the study, formed two new factors (Factor II and III) named by the researcher. The original first factor, "commitment," consisted of four items based on the least successful alliance, and had a Cronbach's alpha of .825 for the total sample. The new first factor, "commitment from the least successful alliance," contained five items and had a Cronbach's alpha of .764. For the total sample, only one had a corrected item-total correlation below .3. Item TC2 would cause the new Factor II alpha to increase from .764 to .806 if deleted. The remaining items were all greater than .30 for the total sample. However, item TC4b was also dropped from the new Factor II because it is different types of attributes of the alliance. The second new factor, "commitment from the most successful alliance," contained four items as originally expected and had a

Cronbach's alpha of .801. Therefore, none of the items in Factor III would increase the reliability if they were deleted.

Both the new and original Factor IV consisted of the same three items, and had a Cronbach's alpha of .676. Item ID1 would cause the new Factor IV alpha to improve to .840 if deleted. The four factors obtained an acceptable level of a coefficient aloha above .7. The *Attributes of the Alliance Scale* appeared to have good internal consistency reliability. Table 4-5 shows the calculated Cronbach's alphas for new factors of the *Attributes of the Alliance Scale.* Table 4-6 shows corrected item-total correlations for new factors of the *Attributes of the Alliance Scale.* With satisfactory factor and reliability analysis, the *Attributes of the Alliance Scale* was used to answer research questions and in the regression models that tested the hypotheses.

Table 4-5

Cronbach's Alphas for the New Factors of the Modified Attributes of the Alliance Scale

Factor	Number of items	Cronbach's Alphas
1. Trust and Coordination		
With CM1 (least)	4	.796
Without CM1 (least)	3	.853
2. Commitment from the Least Successful Alliance		
With Item TC2 and TC4b	5	.764
Without Item TC2	4	.806
Without Item TC4b	3	.741
3. Commitment from the Most Successful Alliance	4	.801
4. Interdependence		
With Item ID1	3	.676
Without Item ID1	2	.840

Table 4-6

Corrected Item-total Correlations for New Factors of the Attributes of the Alliance Scale: Total Sample

Dimension/Item#		Corrected Item-Total Correlation	Alpha if Item Deleted
Factor 1: Trust and Coordination (α = .796)			
TC1	We trust that our strategic supplier alliance/partnership will be beneficial to our business unit.	.675	.715
TC3	This strategic supplier alliance/partnership relationship is marked by a high degree of harmony.	.640	.738
TC4a	Most successful strategic supplier alliance/partnership.	.748	.676
CM1 (least)	Time commitment of your business unit's key personnel—**dropped.**	.448	**.853**
Factor 2: Commitment from the Least Successful Alliance (α = .764)			
TC4b	Least successful strategic supplier alliance/partnership—**dropped.**	.475	**.741**
TC2	We do not get an equitable deal from our strategic supplier in this alliance—**dropped.**	**.286**	.806
CM2 (least)	Supplier training.	.550	.715
CM3 (least)	Capital investment in the supplier.	.699	.663
CM4 (least)	Direct dollar investment in the supplier.	.700	.660
Factor 3: Commitment from the Most Successful Alliance (α = .801)			
CM1 (most)	Time commitment of your business unit's key personnel.	.545	.786
CM2 (most)	Supplier training.	.583	.766
CM3 (most)	Capital investment in the supplier.	.696	.711
CM4 (most)	Direct dollar investment in the supplier.	.639	.739
Factor 4: Interdependence (α = .676)			
ID1	It would be very easy to terminate the most or least successful strategic supplier alliance/partnerships and establish another strategic supplier—**dropped.**	.310	**.840**
ID2	The time to establish another strategic supplier alliance/partnership for this commodity/purchase family would be extremely long.	.563	.486
ID3	The cost to establish another strategic supplier alliance/partnership for this commodity/purchase family would be extremely high.	.650	.396

Exploratory Factor Analysis and Internal Consistency Reliability Analysis of the Communication Behavior Scale

Principal components analyses using varimax rotation were used to establish the construct validity of the *Communication Behavior Scale*. The number of factors actually

extracted was determined by the number of items with eigenvalues greater than 1. For missing values, cases were excluded listwise. To ease interpretation, factor loadings less than .4 were suppressed. The lower threshold was used to ensure every item loaded onto a factor. Initial output was reviewed for singularity and multicollinearity in the data. There were no highly correlated items ($r > .9$), and the determinant of the correlation matrix was greater than the necessary value of 0.00001.

The original *Communication Behavior Scale* had three factors, "information quality," "information participation," and "information sharing." But Factor I and II were combined into a single construct, and so were named "information quality and participation" (Monczka et al., 1998). Therefore, there were two dimensions in the original *Attributes of the Alliance Scale*. The new *Communication Behavior Scale* in the study took apart "information quality" and "information participation" as two single factors in its original dimension of Mohr and Spekman's (1994) model, and also divided "information quality" into two groups: one was from the most successful alliance and the other was from the least successful alliance. For the total sample, eigenvalues indicated five factors (compared with the three currently identified), explained 79.663 % of the total variance, while the scree plot depicted three dimensions. One of the four factors, Factor IV, "information participation," loaded as originally specified (Monczka et al., 1998) with five items, and had a Cronbach's alpha of .896. Factor IV item factor loadings ranged from .589 to .827.

The original Factor I, "information quality," consisted of five items. The new Factor I divided information quality into two groups with the same items and loaded as two separate factors, named by the researcher. The first new factor loaded as originally

specified with five items, and had a Cronbach's alpha of .965. Factor loadings for the five items ranged from .908 to .942. All five items appeared to assess respondents' perception of information quality toward the least favorable strategic construction alliance, and so were named "information quality from the least successful alliance" by the researcher. The second new factor loaded as expected with five items, and had a Cronbach's alpha of .943. Factor loadings for the five items ranged from .859 to .873. All five items appeared to assess respondents' perception of information quality toward the most favorable strategic construction alliance, and so were named "information quality from the most successful alliance" by the researcher.

Of the seven items specified as Factor III, "information sharing," five loaded as expected. Factor loadings for the five items ranged from .524 to .830. Two of the other items loaded together, item IS2, "our strategic supplier shares proprietary information with us," and item IS1, "we share our business unit's proprietary information with this strategic supplier for this strategic alliance/partnership." Factor loadings for the two items ranged from .851 for item IS1 to .871 for item IS2. The word "proprietary information" was concentrated on these two items, so were named "proprietary information sharing." Table 4-7 shows factor items loadings of the total sample for the modified *Communication Behavior Scale*. The highest loading for each item in the factor is displayed in rank order from high to low. All factor loadings of the seventeen items after rotation were more than .40, representing substantive values. Therefore, the results means that construct validity was acceptable.

Table 4-7

Factor Item Loadings of the Total Sample for the Modified Communication Behavior Scale

Item#	Attributes of the Alliance Scale	Component 1	2	3	4	5
Factor 1: Information Quality from the Least Successful Alliance (5 items)						
QL4 (least)	Complete	.942				
QL3 (least)	Adequate	.941				
QL2 (least)	Accurate	.939				
QL5 (least)	Credible	.913				
QL1 (least)	Timely	.908				
Factor 2: Information Quality from the Most Successful Alliance (5 items)						
QL3 (most)	Adequate		.873			
QL2 (most)	Accurate		.867			
QL1 (most)	Timely		.861			
QL4 (most)	Complete		.860			
QL5 (most)	Credible		.859			
Factor 3: Information Sharing (5 items)						
IS5	The parties are expected to keep each other informed about events or changes that may affect the other party.			.830		
IS4	In this relationship, it is expected that any information which might help the other party will be provided.			.807		
IS3	We inform this strategic supplier in advance of changing needs.			.805		
IS7	This strategic supplier keeps us fully informed about issues that affect our business.			.702		
IS6	It is expected that the parties will only provide information according to pre-specified agreements.			-.524		

Continued

Table 4-7 (Continued)

Item#	Attributes of the Alliance Scale	Component 1	2	3	4	5
Factor 4: Information Participation (5 items)						
PT2	The strategic supplier participates in our planning and goal-setting activities.				.827	
PT3	We participate in our strategic supplier's planning and goal-setting activities that are relevant to this strategic supplier alliance/partnership.				.808	
PT4	We actively encourage improvement suggestions from this strategic supplier.				.730	
PT5	We take timely action on this strategic supplier's suggestion(s) for this alliance/partnership.				.658	
PT1	We actively seek advice, counsel, and information from our strategic supplier in this strategic supplier alliance/partnership.				.589	
Factor 5: Proprietary Information Sharing (5 items)						
IS2	Our strategic supplier shares proprietary information with us.					.871
IS1	We share our business unit's proprietary information with this strategic supplier for this strategic alliance/partnership.					.851

Notes: Measured on a 7-point scale: 1 = strongly disagree (poor) and 7 = strongly agree (excellent); KMO = .884; Bartlett's Test of Sphericity = 3094.313

The reliability of the modified *Communication Behavior Scale* was expressed by Cronbach's coefficient alpha. The coefficient alpha values exceeded the minimum standard of .7 (Nunnaly, 1978), providing good estimates of internal consistency reliability. The original *Communication Behavior Scale* had three factors (Monczka et al., 1998). Five factors emerged as a result of the exploratory factor analysis conducted on the *Communication Behavior Scale* items for this study. For the total sample, all data had corrected item-total correlations above .3. The original Factor I items, which divided into two groups with the same items in the study, formed two new factors (Factor I and II) named by the researcher. The original first factor, "information quality," consisted of five items based on the most and least successful strategic alliance/partnership, and had a Cronbach's alpha of .868 for the total sample. The new first factor, "information quality from the least successful alliance," consisted of five items and had a Cronbach's alpha of .965. None of the items here would improve the reliability if they were deleted. The second new factor, "information quality from the most successful alliance," contained five items as originally expected and had a Cronbach's alpha of .943. None of the items in Factor II would increase the reliability if they were removed.

Both the new and original Factor IV, "information participation," consisted of the same five items, and had a Cronbach's alpha of .896. None of the items in Factor IV would increase the reliability if they were deleted. The original Factor III, "information sharing," contained seven items, and had a Cronbach's alpha of .839 for the total sample. The new Factor III retained five of the original seven items and had a Cronbach's alpha of .869. When item IS6 was removed in the new Factor III, the Cronbach's alpha would improve to .917 if deleted. It is worth noting that relatively little attention from the

respondents has been directed towards the keyword "only" in item IS6, even though there is a theoretical reason in reverse coding. When the study reversed the score response of item IS6, there was a negative value (-.385) in the corrected item-total correlation column. In other words, item IS6 turned into a positive value (.385) when not using reverse coding. The respondents might focus on the words "according to pre-specified agreements."

Two other original Factor III items loaded on a new factor, named "proprietary information sharing" by the researcher, with a Cronbach's alpha of .826. None of the items in Factor V would increase the reliability if they were deleted. Table 4-8 shows the calculated Cronbach's alphas for new factors of the *Communication Behavior Scale.* Table 4-9 shows corrected item-total correlations for new factors of the *Communication Behavior Scale.* The five factors obtained an acceptable level of a coefficient aloha above .8. The *Communication Behavior Scale* appeared to have good internal consistency reliability. With satisfactory factor and reliability analysis, the *Communication Behavior Scale* was used to answer research questions and in the regression models that tested the hypotheses.

Table 4-8

Cronbach's Alphas for the New Factors of the Modified Communication Behavior Scale

Factor	Number of items	Cronbach's Alphas
1. Information Quality from the Least Successful Alliance	5	.965
2. Information Quality from the Most Successful Alliance	5	.943
3. Information Sharing		
With Item IS6	5	.869
Without Item IS6	4	.917
4. Information Participation	5	.896
5. Proprietary Information Sharing	2	.826

Table 4-9

Corrected Item-total Correlations for New Factors of the Communication Behavior Scale: Total Sample

Dimension/Item#		Corrected Item-Total Correlation	Alpha if Item Deleted
Factor 1: Information Quality from the Least Successful Alliance (α = .965)			
QL1 (least)	Timely	.869	.962
QL2 (least)	Accurate	.910	.955
QL3 (least)	Adequate	.920	.954
QL4 (least)	Complete	.927	.952
QL5 (least)	Credible	.880	.960
Factor 2: Information Quality from the Most Successful Alliance (α = .943)			
QL1 (most)	Timely	.821	.935
QL2 (most)	Accurate	.830	.933
QL3 (most)	Adequate	.866	.927
QL4 (most)	Complete	.850	.930
QL5 (most)	Credible	.865	.927
Factor 3: Information Sharing (α = .869)			
IS3	We inform this strategic supplier in advance of changing needs.	.759	.826
IS4	In this relationship, it is expected that any information which might help the other party will be provided.	.822	.809
IS5	The parties are expected to keep each other informed about events or changes that may affect the other party.	.835	.804
IS6	It is expected that the parties will only provide information according to pre-specified agreements—**dropped.**	.385	**.917**
IS7	This strategic supplier keeps us fully informed about issues that affect our business.	.721	.835

Continued

Table 4-9 (Continued)

Dimension/Item#		Corrected Item-Total Correlation	Alpha if Item Deleted
Factor 4: Information Participation (α = .896)			
PT1	We actively seek advice, counsel, and information from our strategic supplier in this strategic supplier alliance/partnership.	.687	.885
PT2	The strategic supplier participates in our planning and goal-setting activities.	.757	.870
PT3	We participate in our strategic supplier's planning and goal-setting activities that are relevant to this strategic supplier alliance/partnership.	.719	.878
PT4	We actively encourage improvement suggestions from this strategic supplier.	.762	.869
PT5	We take timely action on this strategic supplier's suggestion(s) for this alliance/partnership.	.809	.861
Factor 5: Proprietary Information Sharing (α = .826)			
IS1	We share our business unit's proprietary information with this strategic supplier for this strategic alliance/partnership.	.706	N/A
IS2	Our strategic supplier shares proprietary information with us.	.706	N/A

Exploratory Factor Analysis and Internal Consistency Reliability Analysis of the Conflict Resolution Techniques Scale

Principal components analyses using varimax rotation were used to establish the construct validity of the *Conflict Resolution Techniques Scale*. The number of factors actually extracted was determined by the number of items with eigenvalues greater than 1. For missing values, cases were excluded listwise. To ease interpretation, factor loadings less than .4 were suppressed. The lower threshold was used to ensure every item loaded onto a factor. Initial output was reviewed for singularity and multicollinearity in the data. There were no highly correlated items ($r > .9$), and the determinant of the correlation matrix was .3 which is greater than the necessary value of 0.00001. The original *Conflict Resolution Techniques Scale* had three factors, "constructive conflict resolution techniques," "conflict avoidance techniques," and "destructive conflict resolution techniques." For the total sample, eigenvalues indicated two factors (compared with the three currently identified), explained 71.747 % of the total variance, while the scree plot depicted three dimensions.

One of the two factors, Factor II, "destructive conflict resolution techniques," loaded as originally specified with two items: a) item CR4 "harsh words" and b) item CR 5 "outside arbitration." Factor loadings for the two items ranged from .883 for item CR 4 to .886 for item CR 5. The original Factor I, "constructive conflict resolution techniques," loaded onto the same factor as expected, with factor loadings ranging from .745 for item CR 3 to .846 for item CR 2. An additional item, item CR1 loaded onto Factor I with a factor loading of .769, named by the researcher. The new Factor I contained three items: a) item CR 1 "smooth over the problem," b) item CR2 "persuasive

attempts by either party," and c) item CR 3 "joint problem solving." All three items were originally thought to represent two different factors; however, these three were combined into a single factor, and so were named "avoidance & constructive conflict resolution techniques" by the researcher. Because each factor loading on avoidance & constructive conflict resolution techniques and destructive conflict resolution techniques were greater than .40, the two-factor structure of the *Conflict Resolution Techniques Scale* was established, providing evidence of construct validity. Table 4-10 shows factor item loadings of the total sample for the modified *Conflict Resolution Techniques Scale.*

Table 4-10

Factor Item Loadings for the Modified Conflict Resolution Techniques Scale

		Component	
Item#	**Conflict Resolution Techniques Scale**	**1**	**2**
Factor 1:	**Avoidance & Constructive Conflict Resolution Techniques (3 items)**		
CR2	Persuasive attempts by either party	.846	
CR1	Smooth over the problem	.769	
CR3	Joint problem solving	.745	
Factor 2:	**Destructive Conflict Resolution Techniques (2 items)**		
CR5	Outside arbitration		.886
CR4	Harsh words		.883

Notes: Measured on a 7-point scale: 1 = never and 7 = occasionally; KMO = .575; Bartlett's Test of Sphericity = 176.259

The reliability of the modified *Conflict Resolution Techniques Scale* was expressed by Cronbach's coefficient alpha. The coefficient alpha values exceeded the minimum standard of .7 (Nunnaly, 1978), providing good estimates of internal consistency reliability. For the total sample, all data had corrected item-total correlations above .3. As shown in Table 4-11, the overall Cronbach's alpha was .7 for avoidance &

constructive conflict resolution techniques, and .754 for destructive conflict resolution techniques. None of the items here would increase the reliability if they were deleted. The two factors obtained an acceptable level of a coefficient aloha above .7. The *Conflict Resolution Techniques Scale* appeared to have good internal consistency reliability. Table 4-12 shows corrected item-total correlations for new factors of the *Conflict Resolution Techniques Scale.* With satisfactory factor and reliability analysis, the *Conflict Resolution Techniques Scale* was used to answer research questions and in the regression models that tested the hypotheses.

Table 4-11

Cronbach's Alphas for the New Factors of the Modified Conflict Resolution Techniques Scale

Factor	Number of items	Cronbach's Alphas
1. Avoidance & Constructive Conflict Resolution Techniques	3	.700
2. Destructive Conflict Resolution Techniques	2	.754

Table 4-12

Corrected Item-total Correlations for New Factors of the Conflict Resolution Techniques Scale: Total Sample

Dimension/Item#		Corrected Item-Total Correlation	Alpha if Item Deleted
Factor 1: Avoidance & Constructive Conflict Resolution Techniques			
CR1	Smooth over the problem	.492	.625
CR2	Persuasive attempts by either party	.602	.483
CR3	Joint problem solving	.439	.680
Factor 2: Destructive Conflict Resolution Techniques			
CR4	Harsh words	.606	N/A
CR5	Outside arbitration	.606	N/A

Exploratory Factor Analysis and Internal Consistency Reliability Analysis of the Commodity/Supplier Selection Process Scale

Principal components analyses using varimax rotation were used to establish the construct validity of the *Commodity/Supplier Selection Process Scale*. The number of factors actually extracted was determined by the number of items with eigenvalues greater than 1. For missing values, cases were excluded listwise. To ease interpretation, factor loadings less than .4 were suppressed. The lower threshold was used to ensure every item loaded onto a factor. Initial output was reviewed for singularity and multicollinearity in the data. There were no highly correlated items ($r > .9$), and the determinant of the correlation matrix was .399 which is greater than the necessary value of 0.00001.

The *Commodity/Supplier Selection Process Scale* had two items that loaded onto one factor, "commodity/supplier selection process," as originally specified, with a factor

loading of .942. For the total sample, eigenvalues indicated one factors, explained 88.751 % of the total variance, while the scree plot depicted one dimensions. All factor loadings of the two items after rotation were more than .40, representing substantive values. Therefore, the results means that construct validity was acceptable, according to Field (2005). Table 4-13 shows factor item loadings of the total sample for the *Commodity/Supplier Selection Process Scale.*

Table 4-13

Factor Item Loadings for the Commodity/Supplier Selection Process Scale

Item#	Commodity/Supplier Selection Process Scale	Component 1
Factor 1: Commodity/Supplier Selection Process (2 items)		
NA1	Your business unit's process to select commodities/purchase items as candidates for strategic supplier alliances/partnerships - compared to what you may consider best practice.	.942
NA2	Your business unit's strategic supplier assessment and selection process - compared to what you consider best practice.	.942

Notes: Measured on a 7-point scale: 1 = very limited and 7 = very comprehensive; KMO = .500; Bartlett's Test of Sphericity = 135.396

The reliability of the *Commodity/Supplier Selection Process Scale* was expressed by Cronbach's coefficient alpha. The coefficient alpha values exceeded the minimum standard of .7 (Nunnaly, 1978), providing good estimates of internal consistency reliability. For the total sample, all data had corrected item-total correlations above .3. As shown in Table 4-14, the overall Cronbach's alpha was .873. None of the items here would increase the reliability if they were deleted. The factor obtained an acceptable level of a coefficient alpha above .7. The *Commodity/Supplier Selection Process Scale* appeared to have good internal consistency reliability. Table 4-15 shows corrected item-

total correlations of the *Commodity/Supplier Selection Process Scale.* With satisfactory factor and reliability analysis, the *Commodity/Supplier Selection Process Scale* was used to answer research questions and in the regression models that tested the hypotheses.

Table 4-14

Cronbach's Alphas for the Factors of the Commodity/Supplier Selection Process Scale

Factor	Number of items	Cronbach's Alphas
1. Commodity/Supplier Selection Process	2	.873

Table 4-15

Corrected Item-total Correlations of the Commodity/Supplier Selection Process Scale: Total Sample

Dimension/Item#		Corrected Item-Total Correlation	Alpha if Item Deleted
Factor 1:	**Commodity/Supplier Selection Process**		
NA1	Your business unit's process to select commodities/purchase items as candidates for strategic supplier alliances/partnerships - compared to what you may consider best practice.	.775	N/A
NA2	Your business unit's strategic supplier assessment and selection process - compared to what you consider best practice.	.775	N/A

Exploratory Factor Analysis and Internal Consistency Reliability Analysis of the Alliance Performance/Success of the Alliance Scale

Principal components analyses using varimax rotation were used to establish the construct validity of the *Alliance Performance Scale.* The number of factors actually extracted was determined by the number of items with eigenvalues greater than 1. For missing values, cases were excluded listwise. To ease interpretation, factor loadings less

than .4 were suppressed. The lower threshold was used to ensure every item loaded onto a factor. Initial output was reviewed for singularity and multicollinearity in the data. There were no highly correlated items ($r > .9$), and the determinant of the correlation matrix was .0008 which is greater than the necessary value of 0.00001.

The original *Alliance Performance Scale* had four factors, "financial perspective," "customer perspective," "internal-business-process perspective," and "learning and growth perspective." For the total sample, eigenvalues indicated four factors, explained 72.250 % of the total variance, while the scree plot depicted four dimensions. All four factors loaded as originally expected, consistent with Kaplan and Norton (1996).

Factor I, "customer perspective," contained four items, with factor loadings ranging from .802 to .873. Factor II, "learning and growth perspective," consisted of three items, with factor loadings ranging from .763 to .819. Factor III, "financial perspective," contained four items, with factor loadings ranging from .599 to .782. Factor IV, "internal-business-process perspective," consisted of five items, with factor loadings ranging from .735 to .855. All factor loadings after rotation were more than .40, representing substantive values. Therefore, the results means that construct validity was acceptable, according to Field (2005). Table 4-16 shows factor item loadings of the total sample for the *Alliance Performance Scale*.

Table 4-16

Factor Item Loadings for the Alliance Performance Scale

Item#	Alliance Performance Scale	Component 1	2	3	4
Factor 1:	**Customer Perspective (4 items)**				
C1	Increase market share	.873			
C2	Increase customer acquisition/Attract new customers	.864			
C3	Increase customer satisfaction/Meet customers' needs	.817			
C4	Increase customer retention/Loyalty/Repeat Business	.802			
Factor 2:	**Learning and Growth Perspective (3 items)**				
LG1	High employee satisfaction		.819		
LG3	High employee productivity		.806		
LG2	High employee retention		.763		
Factor 3:	**Financial Perspective (4 items)**				
F2	Increase return on investment			.782	
F1	Accelerate revenue growth			.738	
F3	Increase profitability			.734	
F4	Control total costs			.599	
Factor 4:	**Internal-Business-Process Perspective (5 items)**				
BP4	Lower costs of existing processes				.855
BP2	Meet contract schedule/Meet time standards				.839
BP1	Reduce order cycle time				.838
BP3	Improve quality standards				.797
BP5	Speed up new product introduction in comparison to competitors/Technology				.735

Notes: Measured on a 7-point scale: 1 = strongly disagree and 7 = strongly agree; KMO = .907; Bartlett's Test of Sphericity = 2515.437

The reliability of the *Alliance Performance Scale* was expressed by Cronbach's coefficient alpha. The coefficient alpha values exceeded the minimum standard of .7 (Nunnaly, 1978), providing good estimates of internal consistency reliability. For the total sample, all data had corrected item-total correlations above .3. As shown in Table 4-17, the calculated Cronbach's alpha was .948 for customer perspective, .931 for learning and growth perspective, .898 for financial perspective, and .916 for internal-

business-process perspective. None of the items here would increase the reliability if they were deleted. The factor obtained an acceptable level of a coefficient alpha above .7. The *Alliance Performance Scale* appeared to have good internal consistency reliability. Table 4-18 shows corrected item-total correlations of the *Alliance Performance Scale*. With satisfactory factor and reliability analysis, the *Alliance Performance Scale* was used to answer research questions and in the regression models that tested the hypotheses.

Table 4-17

Cronbach's Alphas for the Factors of the Alliance Performance Scale

Factor	Number of items	Cronbach's Alphas
1. Customer Perspective	4	.948
2. Learning and Growth Perspective	3	.931
3. Financial Perspective	4	.898
4. Internal-Business-Process Perspective	5	.916

Table 4-18

Corrected Item-total Correlations of the Alliance Performance Scale: Total Sample

Dimension/Item#		Corrected Item-Total Correlation	Alpha if Item Deleted
Factor 1: Customer Perspective (α = .948)			
C1	Increase market share	.888	.929
C2	Increase customer acquisition/Attract new customers	.863	.935
C3	Increase customer satisfaction/Meet customers' needs	.872	.932
C4	Increase customer retention/Loyalty/Repeat Business	.885	.929
Factor 2: Learning and Growth Perspective (α = .931)			
LG1	High employee satisfaction	.849	.907
LG2	High employee retention	.864	.895
LG3	High employee productivity	.861	.897
Factor 3: Financial Perspective (α = .898)			
F1	Accelerate revenue growth	.729	.883
F2	Increase return on investment	.780	.865
F3	Increase profitability	.869	.831
F4	Control total costs	.715	.889
Factor 4: Internal-Business-Process Perspective (α = .916)			
BP1	Reduce order cycle time	.744	.906
BP2	Meet contract schedule/Meet time standards	.826	.888
BP3	Improve quality standards	.814	.891
BP4	Lower costs of existing processes	.807	.893
BP5	Speed up new product introduction in comparison to competitors/Technology	.735	.907

Convergent and Divergent Validity for Scales Used in the Study

To establish convergent validity of the scales used in this study, Pearson r intercorrelations using the total sample was performed to examine the correlations among the modified *Attributes of the Alliance Scale,* the modified *Communication Behavior Scale, Conflict Resolution Techniques Scale, Commodity/Supplier Selection Process Scale* and the related subscales (*trust and coordination, commitment from the least*

successful alliance, *commitment from the most successful alliance*, *interdependence*, *information quality from the least successful alliance*, *information quality from the most successful alliance*, *information sharing*, *information participation*, *proprietary information sharing*, *avoidance & constructive conflict resolution techniques*, and *destructive conflict resolution techniques*).

As shown in Table 4-19, there are significant relationships between *trust and coordination* and all other subscales (except the *commitment from the least successful alliance*, *interdependence*, and *information quality from the least successful alliance*), the *commitment from the least successful alliance* and all other subscales (except the *interdependence*, *information quality from the most successful alliance*, *information sharing*, and *avoidance & constructive conflict resolution techniques*), the *commitment from the most successful alliance* and all other subscales (except the *destructive conflict resolution techniques*), *information quality from the most successful alliance* and all other subscales, *information sharing* and all other subscales, and *information participation* and all other subscales. In addition, *interdependence* is positively related to the following subscales: information quality form the most successful alliance ($r = .241$, $p < .01$) and information sharing ($r = .161$, $p < .05$). *Information quality form the least successful alliance* is positively related to the following subscales: *proprietary information sharing* ($r = .292$, $p < .01$) and *destructive conflict resolution techniques* ($r = .274$, $p < .01$). Finally, the *destructive conflict resolution techniques* subscale is negatively related to the *commodity/supplier selection process* ($r = -.216$, $p < .01$).

Table 4-19

Pearson r Intercorrelations to Establish Convergent Validity for the Subscales

		1	2	3	4	5	6	7	8	9	10	11	12
1	Trust and Coordination		.134	.378**	.143	-.031	.697**	.637**	.656**	.165*	.452**	-.302**	.452**
2	Commitment from the Least Successful Alliance			.262**	.133	.573**	.104	.138	.252**	.191*	.071	.202*	.213**
3	Commitment from the Most Successful Alliance				-.165*	.243**	.342**	.317**	.429**	.344**	.252**	-.075	.302**
4	Interdependence					-.063	.241**	.161*	.051	.063	.095	.068	.120
5	Information Quality from the Least Successful Alliance						.072	.137	.152	.292**	.011	.274**	.101
6	Information Quality from the Most Successful Alliance							.535**	.527**	.195*	.409**	-.251**	.459**
7	Information Sharing								.674**	.339**	.390**	-.292**	.566**
8	Information Participation									.428**	.356**	-.224**	.553**
9	Proprietary Information Sharing										.086	.032	.383**
10	Avoidance & Constructive Conflict Resolution Techniques											.056	.351**
11	Destructive Conflict Resolution Techniques												-.216**
12	Commodity/Supplier Selection Process												

* $p < .05$, ** $p < .01$

There were positive relationships between the modified *Attributes of the Alliance Scale* and the following scales, establishing convergent validity: the modified *Communication Behavior Scale* ($r = .692, p < .01$), *Conflict Resolution Techniques Scale* ($r = .238, p = .003$), and *Commodity/Supplier Selection Process Scale* ($r = .449, p < .01$). There are also positive correlations between the modified *Communication Behavior Scale* and both the *Conflict Resolution Techniques Scale* ($r = .197$, $p = .016$), and the *Commodity/Supplier Selection Process Scale* ($r = .579, p < .01$). Table 4-20 presents the correlation matrix between the scales totals.

Table 4-20

Correlation Matrix of the Attributes of the Alliance Scale, Communication Behavior Scale, Conflict Resolution Techniques Scale, and Commodity/Supplier Selection Process Scale

	Modified Attributes of Alliance	Modified Communication Behavior	Conflict Resolution Techniques	Commodity/Supplier Selection Process
Modified Attributes of Alliance		.692**	.238**	.449**
Modified Communication Behavior			.197*	.579**
Conflict Resolution Techniques				.121
Commodity/Supplier Selection Process				

* $p < .05$, ** $p < .01$

Research Questions

Research Question 1: Descriptive Characteristics of the Sample

Q1: What are alliance manager characteristics, organizational characteristics, dimensions of alliances, and success factors of alliances in the construction industry of USA-based contractor companies?

Alliance Manager Characteristics

The number of usable responses for nine-item sociodemographic characteristics from the *Alliance Manager Characteristics Profile* consisted of 150 executives or professionals who provided personal information about each selected sample company through completing the online survey. The majority of respondents were male (86%). The largest number of respondents were between 35 and 44 years old (31.3%) and the second largest age group was between 45 and 54 (30.7%). On the education scale, the majority (50%) of participants had earned a four-year college diploma, 27.3% of respondents categorized themselves as "professional." The overwhelming majority of respondents were white (92%), while Black/African American and American Indian/Alaska Native were both in the minority (1.3%). The largest respondent ethnicity group was Non-Hispanic (97.3%). Respondents who had "10 or more years" job tenure were the largest group (35.3%), and the respondents who worked "less than 1 year" were the smallest group (4%). Table 4-21 displays the frequency distribution, mean, and mode by gender, age, education, race, ethnicity, and job tenure for the total sample.

Table 4-22 presents the primary job title within a firm, job title for the alliance relationship, and yearly income level from the *Alliance Manager Characteristics Profile* for the total sample. For the original scale of the primary job title within a firm, 75.3% of

respondents categorized themselves as "other" and specified their actual job titles in the blanks. Therefore, the study re-organized the results of primary job title by four levels[1]: top-level manager/corporate executive (38.7%), middle-level manager (12.7%), supervisor (27.3%), and non-supervisory (21.3%). On the job title for the alliance relationship scale, most respondents (72.7%) reported that they did not have job titles within the construction supplier partnerships. The majority (42%) of participants had yearly income in US dollars between 75,000 and 124,999, the second level was more than 125 thousand dollars, and no respondents were categorized as below $44,999.

[1] Note that the four levels of primary job title in the survey of this study included top-level manager/corporate executive (CEO, CFO, COO, CIO, Vice President, CHRO, Director, Treasure), middle-Level Manager (General Manager, Regional Manager, Sales Manager, Operations Manager, Chief Estimator, Senior Project Manager, Controller), supervisor (Department manager, Project Manager, Accounting Manager), and non-supervisory (Purchasing/Procurement profession, Accountant, Architect, Planner, Engineer, Scheduler, Superintendent).

Table 4-21

Alliance Manager Characteristics of the Total Sample by Gender, Age, Education, Race, Ethnicity, and Job Tenure

Alliance Manager Characteristics	Frequency	Valid Percent	Mean	Std. Deviation
Gender	(n=150)		1.14	.348
Male	129	86.0%		
Female	21	14.0%		
Age	(n=150)		3.55	1.007
18-24	0	0%		
25-34	26	17.3%		
35-44	47	31.3%		
45-54	46	30.7%		
55 or more	31	20.6%		
Education	(n=150)		2	.803
Professional *(MA, MS, ME, MD, PhD, and the like)*	41	27.3%		
Four-year college graduate *(BA, BS, BM, and the like)*	75	50.0%		
One to three years college *(also business schools)*	27	18.0%		
High school graduate	7	4.7%		
Ten to eleven years of school *(part high school)*	0	0.0%		
Seven to nine years of school	0	0.0%		
Less than seven years of school	0	0.0%		
Race	(n=150)		1.17	.642
White	138	92.0%		
Black or African American	2	1.3%		
Asian	8	5.4%		
Native Hawaiian or Other Pacific Islander	0	0.0%		
American Indian or Alaska Native	2	1.3%		
Ethnicity	(n=150)		1.97	.162
Hispanic	4	2.7%		
Non-Hispanic	146	97.3%		
Job Tenure	(n=150)			
Less than 1 year	6	4.0%	2.97	.908
1 to less than 5 years	46	30.7%		
5 to less than 10 years	45	30.0%		
10 or more years	53	35.3%		

Table 4-22

Alliance Manager Characteristics of the Total Sample by Primary Job Title within a Firm, Job Title for the Alliance Relationship, and Yearly Income

Alliance Manager Characteristics	Frequency	Valid Percent	Mean	Std. Deviation
Primary Job Title within the Firm	(n=150)		5.34	1.220
Chief Executive Officer (CEO)	0	0.0%		
Chief Operating Officer (COO)	3	2.0%		
Strategy Director	23	15.3%		
Purchasing/Procurement Director	7	4.7%		
Purchasing/Procurement Profession	4	2.7%		
Other	113	75.3%		
Re-organized Primary Job Title within the Firm	(n=150)			
Top-Level Manager/Corporate Executive (CEO, CFO, COO, COO, CIO, Vice President, CHRO, Director, Treasure)	58	38.7%	2.31	1.194
Middle-Level Manager (General Manager, Regional Manager, Sales Manager, Operations Manager, Chief Estimator, Senior Project Manager, Controller)	19	12.7%		
Supervisor (Department manager, Project Manager, Accounting Manager)	41	27.3%		
Non-Supervisory (Purchasing/Procurement Profession, Accountant, Architect, Planner, Engineer, Scheduler, Superintendent)	32	21.3%		
Job Title for the Alliance Relationship	(n=150)		3.45	1.007
Alliance Manager	15	10.0%		
Alliance Team Member	12	8.0%		
Other Title	14	9.3%		
No Job Title	109	72.7%		
Yearly Income	(n=150)		7.22	.732
Under $12,299	0	0.0%		
$12,299 - $19,999	0	0.0%		
$20,000 - $27,499	0	0.0%		
$27,500 - $34,999	0	0.0%		
$35,000 - $44,999	0	0.0%		
$45,000 - $74,999	27	18.0%		
$75,000 - $124,999	63	42.0%		
$125,000 +	60	40.0%		

Organizational Characteristics

The number of usable responses for ten-item setting characteristics from the *Organizational Characteristics Profile* also consisted of 150 executives or professionals who provided the background of the sampled companies through completing the online survey. There were two fill-in questions about respondents' company name and the organization's name of their partners on both the most and least successful strategic alliances. All setting characteristics items were used to answer research questions and in the regression models that tested the hypotheses with the exception of these two confidential survey items. In order to understand the result more deeply, the study re-categorized the number of employees, the number of U.S. offices and foreign offices, and the total revenue by particular levels.

According to the verbatim comment report, the average number of employees was 23,538 and ranged from 30 to 1 million. Among the respondents' companies, the average number of U.S. offices was 43 and ranged from 1 to 800. The average number of foreign offices was 23 and ranged from 0 to 750. After re-categorization, the result indicated that the number of employees in respondents' firms mostly concentrated in the firm size of 1,001-5,000 (34.7%) while the percentage of the firm size over 50,001 was 8%. The majority of respondents reported their companies as having U.S. offices between 6 and 15 (24.7%) and between 16 and 50 (24.7%). One half of the total respondents identified that their companies had "zero" office outside the U.S. (50%), and the sampled companies which had "51 and more" foreign offices were the smallest group (6%).

The largest and the second largest number of respondents reported being regionally located in the Midwest (25.3%) and the Southeast (24%) respectively, and the

smallest number in the West (13.3%). Type of location area of these selected companies included urban (48.7%), suburban (46.7%), and rural (4.6%). Table 4-23 depicts the firm size, number of U.S. and foreign offices, regional location, and types of location area for the total sample.

More than half of the total respondents indicated that the total revenue including domestic and international in U.S. dollars at their firms was "more than $1 billion" and the sampled companies which had annual revenues between $500 million and $1 billion were the smallest group. Most respondents (91.3%) reported receiving new construction contracts in their companies recently. In addition, over half of the total sampled companies reported by the respondents were "not" offering the alliance training programs (64%). Table 4-24 shows the total revenue, new contracts, and alliance training programs for the total sample.

Table 4-23

Organizational Characteristics of the Total Sample by Number of Employees, Number of U.S. Offices and Foreign Offices, U.S. Region, and Types of Location Area

Organizational Characteristics	Frequency	Valid Percent	Mean	Std. Deviation
Number of Employees	(n=150)		2.77	1.277
1 - 500	39	26.0%		
501 - 1,000	14	9.3%		
1,001 - 5,000	52	34.7%		
5,001 - 50,000	33	22.0%		
50,001 and more	12	8.0%		
Total			23,538	
Number of U.S. Offices	(n=150)		2.32	1.113
0 - 5	47	31.3%		
6 - 15	37	24.7%		
16 - 50	37	24.7%		
51 and more	29	19.3%		
Total			43	
Number of Foreign Offices	(n=150)		1.81	0.951
0	75	50.0%		
1 - 10	37	24.7%		
11 - 50	29	19.3%		
51 and more	9	6.0%		
Total			23	
U.S. Region	(n=150)		2.84	1.301
Northeast	28	18.7%		
Southeast	36	24.0%		
Midwest	38	25.3%		
Southwest	28	18.7%		
West	20	13.3%		
Type of Location Area	(n=150)		2.44	0.585
Rural	7	4.6%		
Suburban	70	46.7%		
Urban	73	48.7%		

Table 4-24

Organizational Characteristics of the Total Sample by Total Revenue, New Construction Contracts, and Alliance Training Programs

Organizational Characteristics	Frequency	Valid Percent	Mean	Std. Deviation
Total Revenue	(n=150)		7.23	0.855
Less than $250,000	0	0.0%		
$250,000 - less than $1 million	0	0.0%		
$1 million - less than $5 million	0	0.0%		
$5 million - less than $25 million	0	0.0%		
$25 million - less than $100 million	0	0.0%		
$100 million - less than $500 million	41	27.3%		
$500 million - less than $1 billion	33	22.0%		
$1 billion or more	76	50.7%		
New Contracts	(n=150)		1.09	0.282
Yes	137	91.3%		
No	13	8.7%		
Alliance Training Programs	(n=150)		1.64	0.482
Yes	54	36.0%		
No	96	64.0%		

Dimensions of Alliances

Attributes of the alliance. In this study, the executive/manager's beliefs about the attributes of the construction alliance in their firms were based on participants' total scores on the modified *Attributes of the Alliance Scale*. The modified ***Attributes of the Alliance Scale*** consists of twelve items. The scale contains four dimensions, including trust and coordination (3 items), commitment from the least successful alliance (3 items), commitment from the most successful alliance (4 items), and interdependence (2 items). The response format was a seven-point Likert-type scale with the following response categories: the first and least dimensions are ranged with anchors of "1=strongly disagree and 7=strongly agree, item TC4a is ranged with 1=very poorly coordinated and

7=extremely well coordinated, and the second and third dimensions are ranged with 1=significantly less and 7=significantly more. Possible scores ranged from 12 to 84, with higher scores indicating a greater agreement of the attributes of the alliance.

The average total modified *Attributes of the Alliance Scale* score for the total sample was 54.56 (SD = 7.630). The average item score for the modified ***Attributes of the Alliance Scale*** was 4.55. The modified *Attributes of the Alliance Scale* dimension with the highest item mean (M = 5.25) was *trust and coordination* (M = 15.75, SD = 2.885), with a possible range of 3 to 21. The dimension with the lowest item mean (M = 3.98) was *commitment from the least successful alliance* (M = 11.94, SD = 3.537), with a possible range of 3 to 21. The item with the highest mean was item TC4a, "most successful strategic supplier alliance/partnership" (M = 5.49, SD = 1.157). Item CM3 (L) "capital investment in the supplier," had the lowest item mean (M = 3.91, SD = 1.307). There are three tables in this study which show responses by factor and item for the modified *Attributes of the Alliance Scale*. Table 4-25 presents responses by trust and coordination subscale and item. Table 4-26 shows responses by commitment subscale and item from the least and the most successful alliance. Table 4-27 depicts responses by interdependence subscale and item.

Table 4-25

Response Distribution for the Modified Attributes of the Alliance Scale Trust and Coordination Subscale: Total Sample

Factor/Item		Response Categories Percent Distribution							Mean	Standard Deviation
		Strongly Disagree (Very Poorly Coordinated) 1	2	3	Neutral 4	5	6	Strongly Agree (Extremely Well Coordinated) 7		
Trust and Coordination (I)									**5.25**	
TC1	We trust that our strategic supplier alliance/partnership will be beneficial to our business unit.	0.0%	0.7%	3.3%	22.0%	22.6%	36.7%	14.7%	5.35	1.118
TC3	This strategic supplier alliance/partnership relationship is marked by a high degree of harmony.	0.7%	0.0%	3.3%	34.0%	33.3%	24.0%	4.7%	4.90	1.002
TC4a	Most successful strategic supplier alliance/partnership.	0.7%	0.0%	1.3%	22.0%	20.7%	34.0%	21.3%	5.49	1.157
Factor I Score (Range 3 - 21)									**15.75**	**2.885**

[a]In order to reflect each item of the same factor "trust and coordination" in the same page, the heading for the item TC4a is using a seven-point semantic scale with anchors, 1 = very poorly coordinated; 7 = extremely well coordinated.

Table 4-26

Response Distribution for the Modified Attributes of the Alliance Scale Commitment Subscale: Total Sample

	Response Categories Percent Distribution								
	Significantly Less			Neutral			Significantly More	Mean	Standard Deviation
	1	2	3	4	5	6	7		
Commitment from the Least Successful Alliance (II)								**3.98**	
CM2(L) Supplier training	2.7%	12.7%	14.0%	32.7%	20.0%	15.2%	2.7%	4.11	1.393
CM3(L) Capital investment in the supplier	4.7%	12.7%	9.3%	47.3%	14.0%	10.7%	1.3%	3.91	1.307
CM4(L) Direct dollar investment in the supplier	5.3%	11.3%	13.3%	40.7%	17.3%	9.4%	2.7%	3.92	1.364
Factor II Score (Range 3 - 21)								**11.94**	**3.537**
Commitment from the Most Successful Alliance (III)								**4.59**	
CM1(M) Time commitment of your business unit's key personnel	1.3%	2.7%	4.0%	27.3%	32.7%	26.0%	6.0%	4.89	1.177
CM2(M) Supplier training	0.7%	2.7%	7.3%	39.3%	26.0%	19.3%	4.7%	4.64	1.137
CM3(M) Capital investment in the supplier	1.3%	5.4%	6.0%	43.3%	28.0%	14.0%	2.0%	4.41	1.118
CM4(M) Direct dollar investment in the supplier	1.3%	4.0%	8.0%	42.7%	30.0%	10.0%	4.0%	4.42	1.119
Factor III Score (Range 4 - 28)								**18.37**	**3.601**

Table 4-27

Response Distribution for the Modified Attributes of the Alliance Scale Interdependence Subscale: Total Sample

		Response Categories Percent Distribution								
		Strongly Disagree 1	2	3	Neutral 4	5	6	Strongly Agree 7	Mean	Standard Deviation
Interdependence (IV)									**4.25**	
ID2	The time to establish another strategic supplier alliance/partnership for this commodity/purchase family would be extremely long.	4.6%	6.7%	12.0%	38.0%	24.0%	10.7%	4.0%	4.18	1.346
ID3	The cost to establish another strategic supplier alliance/partnership for this commodity/purchase family would be extremely high.	2.7%	4.6%	10.0%	42.7%	24.7%	10.7%	4.6%	4.33	1.234
Factor IV Score (Range 2 - 14)									**8.51**	**2.398**
Total Attributes of the Alliance Scale Score (Range 12 - 84)									**54.56**	**7.630**

Communication behavior. Construction executives' self-perceptions of their business units' communication with the supplier in the most and least successful (favorable) strategic alliance were measured using the *Communication Behavior Scale.* The modified *Communication Behavior Scale* consists of twenty-one items and the scale contains five dimensions, including information quality from the least successful alliance (5 items), information quality from the most successful alliance (5 items), information sharing (4 items), information participation (5 items), and proprietary information sharing (2 items). The response format was a seven-point Likert-type scale with the following response categories: the first and second dimensions are ranged with anchors of "1= poor and 7= excellent, and the rest of the dimensions are ranged with 1=strongly disagree and 7=strongly agree. Possible scores ranged from 21 to 147, with higher scores indicating a greater agreement of the communication behavior within strategic alliances.

The average total modified *Communication Behavior Scale* score for the total sample was 97.74 (SD = 16.298). The average item score for the modified *Communication Behavior Scale* was 4.65. The modified *Communication Behavior Scale* dimension with the highest item mean (M = 5.40) was *information quality from the most successful alliance* (M = 26.99, SD = 5.134), with a possible range of 5 to 35. The dimension with the lowest item mean (M = 3.59) was *information quality from the least successful alliance* (M = 17.97, SD = 6.543), with a possible range of 5 to 35. The item with the highest mean was item QL5 (M), "credible" (M = 5.47, SD = 1.163). Item QL4 (L) "complete," had the lowest item mean (M = 3.51, SD = 1.384). There are four tables in this study show responses by factor and item for the modified *Communication Behavior Scale.* Table 4-28 presents responses by information quality subscale and item

from the least and the most successful alliance. Table 4-29 shows responses by information sharing subscale and item. Table 4-30 depicts responses by information participation subscale and item. Table 4-31 depicts responses by proprietary information sharing subscale and item.

Table 4-28

Response Distribution for the Modified Communication Behavior Scale Information Quality Subscale: Total Sample

Dimension/Item	Response Categories Percent Distribution							Mean	Standard Deviation
	Poor			Average			Excellent		
	1	2	3	4	5	6	7		
Information Quality from the Least Successful Alliance (I)								**3.59**	
QL1(L) Timely	8.7%	16.0%	18.0%	36.7%	10.0%	8.0%	2.6%	3.58	1.448
QL2(L) Accurate	6.0%	18.0%	21.3%	32.7%	12.0%	8.0%	2.0%	3.59	1.391
QL3(L) Adequate	6.0%	16.0%	18.0%	42.0%	9.4%	7.3%	1.3%	3.60	1.311
QL4(L) Complete	6.7%	17.2%	24.7%	32.7%	9.3%	6.7%	2.7%	3.51	1.384
QL5(L) Credible	8.0%	14.6%	16.7%	36.0%	12.7%	10.0%	2.0%	3.69	1.448
Factor I Score (Range 5 - 35)								**17.97**	**6.543**
Information Quality from the Most Successful Alliance (II)								**5.40**	
QL1(M) Timely	0.0%	0.0%	3.3%	25.3%	16.7%	36.7%	18.0%	5.41	1.147
QL2(M) Accurate	0.0%	0.0%	2.7%	23.3%	23.3%	32.7%	18.0%	5.40	1.111
QL3(M) Adequate	0.7%	0.0%	2.7%	24.7%	26.0%	29.3%	16.6%	5.30	1.157
QL4(M) Complete	0.7%	0.0%	1.3%	22.7%	22.0%	38.0%	15.3%	5.41	1.106
QL5(M) Credible	0.7%	0.0%	1.3%	24.0%	17.3%	36.7%	20.0%	5.47	1.163
Factor II Score (Range 5 - 35)								**26.99**	**5.134**

Table 4-29

Response Distribution for the Modified Communication Behavior Scale Information Sharing Subscale: Total Sample

Dimension/Item		Response Categories Percent Distribution							Mean	Standard Deviation
		Strongly Disagree			Neutral			Strongly Agree		
		1	2	3	4	5	6	7		
Information Sharing (III)									**5.09**	
IS3	We inform this strategic supplier in advance of changing needs.	0.7%	2.0%	4.6%	24.7%	26.0%	34.0%	8.0%	5.07	1.176
IS4	In this relationship, it is expected that any information which might help the other party will be provided.	1.3%	1.3%	1.3%	30.0%	25.4%	27.4%	13.3%	5.12	1.220
IS5	The parties are expected to keep each other informed about events or changes that may affect the other party.	1.3%	0.7%	4.0%	24.7%	22.0%	29.3%	18.0%	5.25	1.281
IS7	This strategic supplier keeps us fully informed about issues that affect our business.	0.7%	1.3%	6.7%	32.0%	22.0%	30.6%	6.7%	4.92	1.179
Factor III Score (Range 4 - 28)									**20.37**	**4.349**

Table 4-30

Response Distribution for the Modified Communication Behavior Scale Information Participation Subscale: Total Sample

Dimension/Item		Response Categories Percent Distribution							Mean	Standard Deviation
		Strongly Disagree			Neutral			Strongly Agree		
		1	2	3	4	5	6	7		
Information Participation (IV)									**4.82**	
PT1	We actively seek advice, counsel, and information from our strategic supplier in this strategic supplier alliance/partnership.	1.3%	1.3%	4.7%	33.4%	22.7%	19.3%	17.3%	5.02	1.323
PT2	The strategic supplier participates in our planning and goal-setting activities.	1.3%	10.7%	6.6%	32.7%	19.3%	24.7%	4.7%	4.51	1.403
PT3	We participate in our strategic supplier's planning and goal-setting activities that are relevant to this strategic supplier alliance/partnership.	2.7%	4.7%	7.3%	35.3%	25.3%	18.0%	6.7%	4.57	1.328
PT4	We actively encourage improvement suggestions from this strategic supplier.	0.7%	2.0%	3.3%	32.0%	28.0%	21.3%	12.7%	4.99	1.212
PT5	We take timely action on this strategic supplier's suggestion(s) for this alliance/partnership.	0.0%	2.0%	2.7%	33.3%	27.3%	22.7%	12.0%	5.02	1.155
Factor IV Score (Range 5 - 35)									**24.11**	**5.407**

Table 4-31

Response Distribution for the Modified Communication Behavior Scale Proprietary Information Sharing Subscale: Total Sample

Dimension/Item		Response Categories Percent Distribution							Mean	Standard Deviation
		Strongly Disagree			Neutral			Strongly Agree		
		1	2	3	4	5	6	7		
Proprietary Information Sharing (V)									**4.16**	
IS1	We share our business unit's proprietary information with this strategic supplier for this strategic alliance/partnership.	6.0%	10.0%	10.7%	38.7%	21.3%	9.3%	4.0%	4.03	1.416
IS2	Our strategic supplier shares proprietary information with us.	2.7%	8.7%	7.3%	40.7%	26.0%	9.3%	5.3%	4.28	1.306
Factor V Score (Range 2 - 14)									**8.31**	**2.514**
Total Communication Behavior Scale Score (Range 21 - 147)									**97.74**	**16.298**

Conflict resolution techniques. Construction executives' attitudes toward conflicts which exist over various program and policy issues in the strategic alliances were based on participants' total scores on the *Conflict Resolution Techniques Scale*. The modified *Conflict Resolution Techniques Scale* consists of five items and the scale contains two dimensions, including avoidance & constructive conflict resolution techniques (3 items), and destructive conflict resolution techniques (2 items). The response format was a seven-point Likert-type scale with the following response categories: 1 = never and 7 = occasionally. Possible scores ranged from 5 to 35, with higher scores indicating a greater agreement of the conflict resolution techniques within strategic alliances.

The average total modified *Conflict Resolution Techniques Scale* score for the total sample was 19.55 (SD = 4.46). The average item score for the modified *Conflict Resolution Techniques Scale* was 3.91. The modified *Conflict Resolution Techniques Scale* dimension with the highest item mean (M = 4.72) was *avoidance & constructive conflict resolution techniques* (M = 14.15, SD = 3.283), with a possible range of 3 to 21. The dimension with the lowest item mean (M = 2.71) was *destructive conflict resolution techniques* (M = 5.41, SD = 2.840), with a possible range of 2 to 14. The item with the highest mean was item CR3, "joint problem solving" (M = 5.11, SD = 1.344). Item CR5 "outside arbitration," had the lowest item mean (M = 2.43, SD = 1.586). Table 4-32 presents responses by factor and item for the modified *Conflict Resolution Techniques Scale.*

Table 4-32

Response Distribution for the Modified Conflict Resolution Techniques Scale Subscale: Total Sample

Dimension/Item	Response Categories Percent Distribution							Mean	Standard Deviation
	Never						Occasionally		
	1	2	3	4	5	6	7		
Avoidance & Constructive Conflict Resolution Techniques (I)								**4.72**	
CR1 Smooth over the problem	6.7%	4.0%	9.2%	30.7%	26.0%	14.7%	8.7%	4.44	1.517
CR2 Persuasive attempts by either party	3.3%	2.7%	7.3%	35.4%	27.3%	17.3%	6.7%	4.59	1.306
CR3 Joint problem solving	1.3%	2.0%	6.7%	22.7%	25.3%	25.3%	16.7%	5.11	1.344
Factor I Score (Range 3 - 21)								**14.15**	**3.283**
Destructive Conflict Resolution Techniques (II)								**2.71**	
CR4 Harsh words	17.3%	30.7%	18.0%	16.7%	9.3%	4.7%	3.3%	2.97	1.584
CR5 Outside arbitration	40.7%	21.3%	9.3%	18.7%	4.0%	4.7%	1.3%	2.43	1.586
Factor II Score (Range 2 - 14)								**5.41**	**2.840**
Total Conflict Resolution Techniques Scale Score (Range 5 - 35)								**19.55**	**4.460**

Commodity/supplier selection process. Construction executives' perceptions of their business units' process to select commodities and assess strategic suppliers were measured using the *Commodity/Supplier Selection Process Scale.* The *Commodity/Supplier Selection Process Scale* combines two items to one dimension. The response format was a seven-point Likert-type scale with the following response categories: 1= very limited and 7= very comprehensive. Possible scores ranged from 2 to 14, with higher scores indicating a greater agreement of the commodity and supplier selection process within strategic alliances.

The average *Commodity/Supplier Selection Process Scale* score for the total sample was 9.28 (SD = 2.486). The average item score for the *Commodity/Supplier Selection Process Scale* was 4.64. The item with the highest mean was item NA1, "your business unit's process to select commodities/purchase items as candidates for strategic supplier alliances/partnerships - compared to what you may consider best practice" (M = 4.65, SD = 1.341). Item NA2 "your business unit's strategic supplier assessment and selection process — compared to what you consider best practice," had the lowest item mean (M = 4.63, SD = 1.297). Table 4-33 presents responses by factor and item for the *Commodity/Supplier Selection Process Scale.*

Table 4-33

Commodity/Supplier Selection Process Scale Response Distribution of the Total Sample

Dimension/Item		Response Categories Percent Distribution							Mean	Standard Deviation
		Very Limited 1	2	3	4	5	6	Very Comprehensive 7		
Commodity/Supplier Selection Process									**4.64**	
NA1	Your business unit's process to select commodities/purchase items as candidates for strategic supplier alliances/partnerships - compared to what you may consider best practice.	1.3%	6.0%	5.3%	38.0%	21.4%	18.7%	9.3%	4.65	1.341
NA2	Your business unit's strategic supplier assessment and selection process - compared to what you consider best practice.	1.3%	4.7%	9.2%	32.7%	24.7%	20.7%	6.7%	4.63	1.297
Factor I Score (Range 2 - 14)									**9.28**	**2.486**
Total Scale Score (Range 2 - 14)									**9.28**	**2.486**

Success Factors

Satisfaction and adjusted satisfaction. Construction executives' perceptions toward experience and satisfaction with strategic alliances were measured using the modified *Indicators of Success Scale*. The modified *Indicators of Success Scale* consists of seven items and the scale contains two dimensions, including past success (4 items), and success difference (2 items). The response format was a seven-point Likert-type scale with the following response categories: the first dimension is ranged with anchors of "1 = strongly disagree; 4 = neutral; 7 = strongly agree," and the second dimension is ranged with "1 = poorly satisfied; 7 = highly satisfied." Possible scores ranged from 6 to 42, with higher scores indicating a greater agreement of the indicators of success within strategic alliances.

The average total modified *Indicators of Success Scale* score for the total sample was 29.77 (SD = 6.000). The average item score for the modified *Indicators of Success Scale* was 4.96. The modified *Indicators of Success Scale* dimension with the highest item mean (M = 5.03) was *past success* (M = 20.12, SD = 4.826), with a possible range of 4 to 28. The dimension with the lowest item mean (M = 4.83) was *success difference* (M = 9.65, SD = 1.813), with a possible range of 2 to 14. The item with the highest mean was item SU1, "in this strategic supplier alliance/partnership relationship, the parties work together to solve problems" (M = 5.13, SD = 1.427). Item SU6 "your satisfaction with this strategic supplier alliance/partnership," had the lowest item mean (M = 4.71, SD = 1.025). Table 4-34 presents responses by past success subscale and item for the modified *Indicators of Success Scale*. And Table 4-35 shows responses by success difference subscale and item.

Table 4-34

Response Distribution for the Modified Indicators of Success Scale Past Success Subscale: Total Sample

Dimension/Item		Response Categories Percent Distribution							Mean	Standard Deviation
		Strongly Disagree			Neutral			Strongly Agree		
		1	2	3	4	5	6	7		
Past Success (I)									**5.03**	
SU1	In this strategic supplier alliance/partnership relationship, the parties work together to solve problems.	2.0%	2.7%	4.0%	27.3%	19.3%	24.7%	20.0%	5.13	1.427
SU2	This strategic supplier is flexible in response to requests we make.	1.3%	2.0%	3.3%	29.3%	24.7%	28.7%	10.7%	5.03	1.242
SU3	This strategic supplier makes an effort to help us during emergencies.	1.3%	3.3%	4.0%	27.3%	16.0%	33.4%	14.7%	5.12	1.366
SU4	When an agreement is made, we can always rely on the strategic supplier to fulfill the requirements.	1.3%	2.7%	3.3%	37.4%	23.3%	22.7%	9.3%	4.84	1.243
Factor I Score (Range 4 - 28)									**20.12**	**4.826**

Table 4-35

Response Distribution for the Modified Indicators of Success Scale Success Difference Subscale: Total Sample

Dimension/Item		Response Categories Percent Distribution							Mean	Standard Deviation
		Poorly Satisfied			Neutral			Highly Satisfied		
		1	2	3	4	5	6	7		
Success Difference (II)									**4.83**	
SU6	Your satisfaction with this strategic supplier alliance/partnership.	0.7%	0.7%	6.7%	38.0%	28.6%	23.3%	2.0%	4.71	1.025
SU6a	Your business unit's overall degree of satisfaction with strategic supplier alliances/partnerships.	0.7%	0.0%	4.0%	31.3%	32.0%	28.7%	3.3%	4.93	1.001
Factor II Score (Range 2 - 14)									**9.65**	**1.813**
Total Indicators of Success Scale Score (Range 6 - 42)									**29.77**	**6.000**

Organizational performance. Construction executives' perceptions about strategic alliances performance were measured using the *Organizational Performance Scale*. The *Organizational Performance Scale* consists of sixteen items and the scale contains two dimensions, including customer perspective (4 items), learning and growth perspective (3 items), financial perspective (4 items), and internal-business-process perspective (5 items). The response format was a seven-point Likert-type scale with the following response categories: 1 = strongly disagree and 7 = strongly agree. Possible scores ranged from 16 to 112, with higher scores indicating a greater agreement of the organizational performance within strategic alliances.

The average total *Organizational Performance Scale* score for the total sample was 79.33 (SD = 15.304). The average item score for the *Organizational Performance Scale* was 4.96. The *Organizational Performance Scale* dimension with the highest item mean (M = 5.15) was *customer perspective* (M = 20.61, SD = 4.729), with a possible range of 4 to 28. The dimension with the lowest item mean (M = 4.77) was *internal-business-process perspective* (M = 23.83, SD = 5.574), with a possible range of 5 to 35. The item with the highest mean was item CP3, "increase customer satisfaction/Meet customers' needs" (M = 5.27, SD = 1.331). Item BP5 "speed up new product introduction in comparison to competitors/Technology," had the lowest item mean (M = 4.59, SD = 1.216). Table 4-36 presents responses by factor and item for the *Organizational Performance Scale*.

Table 4-36

Organizational Performance Scale Response Distribution of the Total Sample

Dimension/Item		Response Categories Percent Distribution							Mean	Standard Deviation
		Strongly Disagree			Neutral			Strongly Agree		
		1	2	3	4	5	6	7		
Customer Perspective (I)									**5.15**	
CP1	Increase market share	0.0%	2.0%	4.7%	26.7%	27.3%	28.0%	11.3%	5.09	1.170
CP2	Increase customer acquisition/Attract new customers	0.0%	2.0%	6.0%	26.0%	24.7%	30.0%	11.3%	5.09	1.198
CP3	Increase customer satisfaction/Meet customers' needs	0.7%	1.3%	4.7%	26.0%	21.3%	22.7%	23.3%	5.27	1.331
CP4	Increase customer retention/Loyalty/Repeat Business	1.3%	1.3%	5.4%	28.0%	22.0%	20.0%	22.0%	5.16	1.376
Factor I Score (Range 4 - 28)									**20.61**	**4.729**
Learning and Growth Perspective (II)									**4.98**	
LG1	High employee satisfaction	1.3%	0.0%	5.3%	28.7%	28.7%	22.7%	13.3%	5.05	1.217
LG2	High employee retention	1.3%	1.3%	5.4%	36.7%	24.0%	22.0%	9.3%	4.84	1.221
LG3	High employee productivity	1.3%	1.3%	3.3%	28.7%	26.0%	28.0%	11.4%	5.06	1.222
Factor II Score (Range 3 - 21)									**14.95**	**3.431**
Financial Perspective (III)									**4.99**	
FP1	Accelerate revenue growth	0.0%	2.0%	8.7%	25.3%	35.3%	22.7%	6.0%	4.86	1.111
FP2	Increase return on investment	1.3%	0.7%	6.0%	29.3%	32.7%	22.0%	8.0%	4.89	1.159
FP3	Increase profitability	0.7%	0.7%	5.3%	26.0%	26.0%	32.7%	8.6%	5.09	1.147
FP4	Control total costs	0.0%	0.7%	7.3%	24.7%	26.0%	30.0%	11.3%	5.11	1.162
Factor III Score (Range 4 - 28)									**19.95**	**4.006**

Continued

Table 4-36 (Continued)

Dimension/Item		Response Categories Percent Distribution							Mean	Standard Deviation
		Strongly Disagree			Neutral			Strongly Agree		
		1	2	3	4	5	6	7		
Internal-Business-Process Perspective (IV)									**4.77**	
BP1	Reduce order cycle time	3.3%	2.7%	7.3%	39.3%	20.0%	18.7%	8.7%	4.61	1.361
BP2	Meet contract schedule/Meet time standards	1.3%	2.0%	6.0%	32.7%	20.0%	24.7%	13.3%	4.95	1.323
BP3	Improve quality standards	2.0%	1.3%	5.3%	36.7%	20.0%	24.0%	10.7%	4.86	1.295
BP4	Lower costs of existing processes	2.7%	0.7%	4.0%	36.0%	28.0%	19.3%	9.3%	4.81	1.245
BP5	Speed up new product introduction in comparison to competitors/Technology	2.0%	2.0%	6.6%	42.7%	24.7%	14.7%	7.3%	4.59	1.216
Factor IV Score (Range 5 - 35)									**23.83**	**5.574**
Total Organizational Performance Scale Score (Range 16 - 112)									**79.33**	**15.304**

Research Question 2: Differences in Alliance Dimensions and Success Factors According to Alliance Manager Characteristics

Q2: Are there differences in dimensions of alliances and success factors of the alliances in the construction industry of USA-based contractor companies according to alliance manager characteristics?

Differences in Alliance Dimensions and Success Factors According to Gender

Independent t-tests were conducted to determine whether the means of two sample distributions differ significantly from each other, such as gender and ethnicity. The comparisons between the means for male and female construction managers' responses to questions related to alliance dimensions (*attributes of the alliance*, *communication behavior*, *conflict resolution techniques,* and *commodity/supplier selection process*) and success factors (*indicators of success* in terms of *past success* and *success difference*, and four perspectives of *organizational performance*) are shown in Table 4-37 and Table 4-38.

Independent t-test comparisons in alliance dimensions according to gender. On average, male construction managers had a higher degree of agreement on attributes of alliance (M = 54.71, SE = .69) than their female counterparts (M = 53.62, SE = 1.36). The difference was not significant $t(148) = .61$, $p > .05$, inferring that male construction managers had an equal degree of agreement on attributes of alliance as their female counterparts. Furthermore, male participants also demonstrated a higher level of communication behavior (M = 98.05, SE = 1.43) than their female counterparts (M = 95.81, SE = 3.47). The difference was non-significant $t(148) = .58$, $p > .05$, indicating that the variances are roughly equal. Generally speaking, male participants reported a

higher level of conflict resolution techniques (M = 19.81, SE = .41) than their female counterparts (M = 17.95, SE = .49). The difference was significant $t(148) = 2.92$, $p < .05$, inferring a violation of homogeneity of variances, one of the assumptions of parametric data. For the total sample, male construction managers showed a higher level of commodity/supplier selection process (M = 9.37, SE = .23) than their female counterparts (M = 8.76, SE = .43). There was also no significant difference $t(148) = 1.04$, $p > .05$, indicating that homogeneity of variances was met.

Table 4-37

Comparison of the Mean Scores for the Attributes of the Alliance, Communication Behavior, Conflict Resolution Techniques, and *Commodity/Supplier Selection Process According to Gender: Independent t-tests*

Group and Variable	N	Mean	Std. Error Mean	*t*	Sig. (*p*)
Modified Attributes of the Alliance (N=150)				.61	.544
Total Scale (Range 12 to 84)					
Males	129	54.71	.69		
Females	21	53.62	1.36		
Modified Communication Behavior (N=150)				.58	.560
Total Scale (Range 21 to 147)					
Males	129	98.05	1.43		
Females	21	95.81	3.74		
Modified Conflict Resolution Techniques (N=150)				2.92	**.005**
Total Scale (Range 5 to 35)					
Males	129	19.81	.41		
Females	21	17.95	.49		
Commodity/Supplier Selection Process (N=150)				1.04	.298
Total Scale (Range 2 to 14)					
Males	129	9.37	.23		
Females	21	8.76	.43		

Independent t-test comparisons in success factors according to gender. Both male and female construction managers who were engaged in strategic alliances showed high levels of past success. The difference was not significant $t(148) = .943$, $p > .05$, inferring that male participants ($M = 20.11$, $SE = .44$) perceived an equal degree of the company's strategic alliance relationship with their construction suppliers in terms of past success as their female counterparts ($M = 20.19$, $SE = .86$). On average, male respondents demonstrated a higher level of success difference ($M = .24$, $SE = .09$) than their female counterparts ($M = .10$, $SE = .07$). According to Monczka et al. (1998), success difference was measured by taking the difference between SU6 and SU6a (i.e., SU6a – SU6). However, there was no significant difference between two means $t(148) = 1.35$, $p > .05$, indicating that both male and female participants are somewhat equally represented at success difference when they rated their private satisfaction and their business units' overall satisfaction with strategic supplier alliances.

For the total sample, female participants reported a higher level of alliance performance in terms of customer perspective ($M = 21.52$, $SE = 1.08$) than their male counterparts ($M = 20.46$, $SE = .41$). The difference was non-significant $t(148) = -.96$, $p > .05$, indicating that homogeneity of variances was met. Both male and female respondents showed high levels of alliance performance in terms of learning and growth perspective. There was no significant difference between the two means $t(148) = .20$, $p > .05$, inferring that male participants ($M = 14.97$, $SE = .30$) perceived equally the customer perspective of alliance performance as their female counterparts ($M = 14.81$, $SE = .83$). In addition, female respondents demonstrated a higher level of alliance performance in terms of financial perspective ($M = 20.38$, $SE = .85$) than their male counterparts ($M =$

19.88, *SE* = .36). The difference was also not significant $t(148) = -.53$, $p > .05$. On average, male participants reported a higher level of alliance performance in terms of the internal-business-process perspective (M = 24.19, SE = .48) than their female counterparts ($M = 21.62$, $SE = 1.28$). The difference was highly significant $t(148) = 1.98$, $p = .05$, inferring a violation of homogeneity of variances, one of the assumptions of parametric data.

Table 4-38

Comparison of the Mean Scores for the Past Success, Success Difference, Customer Perspective, Learning and Growth Perspective, Financial Perspective, and Internal-Business-Process Perspective According to Gender: Independent t-tests

Group and Variable	N	Mean	Std. Error Mean	*t*	Sig. (*p*)
Past Success (N=150)				-.07	.943
Total Scale (Range 4 to 28)					
Males	129	20.11	.44		
Females	21	20.19	.86		
Success Difference (N=150)				1.35	.180
SU6a-SU6					
Males	129	.24	.09		
Females	21	.10	.07		
Customer Perspective (N=150)				-.96	.340
Total Scale (Range 4 to 28)					
Males	129	20.46	.41		
Females	21	21.52	1.08		
Learning and Growth Perspective (N=150)				.20	.844
Total Scale (Range 3 to 21)					
Males	129	14.97	.30		
Females	21	14.81	.83		
Financial Perspective (N=150)				-.53	.600
Total Scale (Range 4 to 28)					
Males	129	19.88	.36		
Females	21	20.38	.85		
Internal-Business-Process Perspective (N=150)				1.98	**.050**
Total Scale (Range 5 to 35)					
Males	129	24.19	.48		
Females	21	21.62	1.28		

Differences in Alliance Dimensions and Success Factors According to Age

One-way ANOVA's were performed to examine differences for the dimensions of alliances scales, success of the alliances scales, and related subscales according to age with four response groups (25-34, 35-44, 45-54, and 55 or more). Ten dependent variables (*attributes of the alliance*, *communication behavior*, *conflict resolution techniques*, *commodity/supplier selection process*, *indicators of success*, and *organizational performance*) were compared using ANOVA ($p < .05$), and if there was a significant F value, Tukey's post hoc comparisons were conducted.

ANOVA comparisons in alliance dimensions according to age. Table 4-39 presents ANOVA comparisons for alliance dimensions scales and related subscales. ANOVA showed a significant F value for *proprietary information sharing* subscale of *communication behavior* ($F = 3.594$, $p = .015$) according to the age of construction managers who were engaged in strategic alliances. Tukey's post hoc analyses indicated that construction managers between the age of 35 and 44 ($\mu = 9.23$) rated *proprietary information sharing* significantly higher than those between the age of 45 and 54 ($\mu = 7.61$). ANOVA showed no significant differences in the responses between *attributes of the alliance*, *conflict resolution techniques*, and *commodity/supplier selection process* according to age.

Table 4-39

ANOVA with Post Hoc Comparisons of Attributes of the Alliance, Communication Behavior, Conflict Resolution Techniques, and *Commodity/Supplier Selection Process and Related Subscales According to Age*

Variable/Age Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Attributes of the Alliance					
Trust and Coordination			1.981	.119[a]	
25-34	26	14.54			
35-44	47	15.83			
45-54	46	16.04			
55 or more	31	16.19			
Commitment from the Least Successful Alliance			1.090	.355[a]	
25-34	26	12.15			
35-44	47	12.53			
45-54	46	11.78			
55 or more	31	11.10			
Commitment from the Most Successful Alliance			.476	.699[a]	
25-34	26	17.65			
35-44	47	18.43			
45-54	46	18.43			
55 or more	31	18.77			
Interdependence			.273	.845[a]	
25-34	26	8.65			
35-44	47	8.28			
45-54	46	8.70			
55 or more	31	8.45			
Total Attributes of the Alliance			.467	.706[a]	
25-34	26	53.00			
35-44	47	55.06			
45-54	46	54.96			
55 or more	31	54.52			

Continued

Table 4-39 (Continued)

Variable/Age Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Communication Behavior					
Information Quality from the Least Successful Alliance			1.821	.146[a]	
25-34	26	19.31			
35-44	47	19.19			
45-54	46	16.89			
55 or more	31	16.58			
Information Quality from the Most Successful Alliance			.612	.608[a]	
25-34	26	26.42			
35-44	47	26.40			
45-54	46	27.65			
55 or more	31	27.35			
Information Sharing			2.086	.105[a]	
25-34	26	20.54			
35-44	47	20.49			
45-54	46	19.24			
55 or more	31	21.71			
Information Participation			1.023	.384[a]	
25-34	26	23.23			
35-44	47	24.66			
45-54	46	23.37			
55 or more	31	25.10			
Proprietary Information Sharing			3.594	**.015**	
25-34	26	8.15			
35-44	47	9.23			
45-54	46	7.61			
55 or more	31	8.10			
35-44 > 45-54					.009
Total Communication Behavior			.853	.467[a]	
25-34	26	97.65			
35-44	47	100.00			
45-54	46	94.76			
55 or more	31	98.84			

Continued

Table 4-39 (Continued)

Variable/Age Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Conflict Resolution Techniques					
Avoidance & Constructive Conflict Resolution Techniques			.336	.800[a]	
25-34	26	13.69			
35-44	47	14.34			
45-54	46	14.00			
55 or more	31	14.45			
Destructive Conflict Resolution Techniques			3.596	**.015**	
25-34	26	6.38			
35-44	47	6.02			
45-54	46	4.83			
55 or more	31	4.52			
Total Conflict Resolution Techniques			1.225	.303[a]	
25-34	26	20.08			
35-44	47	20.36			
45-54	46	18.83			
55 or more	31	18.97			
Commodity/Supplier Selection Process			1.128	.340[a]	
25-34	26	8.58			
35-44	47	9.66			
45-54	46	9.20			
55 or more	31	9.45			

[a]Not significant

ANOVA Comparisons in success factors according to age. Table 4-40 presents ANOVA comparisons for success factors scales (*indicators of success*, and *organizational performance*) and related subscales. In this study, the modified *indicators of success* scale measured ratings of respondents to two dimensions (*past success*, and *success difference*); the modified *organizational performance* has four dimensions (*customer perspective, learning and growth perspective, financial perspective,* and

internal-business-process perspective). ANOVA comparisons showed no significant difference for *indicators of success* and *organizational performance* according to age range.

Table 4-40

ANOVA with Post Hoc Comparisons of Past Success, Success Difference, Customer Perspective, Learning and Growth Perspective, Financial Perspective, and *Internal-Business-Process Perspective According to Age*

Variable/Age Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Indicators of Success					
Past Success			2.472	.064[a]	
25-34	26	18.08			
35-44	47	20.49			
45-54	46	20.02			
55 or more	31	21.42			
Success Difference			2.284	.081[a]	
25-34	26	.15			
35-44	47	.00			
45-54	46	.48			
55 or more	31	.23			
Total Indicators of Success			2.298	.080[a]	
25-34	26	27.31			
35-44	47	30.32			
45-54	46	29.59			
55 or more	31	31.26			

Continued

Table 4-40 (Continued)

Variable/Age Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Organizational Performance					
Customer Perspective			.636	.593[a]	
25-34	26	19.85			
35-44	47	20.40			
45-54	46	21.35			
55 or more	31	20.45			
Learning and Growth Perspective			1.573	.198[a]	
25-34	26	14.15			
35-44	47	14.74			
45-54	46	15.80			
55 or more	31	14.65			
Financial Perspective			.051	.985[a]	
25-34	26	19.81			
35-44	47	20.06			
45-54	46	20.04			
55 or more	31	19.77			
Internal-Business-Process Perspective			.425	.736[a]	
25-34	26	24.38			
35-44	47	23.32			
45-54	46	23.54			
55 or more	31	24.55			
Total Organizational Performance			.217	.884[a]	
25-34	26	78.19			
35-44	47	78.53			
45-54	46	80.74			
55 or more	31	79.42			

[a]Not significant

Differences in Alliance Dimensions and Success Factors According to Education Level

One-way ANOVA's were performed to examine differences for the dimensions of alliances scales, success of the alliances scales, and related subscales according to education level with four response groups (professional, four-year college graduate, one to three years college, and high school graduate). Ten dependent variables (*attributes of*

the alliance, *communication behavior*, *conflict resolution techniques*, *commodity/supplier selection process*, *indicators of success*, and *organizational performance*) were compared using ANOVA ($p < .05$), and if there was a significant F value, Tukey's post hoc comparisons were conducted.

ANOVA comparisons in alliance dimensions according to education level. There was no significant effect of education level ($F = 3.055$, $p = 0.030$) on the total *attributes of the alliance* score. Although post hoc comparisons using the Tukey HSD test illustrated no significant differences in mean total *attributes of the alliance* score, there was some variation in the total score for *attributes of the alliance*, where those with high school diplomas had the highest mean ($\mu = 59.00$) and those who were four-year college graduates had the lowest mean ($\mu = 52.88$). There was little variation in *trust and coordination* subscale according to education background, where those with high school diplomas had the highest mean ($\mu = 17.71$) and those who were four-year college graduates had the lowest mean ($\mu = 15.43$). ANOVA results also showed no significant differences in the other subscales of *attributes of the alliance* according to education. For *commitment from the least successful alliance*, there was little variation where those with high school diplomas had the highest mean ($\mu = 13.14$) and those who were four-year college graduates had the lowest mean ($\mu = 17.73$). For *commitment from the most successful alliance*, there was little variation where those with high school diplomas had the highest mean ($\mu = 20.57$) and those who were four-year college graduates had the lowest mean ($\mu = 17.73$). For *interdependence*, there was little variation where those with professional degrees had the highest mean ($\mu = 8.95$) and those who were high school graduates had the lowest mean ($\mu = 7.57$).

There was no significant effect of education level (F = 1.183, p = .318) on the total *communication behavior* score. Although post hoc comparisons using the Tukey HSD test illustrated no significant differences in mean total *communication behavior* score, there was a some variation in the total score for *communication behavior*, where those with one to three years of college had the highest mean (μ = 103.00) and those who were four-year college graduates had the lowest mean (μ = 96.20). There was little variation in *information quality from the least successful alliance* subscale according to education background, where those with one to three years of college had the highest mean (μ = 19.44) and those who were four-year college graduates had the lowest mean (μ = 17.47). There was little variation in *information quality from the most successful alliance* subscale according to education background, where those with one to three years college levels had the highest mean (μ = 28.52) and those who were four-year college graduates had the lowest mean (μ = 26.37). ANOVA results also showed no significant differences in the other subscales of *communication behavior* according to education. For *information sharing*, there was little variation where those with high school diplomas had the highest mean (μ = 21.71) and those who were four-year college graduates had the lowest mean (μ = 20.11). For *information participation*, there was little variation where those with one to three years of college had the highest mean (μ = 25.78) and those who were high school graduates had the lowest mean (μ = 23.14). For *proprietary information sharing*, there was little variation where those with four-year college graduates had the highest mean (μ = 8.51) and those who were high school graduates had the lowest mean (μ = 6.57).

There was no significant effect of education level (F = 1.853, p = .140) on the total *conflict resolution techniques* score. Although post hoc comparisons using the Tukey HSD test illustrated no significant differences in mean total *conflict resolution techniques* score, there was some variation in the total score for *conflict resolution techniques*, where those with high school diplomas had the highest mean (μ = 22.71) and those who were one to three years of college had the lowest mean (μ = 18.89). There was little variation in *avoidance & constructive conflict resolution techniques* subscale according to education background, where those with high school diplomas had the highest mean (μ = 16.29) and those who were four-year college graduates had the lowest mean (μ = 13.71). There was little variation in *destructive conflict resolution techniques* subscale according to education background, where those with high school diplomas had the highest mean (μ = 6.43) and those who were one to three years of college had the lowest mean (μ = 4.89). There was also no significant effect of education level (F = .810, p = .490) on the total *commodity/supplier selection* score. For *commodity/supplier selection scale*, there was little variation where those with one to three years of college had the highest mean (μ = 9.67) and those who were four-year college graduates had the lowest mean (μ = 8.99). ANOVA comparisons of the dependent variables (alliance dimensions scales and related subscales) and education level are presented in Table 4-41.

Table 4-41

ANOVA with Post Hoc Comparisons of Attributes of the Alliance, Communication Behavior, Conflict Resolution Techniques, and *Commodity/Supplier Selection Process and Related Subscales According to Education Level*

Variable/Education Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Attributes of the Alliance					
Trust and Coordination			1.488	.220[a]	
Professional	41	15.83			
Four-year college graduate	75	15.43			
One to three years college	27	16.00			
High school graduate	7	17.71			
Commitment from the Least Successful Alliance			1.505	.216[a]	
Professional	41	12.17			
Four-year college graduate	75	11.39			
One to three years college	27	12.81			
High school graduate	7	13.14			
Commitment from the Most Successful Alliance			2.481	.063[a]	
Professional	41	18.46			
Four-year college graduate	75	17.73			
One to three years college	27	19.41			
High school graduate	7	20.57			
Interdependence			.957	.415[a]	
Professional	41	8.95			
Four-year college graduate	75	8.33			
One to three years college	27	8.56			
High school graduate	7	7.57			
Total Attributes of the Alliance			3.055	**.030**	
Professional	41	55.41			
Four-year college graduate	75	52.88			
One to three years college	27	56.78			
High school graduate	7	59.00			

Continued

Table 4-41 (Continued)

Variable/Education Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Communication Behavior					
Information Quality from the Least Successful Alliance			.610	.610[a]	
Professional	41	17.85			
Four-year college graduate	75	17.47			
One to three years college	27	19.44			
High school graduate	7	18.29			
Information Quality from the Most Successful Alliance			1.193	.315[a]	
Professional	41	27.00			
Four-year college graduate	75	26.37			
One to three years college	27	28.52			
High school graduate	7	27.57			
Information Sharing			.582	.628[a]	
Professional	41	20.15			
Four-year college graduate	75	20.11			
One to three years college	27	21.07			
High school graduate	7	21.71			
Information Participation			1.082	.359[a]	
Professional	41	23.83			
Four-year college graduate	75	23.75			
One to three years college	27	25.78			
High school graduate	7	23.14			
Proprietary Information Sharing			1.300	.277[a]	
Professional	41	8.34			
Four-year college graduate	75	8.51			
One to three years college	27	8.19			
High school graduate	7	6.57			
Total Communication Behavior			1.183	.318[a]	
Professional	41	97.17			
Four-year college graduate	75	96.20			
One to three years college	27	103.00			
High school graduate	7	97.29			

Continued

Table 4-41 (Continued)

Variable/Education Category	N	Mean	*F*	*Sig. (p)*	Post Hoc Comparison Tukey HSD
Conflict Resolution Techniques					
Avoidance & Constructive Conflict Resolution Techniques			1.853	.140[a]	
Professional	41	14.68			
Four-year college graduate	75	13.71			
One to three years college	27	14.00			
High school graduate	7	16.29			
Destructive Conflict Resolution Techniques			.671	.571[a]	
Professional	41	5.32			
Four-year college graduate	75	5.55			
One to three years college	27	4.89			
High school graduate	7	6.43			
Total Conflict Resolution Techniques			1.642	.182[a]	
Professional	41	20.00			
Four-year college graduate	75	19.25			
One to three years college	27	18.89			
High school graduate	7	22.71			
Commodity/Supplier Selection Process			.810	.490[a]	
Professional	41	9.61			
Four-year college graduate	75	8.99			
One to three years college	27	9.67			
High school graduate	7	9.14			

[a]Not significant

ANOVA comparisons in success factors according to education level. ANOVA showed that there was a significant effect of education ($F = 3.182$, $p = .026$) on the total *indicators of success* score. Tukey's post hoc analyses indicated that construction managers with a high school diploma ($\mu = 35.14$) rated total *indicators of success* score significantly higher than those who were four-year college graduates ($\mu = 28.68$). There was no significant effect of education level on both the *past success* ($F = 2.222$, $p = .088$) and *success difference* ($F = 1.366$, $p = .255$) subscales. Although post hoc comparisons

using the Tukey HSD test illustrated no significant differences in mean, there was some variation in the total score for *past success*, where those with high school diplomas had the highest mean (μ = 23.57) and those who were four-year college graduates had the lowest mean (μ = 19.33). According to Monczka et al. (1998), success difference was measured by taking the difference between SU6 and SU6a (i.e., SU6a – SU6). The result showed that there was also little variation in *success difference* subscale according to education background, where those with professional degrees had the highest mean (μ = .44) and those who were high school graduates had the lowest mean (μ = -.14).

ANOVA showed that there was a significant effect of education level (F = 3.716, p = .013) on the total *organizational performance*. Tukey's post hoc analyses indicated that construction managers with one to three years of college (μ = 86.56) rated total *organizational performance* significantly higher than those with four-year college degrees (μ = 76.01). ANOVA showed a significant effect of education (F = 3.261, p = .023) on the *customer perspective* subscale of *organizational performance*. Tukey's post hoc analyses indicated that construction managers with one to three years of college (μ = 22.96) rated *customer perspective* significantly higher than those with four-year college degrees (μ = 19.73). ANOVA showed a significant effect of education (F = 2.941, p = .035) on the *financial perspective* subscale of *organizational performance*. Tukey's post hoc analyses indicated that construction managers with one to three years of college (μ = 21.70) rated *financial perspective* significantly higher than those with four-year college degrees (μ = 19.21). However, there were no significant effects of education level on the *learning and growth perspective* (F = 2.426, p = .068) and *internal-business-process perspective* (F = 2.624, p = .053) subscales. ANOVA comparisons of the

dependent variables (*indicators of success* and *organizational performance* scales) and education categories are presented in Table 4-42.

Table 4-42

ANOVA with Post Hoc Comparisons of Past Success, Success Difference, Customer Perspective, Learning and Growth Perspective, Financial Perspective, and *Internal-Business-Process Perspective According to Education Level*

Variable/Education Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Indicators of Success					
Past Success			2.222	.088	
Professional	41	20.44			
Four-year college graduate	75	19.33			
One to three years college	27	20.93			
High school graduate	7	23.57			
Success Difference			1.366	.255	
Professional	41	.44			
Four-year college graduate	75	.15			
One to three years college	27	.19			
High school graduate	7	-.14			
Total Indicators of Success			3.182	**.026**	
Professional	41	30.10			
Four-year college graduate	75	28.68			
One to three years college	27	30.89			
High school graduate	7	35.14			
High school graduate > Four-year college graduate					.031

Continued

Table 4-42 (Continued)

Variable/Education Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Organizational Performance					
Customer Perspective			3.261	**.023**	
Professional	41	20.56			
Four-year college graduate	75	19.73			
One to three years college	27	22.96			
High school graduate	7	21.14			
One to three years college > Four-year college graduate					.012
Learning and Growth Perspective			2.426	.068[a]	
Professional	41	14.95			
Four-year college graduate	75	14.36			
One to three years college	27	16.15			
High school graduate	7	16.57			
Financial Perspective			2.941	**.035**	
Professional	41	19.93			
Four-year college graduate	75	19.21			
One to three years college	27	21.70			
High school graduate	7	21.29			
One to three years college > Four-year college graduate					.027
Internal-Business-Process Perspective			2.624	.053[a]	
Professional	41	24.22			
Four-year college graduate	75	22.71			
One to three years college	27	25.74			
High school graduate	7	26.14			
Total Organizational Performance			3.716	**.013**	
Professional	41	79.66			
Four-year college graduate	75	76.01			
One to three years college	27	86.56			
High school graduate	7	85.14			
One to three years college > Four-year college graduate					.010

[a]Not significant

Differences in Alliance Dimensions and Success Factors According to Race

One-way ANOVA's were performed to examine differences for the dimensions of alliances scales, success of the alliances scales, and related subscales according to race with four response groups (white, black or African American, Asian, and American Indian or Alaska Native). Ten dependent variables (*attributes of the alliance*, *communication behavior*, *conflict resolution techniques*, *commodity/supplier selection process*, *indicators of success*, and *organizational performance*) were compared using ANOVA ($p < .05$), and if there was a significant F value, Tukey's post hoc comparisons were conducted.

ANOVA comparisons in alliance dimensions according to race. ANOVA showed that there was a significant effect of race ($F = 4.069$, $p = .008$) on the total *attributes of the alliance* score. Tukey's post hoc analyses indicated that Asian construction managers ($\mu = 63.38$) rated total *attributes of the alliance* score significantly higher than white construction managers ($\mu = 54.07$). ANOVA also showed that there was a significant effect of race ($F = 3.783$, $p = .012$) on the *interdependence*. Tukey's post hoc analyses indicated that Asian construction managers ($\mu = 10.88$) rated *interdependence* significantly higher than white construction managers ($\mu = 8.43$).

ANOVA showed that there was a significant effect of race ($F = 3.937$, $p = .010$) on the *proprietary information sharing* subscale of communication behavior. Tukey's post hoc analyses indicated that Asian construction managers ($\mu = 11.13$) rated *proprietary information sharing* significantly higher than white construction managers ($\mu = 8.14$).

However, ANOVA showed no significant differences in the responses between *conflict resolution techniques*, and *commodity/supplier selection process* according to the

race of the construction managers who were engaged in strategic alliances. ANOVA comparisons of the dependent variables (alliance dimensions scales and related subscales) and race categories are presented in Table 4-43.

Table 4-43

ANOVA with Post Hoc Comparisons of Attributes of the Alliance, Communication Behavior, Conflict Resolution Techniques, and *Commodity/Supplier Selection Process and Related Subscales According to Race*

Variable/Race Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Attributes of the Alliance					
Trust and Coordination			.906	.440[a]	
White	138	15.70			
Black or African American	2	14.00			
Asian	8	17.13			
American Indian or Alaska Native	2	15.00			
Commitment from the Least Successful Alliance			2.096	.103[a]	
White	138	11.74			
Black or African American	2	12.50			
Asian	8	14.63			
American Indian or Alaska Native	2	14.50			
Commitment from the Most Successful Alliance			1.359	.258[a]	
White	138	18.20			
Black or African American	2	19.00			
Asian	8	20.75			
American Indian or Alaska Native	2	19.50			
Interdependence			3.783	**.012**	
White	138	8.43			
Black or African American	2	6.50			
Asian	8	10.88			
American Indian or Alaska Native	2	6.50			
Asian > White					.023
Total Attributes of the Alliance			4.069	**.008**	
White	138	54.07			
Black or African American	2	52.00			
Asian	8	63.38			
American Indian or Alaska Native	2	55.50			
Asian > White					.004

Continued

Table 4-43 (Continued)

Variable/Race Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Communication Behavior					
Information Quality from the Least Successful Alliance			.661	.578[a]	
White	138	17.78			
Black or African American	2	23.00			
Asian	8	19.88			
American Indian or Alaska Native	2	18.50			
Information Quality from the Most Successful Alliance			1.128	.340[a]	
White	138	26.90			
Black or African American	2	23.00			
Asian	8	29.63			
American Indian or Alaska Native	2	26.50			
Information Sharing			.708	.549[a]	
White	138	20.28			
Black or African American	2	20.50			
Asian	8	22.38			
American Indian or Alaska Native	2	18.50			
Information Participation			1.334	.266[a]	
White	138	23.90			
Black or African American	2	25.00			
Asian	8	27.75			
American Indian or Alaska Native	2	23.00			
Proprietary Information Sharing			3.937	**.010**	
White	138	8.14			
Black or African American	2	9.50			
Asian	8	11.13			
American Indian or Alaska Native	2	8.00			
Asian > White					.005
Total Communication Behavior			1.884	.135[a]	
White	138	96.99			
Black or African American	2	101.00			
Asian	8	110.75			
American Indian or Alaska Native	2	94.50			

Continued

Table 4-43 (Continued)

Variable/Race Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Conflict Resolution Techniques					
Avoidance & Constructive Conflict Resolution Techniques			1.707	.168[a]	
White	138	14.17			
Black or African American	2	9.50			
Asian	8	14.25			
American Indian or Alaska Native	2	16.50			
Destructive Conflict Resolution Techniques			.180	.910[a]	
White	138	5.43			
Black or African American	2	4.00			
Asian	8	5.50			
American Indian or Alaska Native	2	5.00			
Total Conflict Resolution Techniques			1.375	.253[a]	
White	138	19.60			
Black or African American	2	13.50			
Asian	8	19.75			
American Indian or Alaska Native	2	21.50			
Commodity/Supplier Selection Process			.370	.774[a]	
White	138	9.30			
Black or African American	2	9.00			
Asian	8	9.50			
American Indian or Alaska Native	2	7.50			

[a]Not significant

ANOVA comparisons in success factors according to race. ANOVA showed no significant effect of race (F = .570, p = .636) on the total *indicators of success* score. Although post hoc comparisons using the Tukey HSD test illustrated no significant differences in mean total *indicators of success* score, there was some variation in the total score for *indicators of success*, where American Indian or Alaska Native construction managers had the highest mean (μ = 35.00) and the Black or African American had the lowest mean (μ = 28.50). There was no significant effect of education level on both the

past success (F = .347, p = .792) and *success difference* (F = .575, p = .632) subscales. Although no significant differences in mean, there was some variation in the total score for *past success*, where American Indian or Alaska Native construction managers had the highest mean (μ = 23.50) and the Black or African American had the lowest mean (μ = 19.50). According to Monczka et al. (1998), success difference was measured by taking the difference between SU6 and SU6a (i.e., SU6a – SU6). The result showed that there was also little variation in *success difference* subscale according to race, where Black or African American construction managers had the highest mean (μ = 1.00) and White construction managers had the lowest mean (μ = .20).

ANOVA showed no significant effect of race (F = 1.514, p = .213) on the total *organizational performance*. Although post hoc comparisons using the Tukey HSD test illustrated no significant differences in mean total *organizational performance* score, there was some variation in the total score for *organizational performance*, where Asian construction managers had the highest mean (μ = 89.50) and White construction managers had the lowest mean (μ = 78.57). There were also no significant differences in the responses between *customer perspective*, learning and growth *perspective*, financial *perspective*, and *internal-business-process perspective* subscales according to race of the construction managers who were engaged in strategic alliances. ANOVA comparisons of the dependent variables (*indicators of success* and *organizational performance* scales) and race categories are presented in Table 4-44.

Table 4-44

ANOVA with Post Hoc Comparisons of Past Success, Success Difference, Customer Perspective, Learning and Growth Perspective, Financial Perspective, and *Internal-Business-Process Perspective According to Race*

Variable/Race Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Indicators of Success					
Past Success			.347	.792[a]	
White	138	20.07			
Black or African American	2	19.50			
Asian	8	20.38			
American Indian or Alaska Native	2	23.50			
Success Difference			.575	.632[a]	
White	138	.20			
Black or African American	2	1.00			
Asian	8	.25			
American Indian or Alaska Native	2	.50			
Total Indicators of Success			.570	.636[a]	
White	138	29.67			
Black or African American	2	28.50			
Asian	8	30.38			
American Indian or Alaska Native	2	35.00			

Continued

Table 4-44 (Continued)

Variable/Race Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Organizational Performance					
Customer Perspective			1.166	.325[a]	
White	138	20.41			
Black or African American	2	23.00			
Asian	8	23.38			
American Indian or Alaska Native	2	20.50			
Learning and Growth Perspective			.777	.509[a]	
White	138	14.87			
Black or African American	2	15.00			
Asian	8	16.63			
American Indian or Alaska Native	2	13.50			
Financial Perspective			1.711	.167[a]	
White	138	19.74			
Black or African American	2	21.50			
Asian	8	22.63			
American Indian or Alaska Native	2	22.50			
Internal-Business-Process Perspective			1.428	.237[a]	
White	138	23.55			
Black or African American	2	27.00			
Asian	8	26.88			
American Indian or Alaska Native	2	27.50			
Total Organizational Performance			1.514	.213[a]	
White	138	78.57			
Black or African American	2	86.50			
Asian	8	89.50			
American Indian or Alaska Native	2	84.00			

[a]Not significant

Differences in Alliance Dimensions and Success Factors According to Ethnicity

Independent t-tests were conducted to determine whether the means of two sample distributions differ significantly from each other, such as gender and ethnicity. The comparisons between the means for Hispanic or Latino and Non-Hispanic or Non-Latino construction managers' responses to questions related to alliance dimensions (*attributes of the alliance*, *communication behavior*, *conflict resolution techniques,* and *commodity/supplier selection process*) and success factors (*indicators of success* in terms of *past success* and *success difference*, and four perspectives of *organizational performance*) are shown in Table 4-45 and Table 4-46.

Independent t-test comparisons in alliance dimensions according to ethnicity. non- Hispanic construction managers rated their strategic alliances as having higher levels of trust and coordination, commitment, and interdependence (M = 54.58, SE = .63) than their Hispanic counterparts (M = 54.00, SE = 4.60). The difference was not significant $t(148) = -.15$, $p > .05$, inferring that Hispanic construction managers had an equal degree of agreement on attributes of alliance as their Non-Hispanic counterparts. Hispanic participants demonstrated a higher level of communication behavior (M = 99.75, SE = 6.90) than their Non-Hispanic counterparts (M = 97.68, SE = 1.36). However, there was no significant difference between two means $t(148) = .25$, $p > .05$, indicating that both Hispanic or Latino and Non-Hispanic or Non-Latino construction managers had roughly equal degrees of information quality, information sharing, information participation, and proprietary information sharing within their strategic supplier alliances.

On average, Non-Hispanic participants reported a higher level of conflict resolution techniques (M = 19.65, SE = .36) than their Hispanic counterparts (M = 16.00, SE = 3.44). There was no significant difference $t(148) = -1.62$, $p > .05$, inferring that Hispanic construction managers had equal levels of avoidance & constructive conflict resolution techniques and destructive conflict resolution techniques as their Non-Hispanic counterparts. For the total sample, Hispanic construction managers showed a higher level of commodity/supplier selection process (M = 9.50, SE = 1.55) than their Non-Hispanic counterparts (M = 9.28, SE = .21). There was also no significant difference $t(148) = 1.04$, $p > .05$, indicating that homogeneity of variances was met.

Table 4-45

Comparison of the Mean Scores for the Attributes of the Alliance, Communication Behavior, Conflict Resolution Techniques, and *Commodity/Supplier Selection Process According to Ethnicity: Independent t-tests*

Group and Variable	N	Mean	Std. Error Mean	*t*	Sig. (*p*)
Modified Attributes of the Alliance (N=150)				-.15	.882
Total Scale (Range 12 to 84)					
Hispanic	4	54.00	4.60		
Non-Hispanic	146	54.58	.63		
Modified Communication Behavior (N=150)				.25	.804
Total Scale (Range 21 to 147)					
Hispanic	4	99.75	6.90		
Non-Hispanic	146	97.68	1.36		
Modified Conflict Resolution Techniques (N=150)				-1.62	.107
Total Scale (Range 5 to 35)					
Hispanic	4	16.00	3.44		
Non-Hispanic	146	19.65	.36		
Commodity/Supplier Selection Process (N=150)				.17	.863
Total Scale (Range 2 to 14)					
Hispanic	4	9.50	1.55		
Non-Hispanic	146	9.28	.21		

Independent t-test comparisons in success factors according to ethnicity. Both Hispanic and non- Hispanic construction managers who were engaged in strategic alliances showed high levels of past success. The difference was not significant $t(148) = .37$, $p > .05$, inferring that Hispanic participants ($M = 21.00$, $SE = 3.81$) perceived an equal degree of the company's strategic alliance relationship with its construction suppliers in terms of past success as their non- Hispanic counterparts ($M = 20.10$, SE

= .39). On average, Hispanic respondents demonstrated a higher level of success difference (M = .25, SE = .25) than their non- Hispanic counterparts (M = .22, SE = .08). According to Monczka et al. (1998), success difference was measured by taking the difference between SU6 and SU6a (i.e., SU6a – SU6). However, there was no significant difference between two means $t(148) = .07$, $p > .05$, indicating that both Hispanic and non- Hispanic participants are somewhat equally represented at success difference when they rated their private satisfaction and their business units' overall satisfaction with strategic supplier alliances.

For the total sample, Hispanic participants reported a higher level of alliance performance in terms of customer perspective (M = 23.25, SE = 1.25) than their non-Hispanic counterparts (M = 20.53, SE = .39). The difference was non-significant $t(148) = 1.13$, $p > .05$, indicating that homogeneity of variances was met. Both Hispanic and non-Hispanic respondents showed high levels of alliance performance in terms of learning and growth perspective. There was no significant difference between two means $t(148) = .33$, $p > .05$, inferring that Hispanic participants (M = 15.50, SE = .87) perceived an equal customer perspective of alliance performance as their non- Hispanic counterparts (M = 14.93, SE = .29). In addition, Hispanic respondents demonstrated a higher level of alliance performance in terms of financial perspective (M = 23.00, SE = 1.73) than their non- Hispanic counterparts (M = 19.87, SE = .33). The difference was also not significant $t(148) = 1.55$, $p > .05$. On average, Hispanic participants reported a higher level of alliance performance in terms of internal-business-process perspective (M = 30.00, SE = 2.71) than their non- Hispanic counterparts (M = 23.66, SE = .46). The

difference was highly significant $t(148) = 2.28$, $p < .05$, inferring a violation of homogeneity of variances, one of the assumptions of parametric data.

Table 4-46

Comparison of the Mean Scores for the Past Success, Success Difference, Customer Perspective, Learning and Growth Perspective, Financial Perspective, and *Internal-Business-Process Perspective According to Ethnicity: Independent t-tests*

Group and Variable	N	Mean	Std. Error Mean	*t*	Sig. (*p*)
Past Success (N=150) Total Scale (Range 4 to 28)				.37	.713
Hispanic	4	21.00	3.81		
Non-Hispanic	146	20.10	.39		
Success Difference (N=150) SU6a-SU6				.07	.947
Hispanic	4	.25	.25		
Non-Hispanic	146	.22	.08		
Customer Perspective (N=150) Total Scale (Range 4 to 28)				1.13	.259
Hispanic	4	23.25	1.25		
Non-Hispanic	146	20.53	.39		
Learning and Growth Perspective (N=150) Total Scale (Range 3 to 21)				.33	.745
Hispanic	4	15.50	.87		
Non-Hispanic	146	14.93	.29		
Financial Perspective (N=150) Total Scale (Range 4 to 28)				1.55	.123
Hispanic	4	23.00	1.73		
Non-Hispanic	146	19.87	.33		
Internal-Business-Process Perspective (N=150) Total Scale (Range 5 to 35)				2.28	**.024**
Hispanic	4	30.00	2.71		
Non-Hispanic	146	23.66	.46		

Differences in Alliance Dimensions and Success Factors According to Job Tenure

One-way ANOVA's were performed to examine differences for the dimensions of alliances scales, success of the alliances scales, and related subscales according to job tenure with four response groups (less than 1 year, 1 to less than 5 years, 5 to less than 10 years, and 10 or more years). Ten dependent variables (*attributes of the alliance*, *communication behavior*, *conflict resolution techniques*, *commodity/supplier selection process*, *indicators of success*, and *organizational performance*) were compared using ANOVA ($p < .05$), and if there was a significant F value, Tukey's post hoc comparisons were conducted.

ANOVA comparisons in alliance dimensions according to job tenure. ANOVA comparisons showed no significant differences for the total *attributes of the alliance* score as shown in Table 4-47. Although not significant, there were trend differences for the *independence* dimension of *attributes of the alliance* where construction managers who worked for "5 to less than 10 years" had the highest mean ($\mu = 9.07$) and the respondents who reported "1 to less than 5 years" job tenure had the lowest mean ($\mu = 7.76$). ANOVA also showed no significant differences in the responses between *communication behavior*, *conflict resolution techniques*, and *commodity/supplier selection process* according to job tenure.

Table 4-47

ANOVA with Post Hoc Comparisons of Attributes of the Alliance, Communication Behavior, Conflict Resolution Techniques, and *Commodity/Supplier Selection Process and Related Subscales According to Job Tenure*

Variable/Job Tenure Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Attributes of the Alliance					
Trust and Coordination			.865	.461[a]	
Less than 1 year	6	14.00			
1 to less than 5 years	46	15.63			
5 to less than 10 years	45	15.96			
10 or more years	53	15.87			
Commitment from the Least Successful Alliance			1.674	.175[a]	
Less than 1 year	6	12.33			
1 to less than 5 years	46	11.00			
5 to less than 10 years	45	12.16			
10 or more years	53	12.53			
Commitment from the Most Successful Alliance			.393	.758[a]	
Less than 1 year	6	18.67			
1 to less than 5 years	46	17.89			
5 to less than 10 years	45	18.64			
10 or more years	53	18.51			
Interdependence			2.450	.066[a]	
Less than 1 year	6	8.67			
1 to less than 5 years	46	7.76			
5 to less than 10 years	45	9.07			
10 or more years	53	8.66			
Total Attributes of the Alliance			2.160	.095[a]	
Less than 1 year	6	53.67			
1 to less than 5 years	46	52.28			
5 to less than 10 years	45	55.82			
10 or more years	53	55.57			

Continued

Table 4-47 (Continued)

Variable/Job Tenure Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Communication Behavior					
Information Quality from the Least Successful Alliance			.555	.645[a]	
Less than 1 year	6	21.17			
1 to less than 5 years	46	17.59			
5 to less than 10 years	45	17.73			
10 or more years	53	18.13			
Information Quality from the Most Successful Alliance			.334	.800[a]	
Less than 1 year	6	26.17			
1 to less than 5 years	46	26.46			
5 to less than 10 years	45	27.40			
10 or more years	53	27.19			
Information Sharing			.624	.600[a]	
Less than 1 year	6	19.83			
1 to less than 5 years	46	20.22			
5 to less than 10 years	45	21.09			
10 or more years	53	19.94			
Information Participation			.076	.973[a]	
Less than 1 year	6	23.50			
1 to less than 5 years	46	23.91			
5 to less than 10 years	45	24.11			
10 or more years	53	24.34			
Proprietary Information Sharing			.375	.771[a]	
Less than 1 year	6	7.67			
1 to less than 5 years	46	8.13			
5 to less than 10 years	45	8.58			
10 or more years	53	8.32			
Asian > White					
Total Communication Behavior			.198	.898[a]	
Less than 1 year	6	98.33			
1 to less than 5 years	46	96.30			
5 to less than 10 years	45	98.91			
10 or more years	53	97.92			

Continued

Table 4-47 (Continued)

Variable/Job Tenure Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Conflict Resolution Techniques					
Avoidance & Constructive Conflict Resolution Techniques			.354	.786[a]	
Less than 1 year	6	14.00			
1 to less than 5 years	46	13.76			
5 to less than 10 years	45	14.22			
10 or more years	53	14.43			
Destructive Conflict Resolution Techniques			1.133	.338[a]	
Less than 1 year	6	4.83			
1 to less than 5 years	46	4.83			
5 to less than 10 years	45	5.80			
10 or more years	53	5.64			
Total Conflict Resolution Techniques			1.184	.318[a]	
Less than 1 year	6	18.83			
1 to less than 5 years	46	18.59			
5 to less than 10 years	45	20.02			
10 or more years	53	20.08			
Commodity/Supplier Selection Process			.408	.747[a]	
Less than 1 year	6	8.83			
1 to less than 5 years	46	9.02			
5 to less than 10 years	45	9.33			
10 or more years	53	9.53			

[a]Not significant

ANOVA comparisons in success factors according to job tenure. ANOVA showed no significant effect of job tenure ($F = .519$, $p = .670$) on the total *indicators of success* score. Although post hoc comparisons using the Tukey HSD test illustrated no significant differences in mean total *indicators of success* score, there was some variation in the total score for *indicators of success*, where construction managers who worked for "10 or more years" had the highest mean ($\mu = 30.57$) and those with "1 to less than 5 years" job tenure had the lowest mean ($\mu = 29.11$). There was no significant effect of job

tenure on both the *past success* ($F = .396$, $p = .756$) and *success difference* ($F = .439$, $p = .725$) subscales. Although no significant differences in mean, there was some variation in the total score for *past success*, where construction managers who worked for "10 or more years" had the highest mean ($\mu = 20.66$) and those with "1 to less than 5 years" job tenure had the lowest mean ($\mu = 19.63$). According to Monczka et al. (1998), success difference was measured by taking the difference between SU6 and SU6a (i.e., SU6a – SU6). The result showed that there was also little variation in *success difference* subscale according to job tenure, where construction managers were working for "10 or more years" had the highest mean ($\mu = .32$) and those with "5 to less than 10 years" had the lowest mean ($\mu = .11$).

ANOVA showed no significant effect of job tenure ($F = .452$, $p = .716$) on the total *organizational performance*. Although post hoc comparisons using the Tukey HSD test illustrated no significant differences in mean total *organizational performance* score, there was some variation in the total score for *organizational performance*, where construction managers who worked for "5 to less than 10 years" had the highest mean ($\mu = 80.89$) and those with "less than 1 year" job tenure had the lowest mean ($\mu = 74.17$). There were also no significant differences in the responses between *customer perspective*, learning and growth *perspective*, financial *perspective*, and *internal-business-process perspective* subscales according to job tenure of the construction managers who were engaged in strategic alliances. ANOVA comparisons of the dependent variables (*indicators of success* and *organizational performance* scales) and job tenure categories are presented in Table 4-48.

Table 4-48

ANOVA with Post Hoc Comparisons of Past Success, Success Difference, Customer Perspective, Learning and Growth Perspective, Financial Perspective, and *Internal-Business-Process Perspective According to Job Tenure*

Variable/Job Tenure Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Indicators of Success					
Past Success			.396	.756[a]	
Less than 1 year	6	19.67			
1 to less than 5 years	46	19.63			
5 to less than 10 years	45	20.04			
10 or more years	53	20.66			
Success Difference			.439	.725[a]	
Less than 1 year	6	.17			
1 to less than 5 years	46	.22			
5 to less than 10 years	45	.11			
10 or more years	53	.32			
Total Indicators of Success			.519	.670[a]	
Less than 1 year	6	29.50			
1 to less than 5 years	46	29.11			
5 to less than 10 years	45	29.53			
10 or more years	53	30.57			

Continued

Table 4-48 (Continued)

Variable/Job Tenure Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Organizational Performance					
Customer Perspective			1.116	.344[a]	
Less than 1 year	6	19.33			
1 to less than 5 years	46	20.33			
5 to less than 10 years	45	21.64			
10 or more years	53	20.11			
Learning and Growth Perspective			.856	.466[a]	
Less than 1 year	6	13.50			
1 to less than 5 years	46	14.54			
5 to less than 10 years	45	15.04			
10 or more years	53	15.38			
Financial Perspective			.614	.607[a]	
Less than 1 year	6	19.00			
1 to less than 5 years	46	19.87			
5 to less than 10 years	45	20.58			
10 or more years	53	19.60			
Internal-Business-Process Perspective			.395	.757[a]	
Less than 1 year	6	22.33			
1 to less than 5 years	46	23.54			
5 to less than 10 years	45	23.62			
10 or more years	53	24.42			
Total Organizational Performance			.452	.716[a]	
Less than 1 year	6	74.17			
1 to less than 5 years	46	78.28			
5 to less than 10 years	45	80.89			
10 or more years	53	79.51			

[a]Not significant

Differences in Alliance Dimensions and Success Factors According to Job Title

One-way ANOVA's were performed to examine differences for the dimensions of alliances scales, success of the alliances scales, and related subscales according to job title with four response groups (top-level manager/corporate executive, middle-level manager, supervisor, and non-supervisory). Ten dependent variables (*attributes of the alliance*, *communication behavior*, *conflict resolution techniques*, *commodity/supplier*

selection process, *indicators of success*, and *organizational performance*) were compared using ANOVA ($p < .05$), and if there was a significant F value, Tukey's post hoc comparisons were conducted.

ANOVA comparisons in alliance dimensions according to job title. ANOVA comparisons showed that there was no significant effect of job title ($F = 2.405$, $p = .070$) on the total *attributes of the alliance* score as shown in Table 4-49. Although post hoc comparisons using the Tukey HSD test illustrated no significant differences, there was some variation in the total score for *attributes of the alliance*, where top-level managers/corporate executives had the highest mean ($\mu = 56.17$) and the middle-level managers had the lowest mean ($\mu = 51.32$).

ANOVA showed that there was a significant effect of job title ($F = 3.671$, $p = .014$) on the *information quality from the least successful alliance* subscale of communication behavior. Tukey's post hoc analyses indicated that the non-supervisory respondents ($\mu = 20.81$) rated *information quality from the least successful alliance* significantly higher than top-level managers/corporate executives ($\mu = 16.41$). There was no significant effect of job title ($F = 1.216$, $p = .306$) on the total *communication behavior* score. Although not significant, there was some variation in the total score for *communication behavior*, where the non-supervisory respondents had the highest mean ($\mu = 100.81$) and the middle-level managers had the lowest mean ($\mu = 92.00$). In addition, ANOVA showed no significant differences in the responses in terms of either *conflict resolution techniques* or *commodity/supplier selection process* according to job title in this study. ANOVA comparisons of the dependent variables and job title (top-level

manager/corporate executive, middle-level manager, supervisor, and non-supervisory) are shown in Table 4-49.

Table 4-49

ANOVA with Post Hoc Comparisons of Attributes of the Alliance, Communication Behavior, Conflict Resolution Techniques, and *Commodity/Supplier Selection Process and Related Subscales According to Job Title*

Variable/Job Title Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Attributes of the Alliance					
Trust and Coordination			1.341	.263[a]	
Top-level manager/ corporate executive	58	16.26			
Middle-level manager	19	14.84			
Supervisor	41	15.51			
Non-supervisory	32	15.66			
Commitment from the Least Successful Alliance			1.372	.254[a]	
Top-level manager/ corporate executive	58	12.22			
Middle-level manager	19	10.63			
Supervisor	41	11.68			
Non-supervisory	32	12.53			
Commitment from the Most Successful Alliance			2.166	.095[a]	
Top-level manager/ corporate executive	58	19.17			
Middle-level manager	19	17.68			
Supervisor	41	17.44			
Non-supervisory	32	18.50			
Interdependence			.410	.746[a]	
Top-level manager/ corporate executive	58	8.52			
Middle-level manager	19	8.16			
Supervisor	41	8.80			
Non-supervisory	32	8.31			
Total Attributes of the Alliance			2.405	.070[a]	
Top-level manager/ corporate executive	58	56.17			
Middle-level manager	19	51.32			
Supervisor	41	53.44			
Non-supervisory	32	55.00			

Continued

Table 4-49 (Continued)

Variable/Job Title Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Communication Behavior					
Information Quality from the Least Successful Alliance			3.671	**.014**	
Top-level manager/ corporate executive	58	16.41			
Middle-level manager	19	16.63			
Supervisor	41	18.56			
Non-supervisory	32	20.81			
Non-supervisory > Top-level manager/ corporate executive					.011
Information Quality from the Most Successful Alliance			.042	.988[a]	
Top-level manager/ corporate executive	58	27.00			
Middle-level manager	19	27.26			
Supervisor	41	26.78			
Non-supervisory	32	27.06			
Information Sharing			1.711	.167[a]	
Top-level manager/ corporate executive	58	21.03			
Middle-level manager	19	18.47			
Supervisor	41	20.46			
Non-supervisory	32	20.16			
Information Participation			1.526	.210[a]	
Top-level manager/ corporate executive	58	24.67			
Middle-level manager	19	21.68			
Supervisor	41	24.29			
Non-supervisory	32	24.28			
Proprietary Information Sharing			.262	.853[a]	
Top-level manager/ corporate executive	58	8.22			
Middle-level manager	19	7.95			
Supervisor	41	8.46			
Non-supervisory	32	8.50			
Total Communication Behavior			1.216	.306[a]	
Top-level manager/ corporate executive	58	97.34			
Middle-level manager	19	92.00			
Supervisor	41	98.56			
Non-supervisory	32	100.81			

Continued

Table 4-49 (Continued)

Variable/Job Title Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Conflict Resolution Techniques					
Avoidance & Constructive Conflict Resolution Techniques			.901	.442[a]	
Top-level manager/ corporate executive	58	14.67			
Middle-level manager	19	13.74			
Supervisor	41	13.66			
Non-supervisory	32	14.06			
Destructive Conflict Resolution Techniques			.834	.477[a]	
Top-level manager/ corporate executive	58	5.00			
Middle-level manager	19	5.53			
Supervisor	41	5.49			
Non-supervisory	32	5.97			
Total Conflict Resolution Techniques			.273	.845[a]	
Top-level manager/ corporate executive	58	19.67			
Middle-level manager	19	19.26			
Supervisor	41	19.15			
Non-supervisory	32	20.03			
Commodity/Supplier Selection Process			.834	.477[a]	
Top-level manager/ corporate executive	58	9.67			
Middle-level manager	19	8.84			
Supervisor	41	9.02			
Non-supervisory	32	9.19			

[a]Not significant

ANOVA comparisons in success factors according to job title. ANOVA showed no significant effect of job title ($F = 1.150$, $p = .331$) on the total *indicators of success* score. Although post hoc comparisons using the Tukey HSD test illustrated no significant differences in mean total *indicators of success* score, there was some variation in the total score for *indicators of success*, where top-level managers/corporate executives

had the highest mean (μ = 30.76) and middle-level managers had the lowest mean (μ = 28.05). There was no significant effect of job title on both the *past success* (F = 1.386, p = .249) and *success difference* (F = .249, p = .862) subscales. Although no significant differences in mean, there was some variation in the total score for *past success*, where top-level managers/corporate executives had the highest mean (μ = 21.02) and middle-level managers had the lowest mean (μ = 19.11). According to Monczka et al. (1998), success difference was measured by taking the difference between SU6 and SU6a (i.e., SU6a – SU6). The result showed that there was also little variation in *success difference* subscale according to job title, where top-level managers/corporate executives had the highest mean (μ = .29) and middle-level managers had the lowest mean (μ = .11).

ANOVA showed significant differences in responses for *financial perspective* subscale of *organizational performance* (F = 3.272, p = .023). Tukey's post hoc analyses indicated that top-level managers/corporate executives (μ = 20.40) rated *financial perspective* subscale score significantly higher than middle-level managers (μ = 17.37), while non-supervisory staff (μ = 20.56) felt their *financial perspective* subscale score significantly higher than middle-level managers (μ = 17.37). However, ANOVA showed no significant effect of job title (F = 2.310, p = .079) on the total *organizational performance*. ANOVA comparisons of the dependent variables (*indicators of success* and *organizational performance* scales) and job title categories are presented in Table 4-50.

Table 4-50

ANOVA with Post Hoc Comparisons of Past Success, Success Difference, Customer Perspective, Learning and Growth Perspective, Financial Perspective, and *Internal-Business-Process Perspective According to Job Title*

Variable/Job Title Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Indicators of Success					
Past Success			1.386	.249[a]	
Top-level manager/corporate executive	58	21.02			
Middle-level manager	19	19.11			
Supervisor	41	20.07			
Non-supervisory	32	19.16			
Success Difference			.249	.862[a]	
Top-level manager/corporate executive	58	.29			
Middle-level manager	19	.11			
Supervisor	41	.20			
Non-supervisory	32	.19			
Total Indicators of Success			1.150	.331[a]	
Top-level manager/corporate executive	58	30.76			
Middle-level manager	19	28.05			
Supervisor	41	29.59			
Non-supervisory	32	29.22			

Continued

Table 4-50 (Continued)

Variable/Job Title Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Organizational Performance					
Customer Perspective			1.692	.171[a]	
Top-level manager/corporate executive	58	21.33			
Middle-level manager	19	18.58			
Supervisor	41	20.76			
Non-supervisory	32	20.31			
Learning and Growth Perspective			1.109	.347[a]	
Top-level manager/corporate executive	58	15.10			
Middle-level manager	19	13.68			
Supervisor	41	15.37			
Non-supervisory	32	14.88			
Financial Perspective			3.272	**.023**	
Top-level manager/corporate executive	58	20.40			
Middle-level manager	19	17.37			
Supervisor	41	20.05			
Non-supervisory	32	20.56			
Top-level manager/corporate executive > Middle-level manager					.021
Non-supervisory > Middle-level manager					.028
Internal-Business-Process Perspective			1.645	.182[a]	
Top-level manager/corporate executive	58	24.07			
Middle-level manager	19	21.21			
Supervisor	41	24.24			
Non-supervisory	32	24.41			
Total Organizational Performance			2.310	.079[a]	
Top-level manager/corporate executive	58	80.90			
Middle-level manager	19	70.84			
Supervisor	41	80.41			
Non-supervisory	32	80.16			

[a]Not significant

Differences in Alliance Dimensions and Success Factors According to Yearly Income

One-way ANOVA's were performed to examine differences for the dimensions of alliances scales, success of the alliances scales, and related subscales according to yearly income with three response groups ($45,000-$74,999, $75,000-$124,999, and $125,000 and over). Ten dependent variables (*attributes of the alliance*, *communication behavior*, *conflict resolution techniques*, *commodity/supplier selection process*, *indicators of success*, and *organizational performance*) were compared using ANOVA ($p < .05$), and if there was a significant F value, Tukey's post hoc comparisons were conducted.

ANOVA comparisons in alliance dimensions according to yearly income. ANOVA comparisons showed that there was no significant effect of yearly income ($F = 1.283$, $p = .280$) on the total *attributes of the alliance* score as shown in Table 4-51. Although post hoc comparisons using the Tukey HSD test illustrated no significant differences, there was some variation in the total score for *attributes of the alliance*, where construction alliance managers who had $125,000 and more yearly income had the highest mean ($\mu = 55.63$) and those who earned $75,000-$124,999 a year had the lowest mean ($\mu = 53.44$).

ANOVA showed that there was a significant effect of yearly income ($F = 5.042$, $p = .008$) on the *information quality from the least successful alliance* subscale of communication behavior. Tukey's post hoc analyses indicated that the construction alliance managers who earned $75,000-$124,999 a year ($\mu = 20.93$) rated *information quality from the least successful alliance* significantly higher than those who made $125,000 and more annual income ($\mu = 16.30$). There was no significant effect of yearly income ($F = 1.502$, $p = .226$) on the total *communication behavior* score. Although not

significant, there was some variation in the total score for *communication behavior*, where construction alliance managers who made $45,000-$74,999 a year had the highest mean (μ = 101.59) and those who earned annual income $125,000 and more had the lowest mean (μ = 95.28).

In addition, ANOVA showed no significant differences in the responses in terms of either *conflict resolution techniques* or *commodity/supplier selection process* according to yearly income (($45,000-$74,999, $75,000-$124,999, and $125,000 and over) in this study.

Table 4-51

ANOVA with Post Hoc Comparisons of Attributes of the Alliance, Communication Behavior, Conflict Resolution Techniques, and *Commodity/Supplier Selection Process and Related Subscales According to Yearly Income*

Variable/Yearly Income Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Attributes of the Alliance					
Trust and Coordination			.747	.475[a]	
$45,000-$74,999	27	15.52			
$75,000-$124,999	63	15.51			
$125,000 +	60	16.10			
Commitment from the Least Successful Alliance			1.275	.283[a]	
$45,000-$74,999	27	12.70			
$75,000-$124,999	63	11.46			
$125,000 +	60	12.10			
Commitment from the Most Successful Alliance			.306	.737[a]	
$45,000-$74,999	27	18.56			
$75,000-$124,999	63	18.10			
$125,000 +	60	18.57			
Interdependence			1.371	.257[a]	
$45,000-$74,999	27	8.00			
$75,000-$124,999	63	8.38			
$125,000 +	60	8.87			
Total Attributes of the Alliance			1.283	.280[a]	
$45,000-$74,999	27	54.78			
$75,000-$124,999	63	53.44			
$125,000 +	60	55.63			

Continued

Table 4-51 (Continued)

Variable/Yearly Income Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Communication Behavior					
Information Quality from the Least Successful Alliance			5.042	**.008**	
$45,000-$74,999	27	20.93			
$75,000-$124,999	63	18.29			
$125,000 +	60	16.30			
$45,000-$74,999 > $125,000 +					.006
Information Quality from the Most Successful Alliance			.143	.867[a]	
$45,000-$74,999	27	26.52			
$75,000-$124,999	63	27.03			
$125,000 +	60	27.15			
Information Sharing			.388	.679[a]	
$45,000-$74,999	27	21.04			
$75,000-$124,999	63	20.21			
$125,000 +	60	20.23			
Information Participation			.100	.905[a]	
$45,000-$74,999	27	24.33			
$75,000-$124,999	63	24.24			
$125,000 +	60	23.87			
Proprietary Information Sharing			2.741	.068[a]	
$45,000-$74,999	27	8.78			
$75,000-$124,999	63	8.67			
$125,000 +	60	7.73			
Total Communication Behavior			1.502	.226[a]	
$45,000-$74,999	27	101.59			
$75,000-$124,999	63	98.43			
$125,000 +	60	95.28			

Continued

Table 4-51 (Continued)

Variable/Yearly Income Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Conflict Resolution Techniques					
Avoidance & Constructive Conflict Resolution Techniques			.727	.485[a]	
$45,000-$74,999	27	13.56			
$75,000-$124,999	63	14.10			
$125,000 +	60	14.47			
Destructive Conflict Resolution Techniques			1.934	.148[a]	
$45,000-$74,999	27	6.37			
$75,000-$124,999	63	5.24			
$125,000 +	60	5.15			
Total Conflict Resolution Techniques			.175	.840[a]	
$45,000-$74,999	27	19.93			
$75,000-$124,999	63	19.33			
$125,000 +	60	19.62			
Commodity/Supplier Selection Process			.449	.639[a]	
$45,000-$74,999	27	8.89			
$75,000-$124,999	63	9.43			
$125,000 +	60	9.32			

[a]Not significant

ANOVA comparisons in success factors according to to yearly income. ANOVA showed no significant effect of yearly income ($F = .643$, $p = .527$) on the total *indicators of success* score. Although post hoc comparisons using the Tukey HSD test illustrated no significant differences in mean total *indicators of success* score, there was little variation in the total score for *indicators of success*, where construction managers who earned $125,000 and more had the highest mean ($\mu = 30.42$) and those who made $45,000-$74,999 a year had the lowest mean ($\mu = 29.00$).

ANOVA also showed no significant effect of yearly income ($F = .354$, $p = .702$) on the total *organizational performance*. Although post hoc comparisons using the

Tukey HSD test illustrated no significant differences in mean total *indicators of success* score, there was some variation in the total score for *indicators of success*, where construction managers who earned more $45,000-$74,999 annually had the highest mean (μ = 81.48) and those who made $125,000 and more a year had the lowest mean (μ = 78.50). ANOVA comparisons of the dependent variables (*indicators of success* and *organizational performance* scales) and education categories are presented in Table 4-52.

Table 4-52

ANOVA with Post Hoc Comparisons of Past Success, Success Difference, Customer Perspective, Learning and Growth Perspective, Financial Perspective, and *Internal-Business-Process Perspective According to Yearly Income*

Variable/Yearly Income Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Indicators of Success					
Past Success			1.302	.275[a]	
$45,000-$74,999	27	19.15			
$75,000-$124,999	63	19.86			
$125,000 +	60	20.83			
Success Difference			1.680	.190[a]	
$45,000-$74,999	27	.07			
$75,000-$124,999	63	.13			
$125,000 +	60	.38			
Total Indicators of Success			.643	.527[a]	
$45,000-$74,999	27	29.00			
$75,000-$124,999	63	29.48			
$125,000 +	60	30.42			

Continued

Table 4-52 (Continued)

Variable/Yearly Income Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Organizational Performance					
Customer Perspective			.613	.543[a]	
$45,000-$74,999	27	21.52			
$75,000-$124,999	63	20.44			
$125,000 +	60	20.37			
Learning and Growth Perspective			.894	.411[a]	
$45,000-$74,999	27	15.07			
$75,000-$124,999	63	15.32			
$125,000 +	60	14.50			
Financial Perspective			.753	.473[a]	
$45,000-$74,999	27	20.74			
$75,000-$124,999	63	19.95			
$125,000 +	60	19.60			
Internal-Business-Process Perspective			.198	.82[a]	
$45,000-$74,999	27	24.15			
$75,000-$124,999	63	23.49			
$125,000 +	60	24.03			
Total Organizational Performance			.354	.702[a]	
$45,000-$74,999	27	81.48			
$75,000-$124,999	63	79.21			
$125,000 +	60	78.50			

[a]Not significant

Research Question 3: Differences in Alliance Dimensions and Success Factors According to Organizational Characteristics

Q3: Are there differences in dimensions of alliance and success factors of the alliance in the construction industry of USA-based contractor companies according to organizational characteristics?

Differences in Alliance Dimensions and Success Factors According to Number of Employees

One-way ANOVA's were performed to examine differences for the dimensions of alliances scales, success of the alliances scales, and related subscales according to organizational size, which was measured by the number of employees with five response groups (1-500, 501-1,000, 1,001-5,000, 5,001-50,000, and 50,001 and more). Ten dependent variables (*attributes of the alliance*, *communication behavior*, *conflict resolution techniques*, *commodity/supplier selection process*, *indicators of success*, and *organizational performance*) were compared using ANOVA ($p < .05$), and if there was a significant F value, Tukey's post hoc comparisons were conducted.

ANOVA comparisons in alliance dimensions according to number of employees. ANOVA showed that there was a significant effect of the number of employees ($F = 3.218$, $p = .014$) on the total *attributes of the alliance* score. Tukey's post hoc analyses indicated that construction managers with 50,001 and more employees ($\mu = 61.42$) rated total *attributes of the alliance* score significantly higher than both managers with 1-500 employees ($\mu = 53.46$) and with 1,001-5,000 employees. For *commitment from the least successful alliance* subscale of *attributes of the alliance*, ANOVA showed significant difference ($F = 2.616$, $p = .038$). Tukey's post hoc indicated

that construction managers with 50,001 and more employees (μ = 14.25) rated their least successful alliances as having more commitment than those with from 1 to 500 employees (μ = 11.03). For the *interdependence* subscale of *attributes of the alliance*, ANOVA showed significant difference ($F = 3.439$, $p = .010$). Tukey's post hoc indicated that construction managers with 50,001 and more employees (μ = 9.92) rated their strategic supplier alliances higher than those with 1-500 employees (μ = 11.03).

ANOVA comparisons showed that there was no significant effect of the number of employees ($F = 2.272$, $p = .064$) on the total *communication behavior* score. Although post hoc comparisons using the Tukey HSD test illustrated no significant differences, there was a trend difference in the total score for *communication behavior*, where construction managers with 50,001 and more employees had the highest mean (μ = 110.25) and those with 1,001-5,000 employees had the lowest mean (μ = 95.08).

In addition, ANOVA showed no significant differences in the responses in terms of either *conflict resolution techniques* or *commodity/supplier selection process* according to number of employees in this study. ANOVA comparisons of the dependent variables and number of employees (1-500, 501-1,000, 1,001-5,000, 5,001-50,000, and 50,001 and more) are shown in Table 4-53.

Table 4-53

ANOVA with Post Hoc Comparisons of Attributes of the Alliance, Communication Behavior, Conflict Resolution Techniques, and *Commodity/Supplier Selection Process and Related Subscales According to Number of Employees*

Variable/Number of Employees Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Attributes of the Alliance					
Trust and Coordination			1.641	.167[a]	
1-500	39	16.10			
501-1,000	14	15.36			
1,001-5,000	52	15.58			
5,001-50,000	33	15.15			
50,001 and more	12	17.42			
Commitment from the Least Successful Alliance			2.616	**.038**	
1-500	39	11.03			
501-1,000	14	12.93			
1,001-5,000	52	11.54			
5,001-50,000	33	12.39			
50,001 and more	12	14.25			
50,001 and more > 1-500					.043
Commitment from the Most Successful Alliance			.957	.433[a]	
1-500	39	18.79			
501-1,000	14	18.43			
1,001-5,000	52	17.83			
5,001-50,000	33	18.15			
50,001 and more	12	19.83			
Interdependence			3.439	**.010**	
1-500	39	7.54			
501-1,000	14	9.07			
1,001-5,000	52	8.42			
5,001-50,000	33	9.03			
50,001 and more	12	9.92			
50,001 and more > 1-500					.019
Total Attributes of the Alliance			3.218	**.014**	
1-500	39	53.46			
501-1,000	14	55.79			
1,001-5,000	52	53.37			
5,001-50,000	33	54.73			
50,001 and more	12	61.42			
50,001 and more > 1-500					.012
50,001 and more > 1,001-5,000					.008

Continued

Table 4-53 (Continued)

Variable/Number of Employees Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Communication Behavior					
Information Quality from the Least Successful Alliance			1.368	.248[a]	
1-500	39	17.46			
501-1,000	14	17.57			
1,001-5,000	52	17.60			
5,001-50,000	33	17.79			
50,001 and more	12	22.17			
Information Quality from the Most Successful Alliance			2.329	.059[a]	
1-500	39	27.31			
501-1,000	14	27.07			
1,001-5,000	52	26.10			
5,001-50,000	33	26.55			
50,001 and more	12	30.92			
Information Sharing			1.624	.171[a]	
1-500	39	21.33			
501-1,000	14	19.79			
1,001-5,000	52	19.73			
5,001-50,000	33	19.76			
50,001 and more	12	22.33			
Information Participation			.484	.748[a]	
1-500	39	24.28			
501-1,000	14	22.86			
1,001-5,000	52	23.73			
5,001-50,000	33	24.55			
50,001 and more	12	25.42			
Proprietary Information Sharing			1.028	.395[a]	
1-500	39	8.26			
501-1,000	14	8.79			
1,001-5,000	52	7.92			
5,001-50,000	33	8.39			
50,001 and more	12	9.42			
Total Communication Behavior			2.272	.064[a]	
1-500	39	98.64			
501-1,000	14	96.07			
1,001-5,000	52	95.08			
5,001-50,000	33	97.03			
50,001 and more	12	110.25			

Continued

Table 4-53 (Continued)

Variable/Number of Employees Category	N	Mean	*F*	*Sig. (p)*	Post Hoc Comparison Tukey HSD
Conflict Resolution Techniques					
Avoidance & Constructive Conflict Resolution Techniques			1.192	.317[a]	
1-500	39	14.38			
501-1,000	14	14.14			
1,001-5,000	52	14.27			
5,001-50,000	33	13.21			
50,001 and more	12	15.42			
Destructive Conflict Resolution Techniques			.950	.437[a]	
1-500	39	4.74			
501-1,000	14	5.79			
1,001-5,000	52	5.69			
5,001-50,000	33	5.30			
50,001 and more	12	6.17			
Total Conflict Resolution Techniques			1.301	.273[a]	
1-500	39	19.13			
501-1,000	14	19.93			
1,001-5,000	52	19.96			
5,001-50,000	33	18.52			
50,001 and more	12	21.58			
Commodity/Supplier Selection Process			1.667	.161[a]	
1-500	39	9.23			
501-1,000	14	10.21			
1,001-5,000	52	8.79			
5,001-50,000	33	9.33			
50,001 and more	12	10.42			

[a]Not significant

ANOVA comparisons in success factors according to number of employees. ANOVA showed no significant effect of the number of employees ($F = .173, p = .952$) on the total *indicators of success* score. Although post hoc comparisons using the Tukey HSD test illustrated no significant differences in mean total *indicators of success* score, there was some variation in the total score for *indicators of success*, where construction

managers with 50,001 and more employees had the highest mean (μ = 31.08) and those with 5,001-50,000 employees had the lowest mean (μ = 28.50).

ANOVA also showed that there was no significant effect of number of employees (F = 1.324, p = .264) on the total *organizational performance*. Although post hoc comparisons using the Tukey HSD test illustrated no significant differences in mean total *organizational performance* score, there was some variation in the total score for *organizational performance*, where construction managers with 50,001 and more employees had the highest mean (μ = 87.00) and those with 5,001-50,000 employees had the lowest mean (μ = 75.76). Simultaneously, there were also no significant differences in the responses between *customer perspective*, learning and growth *perspective*, financial *perspective*, and *internal-business-process perspective* subscales according to race of the construction managers who were engaged in strategic alliances. ANOVA comparisons of the dependent variables (*indicators of success* and *organizational performance* scales) and number of employees (1-500, 501-1,000, 1,001-5,000, 5,001-50,000, and 50,001 and more) are presented in Table 4-54.

Table 4-54

ANOVA with Post Hoc Comparisons of Past Success, Success Difference, Customer Perspective, Learning and Growth Perspective, Financial Perspective, and *Internal-Business-Process Perspective According to Number of Employees*

Variable/Number of Employees Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Indicators of Success					
Past Success			.113	.978[a]	
1-500	39	19.79			
501-1,000	14	20.36			
1,001-5,000	52	20.35			
5,001-50,000	33	19.91			
50,001 and more	12	20.50			
Success Difference			.881	.477[a]	
1-500	39	.00			
501-1,000	14	.36			
1,001-5,000	52	.25			
5,001-50,000	33	.30			
50,001 and more	12	.42			
Total Indicators of Success			.173	.952[a]	
1-500	39	29.69			
501-1,000	14	29.57			
1,001-5,000	52	29.79			
5,001-50,000	33	29.42			
50,001 and more	12	31.08			

Continued

Table 4-54 (Continued)

Variable/Number of Employees Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Organizational Performance					
Customer Perspective			1.123	.348[a]	
1-500	39	21.21			
501-1,000	14	20.71			
1,001-5,000	52	20.33			
5,001-50,000	33	19.58			
50,001 and more	12	22.58			
Learning and Growth Perspective			.811	.520[a]	
1-500	39	15.15			
501-1,000	14	16.00			
1,001-5,000	52	14.98			
5,001-50,000	33	14.15			
50,001 and more	12	15.08			
Financial Perspective			1.582	.182[a]	
1-500	39	20.74			
501-1,000	14	19.64			
1,001-5,000	52	19.71			
5,001-50,000	33	18.91			
50,001 and more	12	21.67			
Internal-Business-Process Perspective			1.810	.130[a]	
1-500	39	23.23			
501-1,000	14	24.71			
1,001-5,000	52	23.58			
5,001-50,000	33	23.15			
50,001 and more	12	27.67			
Total Organizational Performance			1.324	.264[a]	
1-500	39	80.33			
501-1,000	14	81.07			
1,001-5,000	52	78.60			
5,001-50,000	33	75.76			
50,001 and more	12	87.00			

[a]Not significant

Differences in Alliance Dimensions and Success Factors According to Number of U.S. Offices

One-way ANOVA's were performed to examine differences for the dimensions of alliances scales, success of the alliances scales, and related subscales according to number of U.S. offices with four response groups (0-5, 6-15, 16-50, and 51 and more). Ten dependent variables (*attributes of the alliance*, *communication behavior*, *conflict resolution techniques*, *commodity/supplier selection process*, *indicators of success*, and *organizational performance*) were compared using ANOVA ($p < .05$), and if there was a significant F value, Tukey's post hoc comparisons were conducted.

ANOVA comparisons in alliance dimensions according to number of U.S. offices. ANOVA comparisons showed that there was no significant effect of the number of U.S. offices ($F = .058$, $p = .982$) on the total *attributes of the alliance* score as shown in Table 4-55. Although post hoc comparisons using the Tukey HSD test illustrated no significant differences, there was some variation in the total score for *attributes of the alliance*, where construction managers whose organizations had 51 and more offices in the United States had the highest mean ($\mu = 55.00$) and those with 16-50 U.S. offices had the lowest mean ($\mu = 54.30$).

ANOVA showed no significant effect of number of U.S. offices ($F = .503$, $p = .681$) on the total *communication behavior* score. In addition, ANOVA showed no significant differences in the responses in terms of either *conflict resolution techniques* or *commodity/supplier selection process* according to number of U.S. offices in this study. Although not significant, there was a trend difference for *avoidance & constructive conflict resolution techniques* subscale of *conflict resolution techniques*, where

construction managers whose organizations had 0-5 U.S. offices had the highest mean (μ = 14.94) and those with 6-15 U.S. offices had the lowest mean (μ = 13.03).

Table 4-55

ANOVA with Post Hoc Comparisons of Attributes of the Alliance, Communication Behavior, Conflict Resolution Techniques, and *Commodity/Supplier Selection Process and Related Subscales According to Number of U.S. Offices*

Variable/Number of U.S. Offices Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Attributes of the Alliance					
Trust and Coordination			.151	.929[a]	
0 - 5	47	15.94			
6 - 15	37	15.51			
16 - 50	37	15.78			
51 and more	29	15.69			
Commitment from the Least Successful Alliance			.176	.913[a]	
0 - 5	47	11.70			
6 - 15	37	12.27			
16 - 50	37	11.92			
51 and more	29	11.93			
Commitment from the Most Successful Alliance			.746	.526[a]	
0 - 5	47	18.66			
6 - 15	37	17.62			
16 - 50	37	18.43			
51 and more	29	18.76			
Interdependence			.743	.528[a]	
0 - 5	47	8.36			
6 - 15	37	8.95			
16 - 50	37	8.16			
51 and more	29	8.62			
Total Attributes of the Alliance			.058	.982[a]	
0 - 5	47	54.66			
6 - 15	37	54.35			
16 - 50	37	54.30			
51 and more	29	55.00			

Continued

Table 4-55 (Continued)

Variable/Number of U.S. Offices Category	N	Mean	*F*	*Sig. (p)*	Post Hoc Comparison Tukey HSD
Communication Behavior					
Information Quality from the Least Successful Alliance			.213	.887[a]	
0 - 5	47	18.26			
6 - 15	37	17.22			
16 - 50	37	18.19			
51 and more	29	18.17			
Information Quality from the Most Successful Alliance			.134	.939[a]	
0 - 5	47	27.36			
6 - 15	37	26.68			
16 - 50	37	26.92			
51 and more	29	26.86			
Information Sharing			1.053	.371[a]	
0 - 5	47	20.96			
6 - 15	37	19.32			
16 - 50	37	20.41			
51 and more	29	20.69			
Information Participation			.106	.957[a]	
0 - 5	47	24.21			
6 - 15	37	23.68			
16 - 50	37	24.32			
51 and more	29	24.21			
Proprietary Information Sharing			.405	.749[a]	
0 - 5	47	8.45			
6 - 15	37	8.11			
16 - 50	37	8.08			
51 and more	29	8.66			
Total Communication Behavior			.503	.681[a]	
0 - 5	47	99.23			
6 - 15	37	95.00			
16 - 50	37	97.92			
51 and more	29	98.59			

Continued

Table 4-55 (Continued)

Variable/Number of U.S. Offices Category	N	Mean	*F*	*Sig. (p)*	Post Hoc Comparison Tukey HSD
Conflict Resolution Techniques					
Avoidance & Constructive Conflict Resolution Techniques			2.493	.062[a]	
0 - 5	47	14.94			
6 - 15	37	13.03			
16 - 50	37	14.38			
51 and more	29	14.00			
Destructive Conflict Resolution Techniques			.092	.946[a]	
0 - 5	47	5.28			
6 - 15	37	5.35			
16 - 50	37	5.59			
51 and more	29	5.45			
Total Conflict Resolution Techniques			1.321	.270[a]	
0 - 5	47	20.21			
6 - 15	37	18.38			
16 - 50	37	19.97			
51 and more	29	19.45			
Commodity/Supplier Selection Process			.943	.422[a]	
0 - 5	47	9.64			
6 - 15	37	8.76			
16 - 50	37	9.22			
51 and more	29	9.48			

[a]Not significant

ANOVA comparisons in success factors according to number of U.S. offices. ANOVA comparisons of the dependent variables (*indicators of success* and *organizational performance* scales) and number of U.S. offices (0-5, 6-15, 16-50, and 51 and more) are presented in Table 4-56. ANOVA showed no significant effect of number of U.S. offices on the total *indicators of success* score ($F = .824$, $p = .483$). Although post hoc comparisons using the Tukey HSD test illustrated no significant differences in mean

total *indicators of success* score, there was some variation in the total score for *indicators of success*, where construction managers whose organizations had 16-50 U.S. offices had the highest mean (μ = 89.92) and those with 6-15 U.S. offices had the lowest mean (μ = 76.38).

ANOVA also showed that there was no significant effect of number of U.S. offices (F = .694, p = .557) on the total *organizational performance*. Although post hoc comparisons using the Tukey HSD test illustrated no significant differences in mean total *organizational performance* score, there was some variation in the total score for *organizational performance*, where construction managers whose organizations had 16-50 U.S. offices had the highest mean (μ = 89.92) and those with 6-15 U.S. offices had the lowest mean (μ = 76.38).

Table 4-56

ANOVA with Post Hoc Comparisons of Past Success, Success Difference, Customer Perspective, Learning and Growth Perspective, Financial Perspective, and *Internal-Business-Process Perspective According to Number of U.S. Offices*

Variable/Number of U.S. Offices Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Indicators of Success					
Past Success			.438	.726[a]	
0 - 5	47	20.19			
6 - 15	37	19.38			
16 - 50	37	20.62			
51 and more	29	20.31			
Success Difference			1.027	.383[a]	
0 - 5	47	.04			
6 - 15	37	.38			
16 - 50	37	.27			
51 and more	29	.24			
Total Indicators of Success			.824	.483[a]	
0 - 5	47	30.06			
6 - 15	37	28.51			
16 - 50	37	30.62			
51 and more	29	29.79			

Continued

Table 4-56 (Continued)

Variable/Number of U.S. Offices Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Organizational Performance					
Customer Perspective			.871	.458[a]	
0 - 5	47	21.04			
6 - 15	37	19.54			
16 - 50	37	21.05			
51 and more	29	20.69			
Learning and Growth Perspective			1.014	.388[a]	
0 - 5	47	15.49			
6 - 15	37	14.24			
16 - 50	37	15.16			
51 and more	29	14.69			
Financial Perspective			.787	.503[a]	
0 - 5	47	20.38			
6 - 15	37	19.14			
16 - 50	37	20.30			
51 and more	29	19.86			
Internal-Business-Process Perspective			.197	.898[a]	
0 - 5	47	23.66			
6 - 15	37	23.46			
16 - 50	37	24.41			
51 and more	29	23.83			
Total Organizational Performance			.694	.557[a]	
0 - 5	47	80.57			
6 - 15	37	76.38			
16 - 50	37	80.92			
51 and more	29	79.07			

[a]Not significant

Differences in Alliance Dimensions and Success Factors According to Number of Foreign Offices

One-way ANOVA's were performed to examine differences for the dimensions of alliances scales, success of the alliances scales, and related subscales according to number of foreign offices with four response groups (0, 1-10, 11-50, and 51 and over).

Ten dependent variables (*attributes of the alliance*, *communication behavior*, *conflict resolution techniques*, *commodity/supplier selection process*, *indicators of success*, and *organizational performance*) were compared using ANOVA ($p < .05$), and if there was a significant F value, Tukey's post hoc comparisons were conducted.

ANOVA comparisons in alliance dimensions according to number of foreign offices. ANOVA comparisons showed that there was no significant effect of the number of foreign offices ($F = .760$, $p = .519$) on the total *attributes of the alliance* score. Although post hoc comparisons using the Tukey HSD test illustrated no significant differences, there was some variation in the total score for *attributes of the alliance*, where construction managers whose organizations had 11-50 offices in other countries had the highest mean ($\mu = 56.41$) and those with 0 foreign offices had the lowest mean ($\mu = 53.91$). ANOVA showed no significant effect of number of foreign offices ($F = 1.697$, $p = .170$) on the total *communication behavior* score. In addition, ANOVA showed no significant differences in the responses in terms of either *conflict resolution techniques* or *commodity/supplier selection process* according to number of U.S. offices in this study. ANOVA comparisons of the dependent variables and number of foreign offices (0, 1-10, 11-50, and 51 and over) are shown in Table 4-57.

Table 4-57

ANOVA with Post Hoc Comparisons of Attributes of the Alliance, Communication Behavior, Conflict Resolution Techniques, and *Commodity/Supplier Selection Process and Related Subscales According to Number of Foreign Offices*

Variable/Number of Foreign Offices Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Attributes of the Alliance					
Trust and Coordination			.629	.597[a]	
0	75	15.77			
1 - 10	37	15.57			
11 - 50	29	16.21			
51 and over	9	14.78			
Commitment from the Least Successful Alliance			1.233	.300[a]	
0	75	11.44			
1 - 10	37	12.11			
11 - 50	29	12.83			
51 and over	9	12.56			
Commitment from the Most Successful Alliance			.271	.846[a]	
0	75	18.31			
1 - 10	37	18.08			
11 - 50	29	18.66			
51 and over	9	19.11			
Interdependence			.183	.908[a]	
0	75	8.39			
1 - 10	37	8.62			
11 - 50	29	8.72			
51 and over	9	8.33			
Total Attributes of the Alliance			.760	.519[a]	
0	75	53.91			
1 - 10	37	54.38			
11 - 50	29	56.41			
51 and over	9	54.78			

Continued

Table 4-57 (Continued)

Variable/Number of Foreign Offices Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Communication Behavior					
Information Quality from the Least Successful Alliance			1.350	.260[a]	
0	75	17.07			
1 - 10	37	18.57			
11 - 50	29	19.76			
51 and over	9	17.22			
Information Quality from the Most Successful Alliance			.651	.584[a]	
0	75	26.81			
1 - 10	37	26.65			
11 - 50	29	28.14			
51 and over	9	26.11			
Information Sharing			1.519	.212[a]	
0	75	20.61			
1 - 10	37	19.41			
11 - 50	29	21.38			
51 and over	9	19.00			
Information Participation			1.176	.321[a]	
0	75	23.76			
1 - 10	37	24.19			
11 - 50	29	25.52			
51 and over	9	22.11			
Proprietary Information Sharing			.445	.721[a]	
0	75	8.15			
1 - 10	37	8.24			
11 - 50	29	8.76			
51 and over	9	8.56			
Total Communication Behavior			1.697	.170[a]	
0	75	96.40			
1 - 10	37	97.05			
11 - 50	29	103.55			
51 and over	9	93.00			

Continued

Table 4-57 (Continued)

Variable/Number of Foreign Offices Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Conflict Resolution Techniques					
Avoidance & Constructive Conflict Resolution Techniques			.600	.616[a]	
0	75	14.43			
1 - 10	37	13.95			
11 - 50	29	14.03			
51 and over	9	13.00			
Destructive Conflict Resolution Techniques			1.938	.126[a]	
0	75	5.08			
1 - 10	37	6.32			
11 - 50	29	4.97			
51 and over	9	5.78			
Total Conflict Resolution Techniques			.556	.645[a]	
0	75	19.51			
1 - 10	37	20.27			
11 - 50	29	19.00			
51 and over	9	18.78			
Commodity/Supplier Selection Process			.653	.582[a]	
0	75	9.35			
1 - 10	37	8.86			
11 - 50	29	9.45			
51 and over	9	10.00			

[a]Not significant

ANOVA comparisons in success factors according to number of foreign offices. ANOVA comparisons of the dependent variables (*indicators of success* and *organizational performance* scales) and number of foreign offices (0, 1-10, 11-50, and 51 and over) are presented in Table 4-58. ANOVA showed no significant effect of number of foreign offices on the total *indicators of success* score ($F = .983$, $p = .403$). Although post hoc comparisons using the Tukey HSD test illustrated no significant differences in

mean total *indicators of success* score, there was some variation in the total score for *indicators of success*, where construction managers whose organizations had 11-50 foreign offices had the highest mean (μ = 30.97) and those with 51 and over foreign offices had the lowest mean (μ = 76.38).

ANOVA also showed that there was no significant effect of number of foreign offices (F = .53/, p = .657) on the total *organizational performance*. Although post hoc comparisons using the Tukey HSD test illustrated no significant differences in mean total *organizational performance* score, there was some variation in the total score for *organizational performance*, where construction managers whose organizations had 11-50 foreign offices had the highest mean (μ = 81.38) and those with 51 and over foreign offices had the lowest mean (μ = 75.00).

Table 4-58

ANOVA with Post Hoc Comparisons of Past Success, Success Difference, Customer Perspective, Learning and Growth Perspective, Financial Perspective, and *Internal-Business-Process Perspective According to Number of Foreign Offices*

Variable/Number of Foreign Offices Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Indicators of Success					
Past Success			.688	.561[a]	
0	75	19.97			
1 - 10	37	20.24			
11 - 50	29	20.90			
51 and over	9	18.33			
Success Difference			.494	.687[a]	
0	75	.13			
1 - 10	37	.27			
11 - 50	29	.34			
51 and over	9	.33			
Total Indicators of Success			.983	.403[a]	
0	75	29.65			
1 - 10	37	29.70			
11 - 50	29	30.97			
51 and over	9	27.11			

Continued

Table 4-58 (Continued)

Variable/Number of Foreign Offices Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Organizational Performance					
Customer Perspective			.790	.502[a]	
0	75	21.04			
1 - 10	37	19.76			
11 - 50	29	20.90			
51 and over	9	19.56			
Learning and Growth Perspective			.943	.422[a]	
0	75	15.12			
1 - 10	37	14.92			
11 - 50	29	15.10			
51 and over	9	13.11			
Financial Perspective			1.295	.278[a]	
0	75	20.44			
1 - 10	37	19.05			
11 - 50	29	20.21			
51 and over	9	18.78			
Internal-Business-Process Perspective			.958	.414[a]	
0	75	23.17			
1 - 10	37	24.16			
11 - 50	29	25.17			
51 and over	9	23.56			
Total Organizational Performance			.538	.657[a]	
0	75	79.77			
1 - 10	37	77.89			
11 - 50	29	81.38			
51 and over	9	75.00			

[a]Not significant

Differences in Alliance Dimensions and Success Factors According to U.S. Region

One-way ANOVA's were performed to examine differences for the dimensions of alliances scales, success of the alliances scales, and related subscales according to U.S. region with five response groups (Northeast, Southeast, Midwest, Southwest, and West). Ten dependent variables (*attributes of the alliance*, *communication behavior*, *conflict*

resolution techniques, *commodity/supplier selection process*, *indicators of success*, and *organizational performance*) were compared using ANOVA ($p < .05$), and if there was a significant F value, Tukey's post hoc comparisons were conducted.

ANOVA comparisons in alliance dimensions according to U.S. region. ANOVA comparisons showed that there was no significant effect of U.S. region ($F = 1.402, p = .236$) on the total *attributes of the alliance* score as shown. Although post hoc comparisons using the Tukey HSD test illustrated no significant differences, there was some variation in the total score for *attributes of the alliance*, where construction alliance managers of the Northeast region had the highest mean ($\mu = 57.57$) and those of the Southwest region had the lowest mean ($\mu = 53.39$).

ANOVA showed no significant effect of U.S. region ($F = 1.752, p = .142$) on the total *communication behavior* score. Although post hoc comparisons using the Tukey HSD test illustrated no significant differences in mean total *communication behavior* score, there was some variation in the total score for *communication behavior*, where alliance managers of the Northeast region had the highest mean ($\mu = 104.32$) and those of the Southwest region had the lowest mean ($\mu = 93.32$). For *information quality from the least successful alliance* subscale of *communication behavior*, ANOVA showed significant differences ($F = 3.160, p = .016$). Tukey's post hoc analyses indicated that the alliance managers of the Northeast region ($\mu = 21.00$) rated *information quality from the least successful alliance* significantly higher than those of the West region ($\mu = 14.75$). For *information participation* subscale of *communication behavior*, ANOVA also showed significant differences ($F = 2.716, p = .032$). Tukey's post hoc analyses indicated

that the alliance managers of the Northeast region (μ = 25.79) rated *information participation* significantly higher than those of the Southwest region (μ = 23.78).

In addition, ANOVA showed no significant differences in the responses in terms of either *conflict resolution techniques* or *commodity/supplier selection process* according to U.S. region in this study. ANOVA comparisons of the dependent variables and U.S. region categories (Northeast, Southeast, Midwest, Southwest, and West) are shown in Table 4-59.

Table 4-59

ANOVA with Post Hoc Comparisons of Attributes of the Alliance, Communication Behavior, Conflict Resolution Techniques, and *Commodity/Supplier Selection Process and Related Subscales According to U.S. Region*

Variable/U.S. Region Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Attributes of the Alliance					
Trust and Coordination			.256	.905	
Northeast	28	15.96			
Southeast	36	15.50			
Midwest	38	15.95			
Southwest	28	15.43			
West	20	15.95			
Commitment from the Least Successful Alliance			1.497	.206	
Northeast	28	13.39			
Southeast	36	11.61			
Midwest	38	11.71			
Southwest	28	11.61			
West	20	11.40			
Commitment from the Most Successful Alliance			1.731	.146	
Northeast	28	19.75			
Southeast	36	18.69			
Midwest	38	17.87			
Southwest	28	17.79			
West	20	17.60			
Interdependence			.182	.948	
Northeast	28	8.46			
Southeast	36	8.42			
Midwest	38	8.37			
Southwest	28	8.57			
West	20	8.90			
Total Attributes of the Alliance			1.402	.236	
Northeast	28	57.57			
Southeast	36	54.22			
Midwest	38	53.89			
Southwest	28	53.39			
West	20	53.85			

Continued

Table 4-59 (Continued)

Variable/U.S. Region Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Communication Behavior					
Information Quality from the Least Successful Alliance			3.160	**.016**	
Northeast	28	21.00			
Southeast	36	18.64			
Midwest	38	17.24			
Southwest	28	17.36			
West	20	14.75			
Northeast > West					.009
Information Quality from the Most Successful Alliance			.835	.505[a]	
Northeast	28	27.46			
Southeast	36	26.06			
Midwest	38	26.47			
Southwest	28	27.46			
West	20	28.30			
Information Sharing			.898	.467[a]	
Northeast	28	20.71			
Southeast	36	20.28			
Midwest	38	20.74			
Southwest	28	19.07			
West	20	21.15			
Information Participation			2.716	**.032**	
Northeast	28	25.79			
Southeast	36	23.78			
Midwest	38	24.16			
Southwest	28	21.64			
West	20	25.70			
Northeast > Southwest					.032
Proprietary Information Sharing			1.632	.169[a]	
Northeast	28	9.36			
Southeast	36	8.17			
Midwest	38	8.13			
Southwest	28	7.79			
West	20	8.20			
Total Communication Behavior			1.752	.142[a]	
Northeast	28	104.32			
Southeast	36	96.92			
Midwest	38	96.74			
Southwest	28	93.32			
West	20	98.10			

Continued

Table 4-59 (Continued)

Variable/U.S. Region Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Conflict Resolution Techniques					
Avoidance & Constructive Conflict Resolution Techniques			.587	.673[a]	
Northeast	28	14.11			
Southeast	36	13.56			
Midwest	38	14.63			
Southwest	28	14.46			
West	20	13.90			
Destructive Conflict Resolution Techniques			.158	.959[a]	
Northeast	28	5.54			
Southeast	36	5.61			
Midwest	38	5.42			
Southwest	28	5.25			
West	20	5.05			
Total Conflict Resolution Techniques			.284	.888[a]	
Northeast	28	19.64			
Southeast	36	19.17			
Midwest	38	20.05			
Southwest	28	19.71			
West	20	18.95			
Commodity/Supplier Selection Process			.856	.492[a]	
Northeast	28	9.82			
Southeast	36	8.86			
Midwest	38	9.45			
Southwest	28	8.89			
West	20	9.55			

[a]Not significant

ANOVA comparisons in success factors according to U.S. region. ANOVA showed that there was no significant effect of U.S. region ($F = 1.292$, $p = .276$) on the total *indicators of success* score. Although post hoc comparisons using the Tukey HSD test illustrated no significant differences, there was some variation in the total score for

indicators of success, where construction alliance managers of the Northeast region had the highest mean ($\mu = 31.57$) and those of the Southwest region had the lowest mean ($\mu = 28.14$).

ANOVA showed no significant effect of U.S. region ($F = .555$, $p = .696$) on the total *organizational performance*. Although post hoc comparisons using the Tukey HSD test illustrated no significant differences in mean total *organizational performance* score, there was some variation in the total score for *organizational performance*, where construction alliance managers of the West region had the highest mean ($\mu = 82.60$) and those of the Southeast region had the lowest mean ($\mu = 76.75$). Simultaneously, there were also no significant differences in the responses between *customer perspective*, learning and growth *perspective*, financial *perspective*, and *internal-business-process perspective* subscales according to U.S. region in which the participants' offices were located.

Table 4-60

ANOVA with Post Hoc Comparisons of Past Success, Success Difference, Customer Perspective, Learning and Growth Perspective, Financial Perspective, and *Internal-Business-Process Perspective According to U.S. Region*

Variable/U.S. Region Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Indicators of Success					
Past Success			.816	.517[a]	
Northeast	28	21.32			
Southeast	36	20.14			
Midwest	38	20.29			
Southwest	28	19.21			
West	20	19.35			
Success Difference			.808	.522[a]	
Northeast	28	.04			
Southeast	36	.28			
Midwest	38	.37			
Southwest	28	.07			
West	20	.30			
Total Indicators of Success			1.292	.276[a]	
Northeast	28	31.57			
Southeast	36	29.86			
Midwest	38	30.03			
Southwest	28	28.14			
West	20	28.85			

Continued

Table 4-60 (Continued)

Variable/U.S. Region Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Organizational Performance					
Customer Perspective			.711	.586[a]	
Northeast	28	20.64			
Southeast	36	19.61			
Midwest	38	20.66			
Southwest	28	21.00			
West	20	21.70			
Learning and Growth Perspective			1.219	.305[a]	
Northeast	28	15.54			
Southeast	36	13.97			
Midwest	38	15.03			
Southwest	28	14.93			
West	20	15.75			
Financial Perspective			.361	.836[a]	
Northeast	28	20.21			
Southeast	36	19.44			
Midwest	38	20.29			
Southwest	28	19.57			
West	20	20.40			
Internal-Business-Process Perspective			.386	.818[a]	
Northeast	28	24.50			
Southeast	36	23.72			
Midwest	38	23.18			
Southwest	28	23.50			
West	20	24.75			
Total Organizational Performance			.555	.696[a]	
Northeast	28	80.89			
Southeast	36	76.75			
Midwest	38	79.16			
Southwest	28	79.00			
West	20	82.60			

[a]Not significant

Differences in Alliance Dimensions and Success Factors According to Type of Location Area

One-way ANOVA's were performed to examine differences for the dimensions of alliances scales, success of the alliances scales, and related subscales according to type of location area with three response groups (rural, suburban, and urban). Ten dependent variables (*attributes of the alliance*, *communication behavior*, *conflict resolution techniques*, *commodity/supplier selection process*, *indicators of success*, and *organizational performance*) were compared using ANOVA ($p < .05$), and if there was a significant F value, Tukey's post hoc comparisons were conducted.

ANOVA comparisons in alliance dimensions according to type of location area.

ANOVA comparisons showed that there was no significant effect of type of location area ($F = .505$, $p = .605$) on the total *attributes of the alliance* score. Although post hoc comparisons using the Tukey HSD test illustrated no significant differences, there was some variation in the total score for *attributes of the alliance*, where rural construction alliance managers had the highest mean ($\mu = 55.43$) and urban managers had the lowest mean ($\mu = 53.92$).

ANOVA showed no significant effect of type of location area ($F = 3.671$, $p = .014$) on the total *communication behavior* score. Although not significant, there were trend differences for the *information quality from the least successful alliance* subscale of *communication behavior* where suburban construction managers had the highest mean ($\mu = 27.96$) and urban alliance managers had the lowest mean ($\mu = 26.04$). In addition, there were also trend differences for the *information sharing* subscale of *communication*

behavior where suburban construction managers had the highest mean (μ = 21.19) and urban alliance managers had the lowest mean (μ = 19.63).

In the end, ANOVA showed no significant differences in the responses in terms of either *conflict resolution techniques* or *commodity/supplier selection process* according to job title in this study. ANOVA comparisons of the dependent variables and type of location area (rural, suburban, and urban) are shown in Table 4-61.

Table 4-61

ANOVA with Post Hoc Comparisons of Attributes of the Alliance, Communication Behavior, Conflict Resolution Techniques, and *Commodity/Supplier Selection Process and Related Subscales According to Type of Location Area*

Variable/Location Type Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Attributes of the Alliance					
Trust and Coordination			1.756	.176[a]	
Rural	7	15.86			
Suburban	70	16.20			
Urban	73	15.30			
Commitment from the Least Successful Alliance			.062	.939[a]	
Rural	7	11.71			
Suburban	70	11.86			
Urban	73	12.04			
Commitment from the Most Successful Alliance			.112	.894[a]	
Rural	7	19.00			
Suburban	70	18.34			
Urban	73	18.33			
Interdependence			.841	.433[a]	
Rural	7	8.86			
Suburban	70	8.74			
Urban	73	8.25			
Total Attributes of the Alliance			.505	.605[a]	
Rural	7	55.43			
Suburban	70	55.14			
Urban	73	53.92			

Continued

Table 4-61 (Continued)

Variable/Location Type Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Communication Behavior					
Information Quality from the Least Successful Alliance			.619	.540[a]	
Rural	7	15.43			
Suburban	70	18.30			
Urban	73	17.89			
Information Quality from the Most Successful Alliance			2.543	.082[a]	
Rural	7	27.14			
Suburban	70	27.96			
Urban	73	26.04			
Information Sharing			2.379	.096[a]	
Rural	7	19.86			
Suburban	70	21.19			
Urban	73	19.63			
Information Participation			1.934	.148[a]	
Rural	7	23.43			
Suburban	70	25.03			
Urban	73	23.29			
Proprietary Information Sharing			.008	.992[a]	
Rural	7	8.43			
Suburban	70	8.31			
Urban	73	8.30			
Total Communication Behavior			2.342	.100[a]	
Rural	7	94.29			
Suburban	70	100.99			
Urban	73	95.15			

Continued

Table 4-61 (Continued)

Variable/Location Type Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Conflict Resolution Techniques					
Avoidance & Constructive Conflict Resolution Techniques			.883	.416[a]	
Rural	7	14.57			
Suburban	70	14.49			
Urban	73	13.78			
Destructive Conflict Resolution Techniques			2.428	.092[a]	
Rural	7	4.29			
Suburban	70	5.00			
Urban	73	5.90			
Total Conflict Resolution Techniques			.124	.884[a]	
Rural	7	18.86			
Suburban	70	19.49			
Urban	73	19.68			
Commodity/Supplier Selection Process			.141	.869[a]	
Rural	7	9.29			
Suburban	70	9.40			
Urban	73	9.18			

[a]Not significant

ANOVA comparisons in success factors according to type of location area. ANOVA showed that there was no significant effect of type of location area ($F = 1.829$, $p = .164$) on the total *indicators of success* score. ANOVA also showed that there was no significant effect of type of location area ($F = .238$, $p = .789$) on the total *organizational performance*. ANOVA comparisons of the dependent variables (*indicators of success* and *organizational performance* scales) and type of location area categories (rural, suburban, and urban) are presented in Table 4-62.

Table 4-62

ANOVA with Post Hoc Comparisons of Past Success, Success Difference, Customer Perspective, Learning and Growth Perspective, Financial Perspective, and *Internal-Business-Process Perspective According to Type of Location Area*

Variable/Location Type Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Indicators of Success					
Past Success			1.899	.153[a]	
Rural	7	20.43			
Suburban	70	20.90			
Urban	73	19.34			
Success Difference			.316	.730[a]	
Rural	7	.43			
Suburban	70	.17			
Urban	73	.25			
Total Indicators of Success			1.829	.164[a]	
Rural	7	30.00			
Suburban	70	30.73			
Urban	73	28.82			

Continued

Table 4-62 (Continued)

Variable/Location Type Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Organizational Performance					
Customer Perspective			.548	.580[a]	
Rural	7	20.86			
Suburban	70	21.01			
Urban	73	20.19			
Learning and Growth Perspective			.606	.547[a]	
Rural	7	15.14			
Suburban	70	15.26			
Urban	73	14.63			
Financial Perspective			.246	.782[a]	
Rural	7	19.71			
Suburban	70	20.20			
Urban	73	19.74			
Internal-Business-Process Perspective			.516	.598[a]	
Rural	7	21.86			
Suburban	70	23.76			
Urban	73	24.08			
Total Organizational Performance			.238	.789[a]	
Rural	7	77.57			
Suburban	70	80.23			
Urban	73	78.64			

aNot significant

Differences in Alliance Dimensions and Success Factors According to Total Revenue

One-way ANOVA's were performed to examine differences for the dimensions of alliances scales, success of the alliances scales, and related subscales according to total revenue with three response groups ($100 million-less than $500 million, $500 million-less than $1 billion, and $1 billion or more). Ten dependent variables (*attributes of the alliance*, *communication behavior*, *conflict resolution techniques*, *commodity/supplier selection process*, *indicators of success*, and *organizational performance*) were compared

using ANOVA ($p < .05$), and if there was a significant F value, Tukey's post hoc comparisons were conducted.

ANOVA comparisons in alliance dimensions according to total revenue. ANOVA comparisons showed that there was no significant effect of total revenue ($F = 2.709$, $p = .070$) on the total *attributes of the alliance* score as shown in Table 4-63. Although post hoc comparisons using the Tukey HSD test illustrated no significant differences, there was trend differences in the total score for *attributes of the alliance*, where alliance managers whose organizations reported total revenue of $500 million-less than $1 billion had the highest mean ($\mu = 56.79$) and those of $100 million-less than $500 million had the lowest mean ($\mu = 52.68$). For *interdependence* subscale of *attributes of the alliance*, there was also a trend difference where alliance managers whose organizations reported total revenue of $500 million-less than $1 billion had the highest mean ($\mu = 8.82$) and those of ($100 million-less than $500 million had the lowest mean ($\mu = 7.76$). ANOVA showed there was a significant effect of total revenue ($F = 3.852$, $p = .023$) on the *commitment from the least successful alliance* subscale of *attributes of the alliance*. Tukey's post hoc indicated that alliance managers whose organizations reported total revenue of $1 billion or more rated their construction supplier alliance ($\mu = 12.39$) higher than those between $100 million and $500 million ($\mu = 10.66$).

ANOVA showed that there was a significant effect of total revenue ($F = 4.421$, $p = .014$) on the total *communication behavior* score. Tukey's post hoc analyses indicated that construction managers whose companies reported total revenue of $500 million-less than $1 billion ($\mu = 104.97$) rated total *communication behavior* score significantly higher than those of $1 billion or more ($\mu = 95.30$). ANOVA showed that there was a

significant effect of total revenue ($F = 7.249, p = .001$) on the *information quality from the least successful alliance* subscale of *communication behavior*. Tukey's post hoc analyses indicated that the managers whose firms earned total revenue of $500 million-less than $1 billion ($\mu = 20.81$) rated *information quality from the least successful alliance* significantly higher than both those of $100 million-less than $500 million ($\mu = 16.17$) and those of $1 billion or more ($\mu = 17.39$). In addition, ANOVA showed no significant differences in the responses in terms of either *conflict resolution techniques* or *commodity/supplier selection process* according to job title in this study.

Table 4-63

ANOVA with Post Hoc Comparisons of Attributes of the Alliance, Communication Behavior, Conflict Resolution Techniques, and *Commodity/Supplier Selection Process and Related Subscales According to Total Revenue*

Variable/Yearly Income Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Attributes of the Alliance					
Trust and Coordination			1.899	.153[a]	
$100 million-less than $500 million	41	15.78			
$500 million-less than $1 billion	33	16.55			
$1 billion or more	76	15.38			
Commitment from the Least Successful Alliance			3.852	**.023**	
$100 million-less than $500 million	41	10.66			
$500 million-less than $1 billion	33	12.48			
$1 billion or more	76	12.39			
$1 billion or more > $100 million-less than $500 million					.029
Commitment from the Most Successful Alliance			.727	.485[a]	
$100 million-less than $500 million	41	18.49			
$500 million-less than $1 billion	33	18.94			
$1 billion or more	76	18.05			
Interdependence			2.833	.062[a]	
$100 million-less than $500 million	41	7.76			
$500 million-less than $1 billion	33	8.82			
$1 billion or more	76	8.78			
Total Attributes of the Alliance			2.709	.070[a]	
$100 million-less than $500 million	41	52.68			
$500 million-less than $1 billion	33	56.79			
$1 billion or more	76	54.61			

Continued

Table 4-63 (Continued)

Variable/Yearly Income Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Communication Behavior					
Information Quality from the Least Successful Alliance			7.249	**.001**	
$100 million-less than $500 million	41	16.17			
$500 million-less than $1 billion	33	21.52			
$1 billion or more	76	17.39			
$500 million-less than $1 billion > $100 million-less than $500 million					.001
$500 million-less than $1 billion > $1 billion or more					.006
Information Quality from the Most Successful Alliance			.859	.426[a]	
$100 million-less than $500 million	41	26.98			
$500 million-less than $1 billion	33	27.97			
$1 billion or more	76	26.57			
Information Sharing			3.534	**.032**	
$100 million-less than $500 million	41	21.12			
$500 million-less than $1 billion	33	21.52			
$1 billion or more	76	19.46			
Information Participation			1.202	.303[a]	
$100 million-less than $500 million	41	23.76			
$500 million-less than $1 billion	33	25.39			
$1 billion or more	76	23.74			
Proprietary Information Sharing			.381	.684[a]	
$100 million-less than $500 million	41	8.41			
$500 million-less than $1 billion	33	8.58			
$1 billion or more	76	8.14			
Total Communication Behavior			4.421	**.014**	
$100 million-less than $500 million	41	96.44			
$500 million-less than $1 billion	33	104.97			
$1 billion or more	76	95.30			
$500 million-less than $1 billion > $1 billion or more					.012

Continued

Table 4-63 (Continued)

Variable/Yearly Income Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Conflict Resolution Techniques					
Avoidance & Constructive Conflict Resolution Techniques			.230	.795[a]	
$100 million-less than $500 million	41	14.00			
$500 million-less than $1 billion	33	14.48			
$1 billion or more	76	14.08			
Destructive Conflict Resolution Techniques			1.380	.255[a]	
$100 million-less than $500 million	41	4.78			
$500 million-less than $1 billion	33	5.67			
$1 billion or more	76	5.63			
Total Conflict Resolution Techniques			.959	.386[a]	
$100 million-less than $500 million	41	18.78			
$500 million-less than $1 billion	33	20.15			
$1 billion or more	76	19.71			
Commodity/Supplier Selection Process			.169	.845[a]	
$100 million-less than $500 million	41	9.15			
$500 million-less than $1 billion	33	9.48			
$1 billion or more	76	9.28			

[a]Not significant

ANOVA comparisons in success factors according to total revenue. ANOVA showed that there was no significant differences in the responses in terms of either the total *indicators of success* score (F = 1.836, p = .163) and the total *organizational performance* score (F = .093, p = .911) according to the total revenue range of the respondents' organizations. ANOVA comparisons of the dependent variables (*indicators of success* and *organizational performance* scales) and total revenue ($100 million-less

than $500 million, $500 million-less than $1 billion, and $1 billion or more) categories are presented in Table 4-64.

Table 4-64

ANOVA with Post Hoc Comparisons of Past Success, Success Difference, Customer Perspective, Learning and Growth Perspective, Financial Perspective, and *Internal-Business-Process Perspective According to Total Revenue*

Variable/Yearly Income Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Indicators of Success					
Past Success			1.806	.168[a]	
$100 million-less than $500 million	41	19.39			
$500 million-less than $1 billion	33	21.45			
$1 billion or more	76	19.93			
Success Difference			2.139	.121[a]	
$100 million-less than $500 million	41	-.02			
$500 million-less than $1 billion	33	.27			
$1 billion or more	76	.33			
Total Indicators of Success			1.836	.163[a]	
$100 million-less than $500 million	41	28.98			
$500 million-less than $1 billion	33	31.48			
$1 billion or more	76	29.45			

Continued

Table 4-64 (Continued)

Variable/Yearly Income Category	N	Mean	*F*	*Sig.* (*p*)	Post Hoc Comparison Tukey HSD
Organizational Performance					
Customer Perspective			.650	.523[a]	
$100 million-less than $500 million	41	21.22			
$500 million-less than $1 billion	33	20.79			
$1 billion or more	76	21.20			
Learning and Growth Perspective			.761	.469[a]	
$100 million-less than $500 million	41	15.46			
$500 million-less than $1 billion	33	15.00			
$1 billion or more	76	14.64			
Financial Perspective			.118	.888[a]	
$100 million-less than $500 million	41	20.20			
$500 million-less than $1 billion	33	19.97			
$1 billion or more	76	19.82			
Internal-Business-Process Perspective			.777	.462[a]	
$100 million-less than $500 million	41	22.90			
$500 million-less than $1 billion	33	24.24			
$1 billion or more	76	24.14			
Total Organizational Performance			.093	.911[a]	
$100 million-less than $500 million	41	79.78			
$500 million-less than $1 billion	33	80.00			
$1 billion or more	76	78.80			

aNot significant

Differences in Alliance Dimensions and Success Factors According to New Contracts

Independent t-tests were conducted to determine whether the means of two sample distributions differ significantly from each other, such as business units receiving new contracts and non-contracts here. The comparisons between these two means for construction managers' responses to questions related to alliance dimensions (*attributes of the alliance*, *communication behavior*, *conflict resolution techniques,* and

commodity/supplier selection process) and success factors (*indicators of success* in terms of *past success* and *success difference*, and four perspectives of *organizational performance*) are shown in Table 4-65 and Table 4-66.

Independent t-test comparisons in alliance dimensions according to new contracts. Construction managers whose business units recently receive new contracts within strategic alliances rated their strategic alliances as having a higher level of attributes of alliance (M = 54.65, SE = .61) than those whose companies recently received no contract (M = 53.62, SE = 3.30). The difference was not significant $t(148) = .31$, $p > .05$, inferring that construction managers whose business units recently received new contracts had an equal degree of agreement on attributes of alliance as those whose companies recently received no contract. The participants whose business units recently received no contract within strategic alliances demonstrated a higher level of communication behavior (M = 100.00, SE = 5.24) than those whose companies recently received new contracts (M = 97.53, SE = 1.37). However, there was also no significant difference between two means $t(148) = -.52$, $p > .603$, indicating that both kinds of participants had somewhat equal degrees of information quality, information sharing, information participation, and proprietary information sharing within their strategic supplier alliances, whether their business units recently received new contracts or not.

On average, the participants whose business units recently received new contracts within strategic alliances reported a higher level of conflict resolution techniques (M = 19.61, SE = .38) than those whose companies recently received no contract (M = 18.92, SE = 1.45). There was no significant difference $t(148) = .53$, $p > .05$, inferring that the construction managers receiving new contracts had equal levels of avoidance &

constructive conflict resolution techniques and destructive conflict resolution techniques as those receiving no contract. For the total sample, both kinds of construction managers, no matter whether business units recently received new contracts or no contract within strategic alliances, showed high levels of commodity/supplier selection process. There was also no significant difference $t(148) = .09$, $p > .05$, indicating that the participants receiving new contracts ($M = 9.29$, $SE = .21$) had somewhat equal degrees of commodity/supplier selection process as those who obtained no contract ($M = 9.23$, $SE = .89$).

Table 4-65

Comparison of the Mean Scores for the Attributes of the Alliance, Communication Behavior, Conflict Resolution Techniques, and *Commodity/Supplier Selection Process According to New Contracts: Independent t-tests*

Group and Variable	N	Mean	Std. Error Mean	*t*	Sig. (*p*)
Modified Attributes of the Alliance (N=150)				.31	.763
Total Scale (Range 12 to 84)					
New Contract	137	54.65	.61		
No Contract	13	53.62	3.30		
Modified Communication Behavior (N=150)				-.52	.603
Total Scale (Range 21 to 147)					
New Contract	137	97.53	1.37		
No Contract	13	100.00	5.24		
Modified Conflict Resolution Techniques (N=150)				.53	.596
Total Scale (Range 5 to 35)					
New Contract	137	19.61	.38		
No Contract	13	18.92	1.45		
Commodity/Supplier Selection Process (N=150)				.09	.933
Total Scale (Range 2 to 14)					
New Contract	137	9.29	.21		
No Contract	13	9.23	.89		

Independent t-test comparisons in success factors according to new contracts. On average, construction managers whose business units recently received new contracts rated their companies' strategic alliance relationships with their construction suppliers as having a higher level of past success ($M = 20.40$, $SE = .40$) than those whose companies recently received no contract ($M = 17.15$, $SE = 1.45$). And the difference was significant $t(148) = 2.35$, $p < .05$, inferring a violation of homogeneity of variances, one of the

assumptions of parametric data. The construction managers whose business units recently received no contract demonstrated a higher level of success difference (M = .31, SE = .17) than those under new contracts (M = .21, SE = .08). According to Monczka et al. (1998), success difference was measured by taking the difference between SU6 and SU6a (i.e., SU6a – SU6). However, there was no significant difference between two means $t(148) = -.37$, $p > .05$. In other words, no matter whether their business units recently received new contracts within strategic alliances or not, both kinds of participants are somewhat equally represented at success difference when they rated their private satisfaction and their business units' overall satisfaction with strategic supplier alliances.

For the total sample, the participants whose business units recently received new contracts reported a higher level of alliance performance in terms of customer perspective (M = 20.74, SE = .40) than those under no contract (M = 19.74, SE = 1.49). The difference was non-significant $t(148) = 1.10$, $p > .05$, indicating that homogeneity of variances was met. On average, the respondents whose business units recently received no contract showed high levels of alliance performance in terms of learning and growth perspective (M = 15.08, SE = .84) than those under new contracts (M = 14.93, SE = .30). There was no significant difference between two means $t(148) = -.14$, $p > .05$, inferring that the variances are roughly equal. In addition, the participants whose business units recently received new contracts demonstrated a higher level of alliance performance in terms of financial perspective (M = 20.07, SE = .34) than those under no contract (M = 18.77, SE = 1.05). The difference was also not significant $t(148) = 1.12$, $p > .05$. Although, both kinds of construction managers, no matter whether business units recently

received new contracts (M = 23.87, SE = .49) or no contract (M = 23.38, SE = 1.18) within strategic alliances reported higher levels of alliance performance in terms of the internal-business-process perspective. However, the difference was not significant $t(148) = .30, p > .05$, inferring homogeneity of variances was met.

Table 4-66

Comparison of the Mean Scores for the Past Success, Success Difference, Customer Perspective, Learning and Growth Perspective, Financial Perspective, and *Internal-Business-Process Perspective According to New Contracts: Independent t-tests*

Group and Variable	N	Mean	Std. Error Mean	*t*	Sig. (*p*)
Past Success (N=150)				2.35	**.020**
Total Scale (Range 4 to 28)					
New Contract	137	20.40	.40		
No Contract	13	17.15	1.45		
Success Difference (N=150)				-.37	.716
SU6a-SU6					
New Contract	137	.21	.08		
No Contract	13	.31	.17		
Customer Perspective (N=150)				1.10	.274
Total Scale (Range 4 to 28)					
New Contract	137	20.74	.40		
No Contract	13	19.23	1.49		
Learning and Growth Perspective (N=150)				-.14	.887
Total Scale (Range 3 to 21)					
New Contract	137	14.93	.30		
No Contract	13	15.08	.84		
Financial Perspective (N=150)				1.12	.266
Total Scale (Range 4 to 28)					
New Contract	137	20.07	.34		
No Contract	13	18.77	1.05		
Internal-Business-Process Perspective (N=150)				.30	.766
Total Scale (Range 5 to 35)					
New Contract	137	23.87	.49		
No Contract	13	23.38	1.18		

Differences in Alliance Dimensions and Success Factors According to Alliance Training Programs

Independent t-tests were conducted to determine whether the means of two sample distributions differ significantly from each other, such as business units offering alliance training programs and non-training programs here. The comparisons between these two means for construction managers' responses to questions related to alliance dimensions (*attributes of the alliance*, *communication behavior*, *conflict resolution techniques,* and *commodity/supplier selection process*) and success factors (*indicators of success* in terms of *past success* and *success difference*, and four perspectives of *organizational performance*) are shown in Table 4-67 and Table 4-68.

Independent t-test comparisons in alliance dimensions according to alliance training programs. The construction managers whose business units offer alliance training programs rated their strategic alliances as having higher levels of trust and coordination, commitment, and interdependence ($M = 56.46$, $SE = .92$) than those with no training ($M = 53.49$, $SE = .81$). The difference was significant $t(148) = 2.32$, $p < .05$, inferring a violation of homogeneity of variances, one of the assumptions of parametric data. On average, the participants whose business units offered alliance training programs demonstrated a higher level of communication behavior ($M = 100.43$, $SE = 2.21$) than those with no training ($M = 96.23$, $SE = 1.65$). However, there was no significant difference between two means $t(148) = 1.52$, $p > .05$, indicating that both kinds of construction managers, no matter whether business units offered alliance training programs or not, had somewhat equal degrees of information quality, information sharing,

information participation, and proprietary information sharing within their strategic supplier alliances.

Generally speaking, the participants whose business units offered alliance training programs reported a similar level of conflict resolution techniques (M = 19.72, SE = .61) as those with no training (M = 19.46, SE = .46). There was no significant difference $t(148) = .35$, $p > .05$, inferring that both kinds of construction managers, no matter whether their business units offered alliance training programs or not, had equal levels of avoidance & constructive conflict resolution techniques and destructive conflict resolution techniques. For the total sample, the respondents with training programs showed a higher level of commodity/supplier selection process (M = 10.02, SE = .34) than their Non-training counterparts (M = 8.88, SE = .24). There was also significant difference $t(148) = 2.76$, $p < .05$, indicating a violation of homogeneity of variances, one of the assumptions of parametric data.

Table 4-67

Comparison of the Mean Scores for the Attributes of the Alliance, Communication Behavior, Conflict Resolution Techniques, and *Commodity/Supplier Selection Process According to Alliance Training Programs: Independent t-tests*

Group and Variable	N	Mean	Std. Error Mean	*t*	Sig. (*p*)
Modified Attributes of the Alliance (N=150) Total Scale (Range 12 to 84)				2.32	**.021**
Training Program	54	56.46	.92		
No Training	96	53.49	.81		
Modified Communication Behavior (N=150) Total Scale (Range 21 to 147)				1.52	.131
Training Program	54	100.43	2.21		
No Training	96	96.23	1.65		
Modified Conflict Resolution Techniques (N=150) Total Scale (Range 5 to 35)				.35	.729
Training Program	54	19.72	.61		
No Training	96	19.46	.46		
Commodity/Supplier Selection Process (N=150) Total Scale (Range 2 to 14)				2.76	**.006**
Training Program	54	10.02	.34		
No Training	96	8.88	.24		

Independent t-test comparisons in success factors according to alliance training programs. Construction managers whose business units offered alliance training programs showed higher levels of past success ($M = 21.30$, $SE = .63$) than those with no training ($M = 19.46$, $SE = .49$). The difference was significant $t(148) = 2.27$, $p < .05$, inferring a violation of homogeneity of variances, one of the assumptions of parametric data. On average, the respondents with alliance training programs demonstrated a higher level of success difference ($M = .26$, $SE = .17$) than their non- training counterparts (M

= .20, *SE* = .07). According to Monczka et al. (1998), success difference was measured by taking the difference between SU6 and SU6a (i.e., SU6a – SU6). However, there was no significant difference between the two means $t(148) = .34$, $p > .05$, indicating that both kinds of construction managers, no matter whether their business units offered alliance training programs or not, are somewhat equally represented at success difference when they rated their private satisfaction and their business units' overall satisfaction with strategic supplier alliances.

For the total sample, participants with alliance training programs reported a higher level of alliance performance in terms of customer perspective (*M* = 21.24, *SE* = .56) than their non- training counterparts (*M* = 20.25, *SE* = .51). However, the difference was non-significant $t(148) = 1.23$, $p > .05$, indicating that homogeneity of variances was met. On average, the respondents with alliance training programs showed higher levels of alliance performance in terms of learning and growth perspective (*M* = 15.37, *SE* = .36) than (*M* = 14.71, *SE* = .39). There was also no significant difference between two means $t(148) = 1.25$, $p > .05$, inferring that the participants with alliance training programs perceived equal customer perspective of alliance performance as their non- training counterparts. In addition, the respondents with alliance training programs demonstrated a higher level of alliance performance in terms of financial perspective (*M* = 20.48, *SE* = .50) than their non- training counterparts (*M* = 19.66, *SE* = .43). The difference was also not significant $t(148) = 1.21$, $p > .05$. On average, the participants whose business units offered alliance training programs reported a higher level of alliance performance in terms of internal-business-process perspective (*M* = 25.52, *SE* = .63) than those with no training (*M* =

22.88, *SE* = .60). The difference was significant $t(148) = 2.85$, $p < .05$, inferring a violation of homogeneity of variances, one of the assumptions of parametric data.

Table 4-68

Comparison of the Mean Scores for the Past Success, Success Difference, Customer Perspective, Learning and Growth Perspective, Financial Perspective, and *Internal-Business-Process Perspective According to Alliance Training Programs: Independent t-tests*

Group and Variable	N	Mean	Std. Error Mean	*t*	Sig. (*p*)
Past Success (N=150)				2.27	**.025**
Total Scale (Range 4 to 28)					
Training Program	54	21.30	.63		
No Training	96	19.46	.49		
Success Difference (N=150)				.34	.733
SU6a-SU6					
Training Program	54	.26	.17		
No Training	96	.20	.07		
Customer Perspective (N=150)				1.23	.219
Total Scale (Range 4 to 28)					
Training Program	54	21.24	.56		
No Training	96	20.25	.51		
Learning and Growth Perspective (N=150)				1.25	.212
Total Scale (Range 3 to 21)					
Training Program	54	15.37	.36		
No Training	96	14.71	.39		
Financial Perspective (N=150)				1.21	.227
Total Scale (Range 4 to 28)					
Training Program	54	20.48	.50		
No Training	96	19.66	.43		
Internal-Business-Process Perspective (N=150)				2.85	**.005**
Total Scale (Range 5 to 35)					
Training Program	54	25.52	.63		
No Training	96	22.88	.60		

Research Hypotheses

To test the six hypotheses in the study, multiple regression analyses were used to explain the combined relationships between each of the explanatory constructs (independent variables) and the dependent variables. Based on low numbers of previous findings or theoretical consideration, the hierarchical (enter) method was selected, whereby only those independent variables with significant or trend relationships and the dependent variables were entered into the regression model. This means that the variables were entered into the model in order of their importance for predicting the outcome. There were three steps when determining the variables to enter into the model and the order in which the predictors should be entered:

1. Categorical variables were correlated with the dependent variable using *eta.* Eta (*h*), a coefficient of nonlinear association, was used to measure the strength of relationship between the dependent variable and the group (categorical) variable (Field, 2005). In SPSS 17.0 version, selecting the *Means* options from the *Analyze* menu produced an ANOVA table and measures of an association table which provided the *F*, *p* values, *eta* (η), and *eta squared* (η^2)for each correlation. Then, categorical variables with significant or trend relationships were recoded into dummy variables.
2. A dummy variable was created by the coding procedure of using a dichotomous variable (coded as 0 or 1) to present a categorical variable with more than two categories into a series of variables. The number of dummy variables needed to be one less than the number of categories of the independent variable (Field, 2005). Of the eight alliance manager characteristics, three were categorical

variables: gender, ethnicity, and race. Of the eight organizational characteristics, four were categorical variables: U.S. region, type of location area, new construction contracts, and alliance training programs. Pearson *r* correlations were calculated for the dummy variables, which resulted in significant or trend *eat* correlations, and for the interval or ratio level explanatory variables with dependent variables in each sub-hypothesis to determine any correlation coefficient significant or any trend relationship. Two-tailed tests were conducted for all Pearson's correlation coefficients.

3. Finally, variables which had significant ($p \leq .05$) or trend ($.05 < p < .10$) relationships with the dependent variables were entered into the multiple regression model of the enter method in the order of the strongest Pearson *r* correlations to the weakest.

Based on the order of the Pearson *r* correlations from the strongest to the weakest, the explanatory variables were entered into a enter regression model until the model with the highest explanatory power (R^2) and adjusted R^2 were produced. R is the coefficient of multiple correlation between the predictors and the outcome; the coefficient of determination, R^2 was the variance in the outcome for which the predictors account (Field, 2005). The adjusted R^2 accounts for the number of explanatory variables in the model, and generally is a better indicator of goodness-of-fit than R^2. Unlike R^2, the adjusted R^2 was used to be a good gauge to determine the best model of each hypothesis because it increases only if the new variable improves the model more than would be expected by chance. In addition, collinearity diagnostics was examined by the variance inflation factor (VIF) and the tolerance statistics—VIF's reciprocal. Field (2005)

indicated that the VIF value of 10 should be cause for concern and the tolerance level below .10 would indicate problems with the data (Field, 2005).

Hypothesis 1: Alliance Manager Characteristics and Dimensions of Alliances

Alliance manager characteristics (gender, age, level of education, race, ethnicity, job tenure, job title, and yearly income) are significant explanatory variables of dimensions of alliances (attributes of the alliance, communication behavior, conflict resolution techniques, and commodity/supplier selection process) in the construction industry.

Five sets of analyses were conducted, one for each of the sub-hypotheses: H1a *attributes of the alliance*, H1b *communication behavior*, H1c *conflict resolution techniques*, H1d *commodity/supplier selection process*, and H1e *dimensions of alliances total scale*.

H1a: Alliance Manager Characteristics and Attributes of the Alliance

H_{1a}: Alliance manager characteristics are significant explanatory variables of *attributes of the alliance* in the construction industry.

Alliance manager characteristics categorical variables of gender and ethnicity showed no significant *eta* correlations with *attributes of alliance*, and thus, those variables were not included in either the Pearson *r* or regression analyses. Race did have a significant eta correlation (η = .278, F = 4.069, p = .008) with *attributes of alliance*. The results of *eta* correlations using the means procedure in SPSS are shown in Table 4-69.

Table 4-69

Eta Correlations of the Categorical Variables with the Variable of Attributes of Alliances, N = 150

Categorical Variables	Eta (η)	Eta Squared ($\eta 2$)	*F*	*p* value
Correlations with Attributes of Alliance				
Gender	.050	.002	.370	.544
Ethnicity	.012	.000	.022	.882
Race	.278	.077	**4.069**	**.008**

Following the results from *eta* correlations, four dummy variables were created for race, and these dummy variables were included in the Pearson *r* correlation analysis of *alliance manager characteristics* variables of age, education level, job tenure, job title, and yearly income with *attributes of alliance*. Results of Pearson *r* correlations of the dummy coded variables for race showed a positive, significant correlation between Asian construction managers ($r = .275, p = .001$) and *attributes of alliance*, as well as an inverse relationship between white construction managers ($r = -.217, p = .008$) and *attributes of alliance*. The inverse relationship indicated that the higher the frequency of white respondents, the lower the attributes of alliance. *Alliance manager characteristics* variables of job tenure ($r = .164, p = .046$) also showed a positive, significant Pearson *r* correlation with *attributes of alliance*. The results of Pearson *r* correlations of race dummy coded variables, *alliance manager characteristics* variables of age, education level, job tenure, job title, and yearly income with *attributes of alliance* are shown in Table 4-70.

Table 4-70

Pearson r Correlations of Dummy-Coded Variables, Alliance Manager Characteristics Variables of Age, Education, Job Tenure, Job Title, and Yearly Income with Attributes of Alliances, N = 150

Variable	Race				Age	Education Level	Job Tenure	Job Title	Yearly Income
	White	Black	Asian	American Native					
Attributes of Alliances									
Pearson *r*	**-.217**	-.039	**.275**	.014	.049	.095	**.164**	-.082	.070
p	**.008**	.634	**.001**	.861	.552	.246	**.046**	.318	.392

Significant variables (there were no trend variables) from the Pearson *r* analysis were entered into a hierarchical (enter) regression model in order of significance from the strongest to the weakest; Asian (race) was entered into the first block, white into the second block, and job tenure into the third block of the regression model. All three different models had produced significant *F* values, and the *t*-statistic for all three models was significant for the constant. The VIF values of these three models were all well below 10 and the tolerance statistics all well above .2, thus multicollinearity was not a problem.

Model 3 had two dummy variables "Asian and white" for race and job tenure as explanatory variables ($F = 5.69$, $p = .001$) and produced the highest adjusted R^2 (8.6%) and R^2 (10.5%) of all the models. If Asian accounts for 7.6% of the variation in attributes of alliances in Model 1, white accounts for no additional percentage of the variation in Model 2 and job tenure accounts for additional 2.9% of variation in Model 3. Thus,

Model 3 was selected as the best explanatory model for predicting *attributes of alliance*. The best explanatory model found was:

Attributes of Alliance = 49.82 (*Constant*) + 9.45 (*Asian Race Dummy Variable*) + 1.431 (*Job Tenure*) + ε

The *t*-statistic, which is the ratio of the regression coefficient to its standard error (*B/SE*), was used to analyze the individual predictors in Model 3. Analysis of individual predictors indicated two of the three predictors were significant with *attributes of alliance*. The standardized beta coefficient (β) for each of the two significant predictors and the one non-significant predictor indicated their relative importance in explaining *attributes of alliance*. Asian (t = 2.115, p = .036, β = .279) was the most important predictor in the model. The positive relationship indicated that the frequency in the number of Asian construction managers was positively related to *attributes of alliance*. The second most important variable was job tenure (t = 2.172, p = .032, β = .170). The positive relationship indicated that the more job tenure, the more *attributes of alliance*. The remaining predictor, white, was not significant as an individual predictor (t = -.001, p = .999).

Results of the regression analyses showed H_{1a} was supported. Race and job tenure were explanatory variables of expected *attributes of alliance* even although the other variables of *alliance manager characteristics* were excluded from the regression model as explanatory variables. An additional regression analysis was run using the forward hierarchical method. This analysis resulted in the white race dummy variable being excluded from the model, and the adjusted R^2 was 9.2%. The results of hierarchical multiple regression for H_{1a} are displayed in Table 4-71.

Table 4-71

Summarized Hierarchical Multiple Regression Analysis of Alliance Manager Characteristics Race and Job Tenure as Variables Explaining Attributes of Alliances, N = 150

Variable	*F*	*df*	*p*	*B*	*SE*	*β*	*t*	*p*	R^2	Adj. R^2
Model 1	12.12	1	0.001						0.076	0.069
Model 2	6.023	2	0.003						0.076	0.063
Model 3	5.689	3	0.001						0.105	0.086
(Constant)				49.816	4.072		12.233	.000		
Race: Asian				9.446	4.467	.279	2.115	0.036		
Race: White				-0.004	3.702	.000	-0.001	0.999		
Job Tenure				1.431	0.659	.170	2.172	0.032		

H1b: Alliance Manager Characteristics and Communication Behavior

H_{1b}: Alliance manager characteristics are significant explanatory variables of *communication behavior* in the construction industry.

Alliance manager characteristics categorical variables of gender, ethnicity, and race showed no significant *eta* correlations with *communication behavior*, and thus, those variables were not included in either the Pearson *r* or regression analyses. The results of *eta* correlations using the means procedure in SPSS are shown in Table 4-72.

Table 4-72

Eta Correlations of the Categorical Variables with the Variable of Communication Behavior, N = 150

Categorical Variables	Eta (η)	Eta Squared ($\eta 2$)	*F*	*p* value
Correlations with Communication Behavior				
Gender	.048	.002	.341	.560
Ethnicity	.020	.000	.062	.804
Race	.193	.037	1.884	.135

In addition to there being no significant or trend eta correlations among the categorical variables and *communication behavior*, *alliance manager characteristics* interval variables of age, education level, job tenure, and job title showed no significant or trend Pearson *r* correlations with *communication behavior*, although yearly income did produce an inverse trend relationship (r = -.142, p = .084). The results of Pearson *r* correlations among *alliance manager characteristics* variables of age, education level, job tenure, job title, yearly income, and the dependent variable *communication behavior* are shown in Table 4-73.

Table 4-73

Pearson r Correlations of Alliance Manager Characteristics Variables of Age, Education, Job Tenure, Job Title, and Yearly Income with Communication Behavior, N = 150

Variable	Age	Education Level	Job Tenure	Job Title	Yearly Income
Communication Behavior					
Pearson *r*	-.027	.082	.031	.087	**-.142**
p	.741	.321	.705	.288	**.084**

Simple regression analysis was used to test significant and trend explanatory variables in H_{1b} to determine the best explanatory model of the relationship between yearly income and *communication behavior*. One model was produced from the simple regression result. Model 1 did not have a significant F value for the overall regression equation but did indicate trend significance (F = 3.025, p = .084). Based on these results, Hypothesis H_{1b} was not supported. The result of the regression analysis for H_{1b} is summarized in Table 4-74.

Table 4-74

Summarized Hierarchical Multiple Regression Analysis of Alliance Manager Characteristics Yearly Income as a Variable Explaining Communication Behavior, N = 150

Variable	*F*	*df*	*p*	*B*	*SE*	*β*	*t*	*p*	R^2	Adj. R^2
Model 1	3.025	1	.084						.020	.013
(Constant)				120.505	13.156		9.160	.000		
Yearly Income				-3.153	1.813	-.142	-1.739	.084		

H1c: Alliance Manager Characteristics and Conflict Resolution Techniques

H_{1c}: Alliance manager characteristics are significant explanatory variables of *conflict resolution techniques* in the construction industry.

Alliance manager characteristics categorical variables of ethnicity and race showed no significant *eta* correlations with *conflict resolution techniques*, and thus, those variables were not included in either the Pearson *r* or regression analyses. Gender had a trend correlation ($\eta = .145$, $F = 3.191$, $p = .076$) with *conflict resolution techniques*. The results of *eta* correlations using the means procedure in SPSS are shown in Table 4-75.

Table 4-75

Eta Correlations of the Categorical Variables with the Variable of Conflict Resolution Techniques, N = 150

Categorical Variables	Eta (η)	Eta Squared ($\eta 2$)	*F*	*p* value
Correlations with Conflict Resolution Techniques				
Gender	.145	.021	**3.191**	**.076**
Ethnicity	.132	.017	2.636	.107
Race	.166	.027	1.375	.253

Following the results from *eta* correlations, two dummy variables were created for gender, and these dummy variables were included in the Pearson *r* correlation analysis of *alliance manager characteristics* variables of age, education level, job tenure, job title, and yearly income with *conflict resolution techniques*. Pearson *r* correlations resulted in zero variables that were significant correlated with *conflict resolution techniques* but the dummy coded variables for gender showed a trend relationship. The order of the strongest to the weakest correlation coefficients were: male construction manager (r = .145, p = .076) and female construction manager (r = -.145, p = .076 inverse). Gender was dichotomous and only one of these variables was enter into a regression model. The results of Pearson *r* correlations of gender dummy coded variables, *alliance manager characteristics* variables of age, education level, job tenure, job title, and yearly income with *conflict resolution techniques* are shown in Table 4-76.

Table 4-76

Pearson r Correlations of Dummy-Coded Variables, Alliance Manager Characteristics Variables of Age, Education, Job Tenure, Job Title, and Yearly Income with Conflict Resolution Techniques, N = 150

Variable	Gender		Age	Education Level	Job Tenure	Job Title	Yearly Income
	Male	Female					
Conflict Resolution Techniques							
Pearson *r*	**.145**	**-.145**	-.125	.015	.134	.009	-.013
p	**.076**	**.076**	.129	.855	.103	.915	.876

Simple regression analysis was used to test significant and trend explanatory variables in H_{1c} to determine the best explanatory model of the relationship between

gender (male) and *communication behavior*. One model was produced from the simple regression result. Model 1 did not produce significant F value for the overall regression equation but did indicate trend significance ($F = 3.191, p = .076$). Based on these results, Hypothesis H_{1c} was not supported. The result of the regression analysis for H_{1c} is displayed in Table 4-77.

Table 4-77

Summarized Hierarchical Multiple Regression Analysis of Alliance Manager Characteristics Gender as a Variable Explaining Conflict Resolution Techniques, N = 150

Variable	*F*	*df*	*p*	*B*	*SE*	*β*	*t*	*p*	R^2	Adj. R^2
Model 1	3.191	1	.076						.021	.014
(Constant)				17.952	.966		18.577	.000		
Gender (Male)				1.862	1.042	.145	1.786	.076		

H1d: Alliance Manager Characteristics and Commodity/Supplier Selection Process

H_{1d}: Alliance manager characteristics are significant explanatory variables of *commodity/supplier selection process* in the construction industry.

Alliance manager characteristics categorical variables of gender, ethnicity, and race showed no significant *eta* correlations with *commodity/supplier selection process*, and thus, those variables were not included in either the Pearson *r* or regression analyses. The results of *eta* correlations using the means procedure in SPSS are shown in Table 4-78.

Table 4-78

Eta Correlations of the Categorical Variables with the Variable of Commodity/Supplier Selection Process, N = 150

Categorical Variables	Eta (η)	Eta Squared ($\eta 2$)	*F*	*p* value
Correlations with Commodity /Supplier Selection Process				
Gender	.085	.007	1.089	.298
Ethnicity	.014	.000	.030	.863
Race	.087	.008	.370	.774

In addition to there being no significant or trend *eta* correlations among categorical variables and *commodity/supplier selection process*, *alliance manager characteristics* variables of age, education level, job tenure, job title, and yearly income showed no significant or trend Pearson *r* correlations with *commodity/supplier selection process*. Based on the small sample size and the lack of significant or trend relationships between the explanatory and dependent variables, hierarchical regression analysis was not conducted for H_{1d}. The results of Pearson *r* correlations of *alliance manager characteristics* variables of age, education level, job tenure, job title, and yearly income with *commodity/supplier selection process* are shown in Table 4-79.

Table 4-79

Pearson r Correlations of Alliance Manager Characteristics Variables of Age, Education, Job Tenure, Job Title, and Yearly Income with Commodity/Supplier Selection Process, N = 150

Variable	Age	Education Level	Job Tenure	Job Title	Yearly Income
Commodity/Supplier Selection Process					
Pearson *r*	.066	-.017	.090	-.089	.046
p	.425	.838	.271	.277	.574

H1e: Alliance Manager Characteristics and Dimensions of Alliances (Total Score)

H_{1e}: Alliance manager characteristics are significant explanatory variables of *dimensions of alliances (total score)* in the construction industry.

Alliance manager characteristics categorical variables of gender and ethnicity showed no significant *eta* correlations with *dimensions of alliances (total score)*, and thus, those variables were not included in either the Pearson *r* or regression analyses. Race had a trend correlation ($\eta = .211$, $F = 2.276$, $p = .082$) with *dimensions of alliances (total score)*. The results of *eta* correlations using the means procedure in SPSS are shown in Table 4-80.

Table 4-80

Eta Correlations of the Categorical Variables with the Variable of Dimensions of Alliances (total score), N = 150

Categorical Variables	Eta (η)	Eta Squared ($\eta 2$)	*F*	*p* value
Correlations with Dimensions of Alliances (Total Scale)				
Gender	.080	.006	.962	.328
Ethnicity	.012	.000	.023	.880
Race	.211	.045	**2.276**	**.082**

Following the results from *eta* correlations, four dummy variables were created for race, and these dummy variables were included in the Pearson *r* correlation analysis of *alliance manager characteristics* variables of age, education level, job tenure, job title, and yearly income with *dimensions of alliances (total score)*. Results of Pearson *r* correlations of the dummy coded variables for race showed a positive, significant correlation between Asian construction managers ($r = .210$, $p = .010$) and *attributes of alliance*, as well as an inverse trend relationship between white construction managers ($r = -.159$, $p = .052$) and *attributes of alliance*. The inverse trend relationship indicated that the higher frequency of white respondents might cause a lower perception for *dimensions of alliances (total score)*. The results of Pearson *r* correlations of race dummy coded variables, *alliance manager characteristics* variables of age, education level, job tenure, job title, and yearly income with *dimensions of alliances (total score)* are shown in Table 4-81.

Table 4-81

Pearson r Correlations of Dummy-Coded Variables, Alliance Manager Characteristics Variables of Age, Education, Job Tenure, Job Title, and Yearly Income with Dimensions of Alliances (total score), N = 150

Variable	Race				Age	Education Level	Job Tenure	Job Title	Yearly Income
	White	Black	Asian	American Native					
Dimensions of Alliances (Total Scale)									
Pearson *r*	**-.159**	-.026	**.210**	-.010	-.018	.083	.102	.024	-.068
p	**.052**	.751	**.010**	.904	.823	.314	.212	.767	.408

The significant and trend variables from the Pearson *r* analysis were entered into a hierarchical regression model in order of the strongest to the weakest correlation coefficients. Two different models had produced significant *F* values, and the *t*-statistic for all three models was significant for the constant. The VIF values of the two models were all well below 10 and the tolerance statistics all well above .2, thus multicollinearity was not a problem.

Model 1 had one dummy variable, "Asian," for race as the explanatory variable ($F = 6.852, p = .010$) and produced R^2 (4.4%) and the higher adjusted R^2 (3.8%). Model 2 with two explanatory variables of "Asian and white" for race ($F = 3.427$, $p = .035$) produced R^2 of 4.5% and adjusted R^2 of 3.2%. Since the adjusted R^2 in Model 2 was lower than that of Model 1, Model 1 was selected as the best explanatory model for predicting *dimensions of alliances (total score)*. The best explanatory model found was:

Dimensions of Alliances (Total Score) = 197.89 (*Constant*) + 23.49 (*Asian Race Dummy Variable*) + ε

The *t*-statistic, which is the ratio of the regression coefficient to its standard error (*B/SE*), was used to analyze the individual predictors in Model 1. Analysis of individual predictors indicated one of the two predictors had a trend relationship with *dimensions of alliances (total score).* The standardized beta coefficient (β) for each of the two significant predictors and the one non-significant predictor indicated their relative importance in explaining *dimensions of alliances (total score).* Asian ($t = 2.618, p = .010, \beta = .210$) was the most important predictor in the model. The positive relationship indicated that the frequency in the number of Asian construction managers was positively related to *dimensions of alliances (total score).* The second most important variable was white ($t = .216, p = .829, \beta = .029$). Results of the regression analyses showed H_{1e} was supported because Asian and white were explanatory variables of expected *dimensions of alliances (total score).* The other variables were excluded from the regression model as explanatory variables. Table 4-82 displays the results of hierarchical multiple regression for H_{1e}.

Table 4-82

Summarized Hierarchical Multiple Regression Analysis of Alliance Manager Characteristics Gender as a Variable Explaining Dimensions of Alliances (total score), N = 150

Variable	*F*	*df*	*p*	*B*	*SE*	*β*	*t*	*p*	R^2	Adj. R^2
Model 1	6.852	1	.010						.044	.038
(Constant)				179.887	2.072		86.812	.000		
Race: Asian				23.488	8.973	.210	2.618	.010		
Model 2	3.427	2	.035						.045	.032

Hypothesis 2: Alliance Manager Characteristics and Success of the Alliances

Alliance manager characteristics (gender, age, level of education, race, ethnicity, job tenure, job title, and yearly income) are significant explanatory variables of the success of the alliances (satisfaction, adjusted satisfaction, financial perspective, customer perspective, internal-business-process perspective, and learning and growth perspective) in the construction industry.

Seven sets of analyses were conducted, one for each of the sub-hypotheses: H2a *satisfaction with the alliance*, H2b *adjusted satisfaction with the alliance*, H2c *financial perspective performance*, H2d *customer perspective performance*, H2e *internal-business-process perspective performance*, H2f *learning and growth perspective performance*, and H2g *success of alliances total score*.

H2a: Alliance Manager Characteristics and Satisfaction

H_{2a}: Alliance manager characteristics are significant explanatory variables of *satisfaction with the alliance* in the construction industry.

Alliance manager characteristics categorical variables of gender, ethnicity, and race showed no significant *eta* correlations with *satisfaction* (i.e. *past success*), and thus, those variables were not included in either the Pearson *r* or regression analyses. The results of *eta* correlations using the means procedure in SPSS are shown in Table 4-83.

Table 4-83

Eta Correlations of the Categorical Variables with the Variable of Satisfaction with the Alliance, N = 150

Categorical Variables	Eta (η)	Eta Squared ($\eta 2$)	*F*	*p* value
Correlations with Satisfaction				
Gender	.006	.000	.005	.943
Ethnicity	.030	.001	.136	.713
Race	.084	.007	.347	.792

In addition to there being no significant or trend eta correlations among the categorical variables and *satisfaction*, *alliance manager characteristics* interval variables of education level, job tenure, job title, and yearly income showed no significant or trend Pearson *r* correlations with *satisfaction.* Age did have a positive, significant Pearson *r* correlation with *satisfaction* ($r = .178$, $p = .029$). The results of Pearson *r* correlations among *alliance manager characteristics* variables of age, education level, job tenure, job title, yearly income, and the dependent variable *satisfaction* are shown in Table 4-84.

Table 4-84

Pearson r Correlations of Alliance Manager Characteristics Variables of Age, Education, Job Tenure, Job Title, and Yearly Income with Satisfaction with the Alliance, N = 150

Variable	Age	Education Level	Job Tenure	Job Title	Yearly Income
Satisfaction					
Pearson *r*	**.178**	.099	.087	-.135	.131
p	**.029**	.229	.291	.100	.109

Simple regression analysis was used to test significant and trend explanatory variables in H_{2a} to determine the best explanatory model of the relationship between age and *satisfaction with the alliance* (i.e. *past success).* One model was produced from the simple regression result. The VIF values of the model were all well below 10 and the tolerance statistics all well above .2, thus multicollinearity was not a problem. Model 1 did have a significant F value (F = 4.861, p = .029). A significant explanatory relationship was found between the variable *alliance manager characteristics* age and *satisfaction*, indicating that older construction managers who were engaged in strategic alliances may perceive more *satisfaction with the alliance* based on their past success than the younger ones. Model 1 produced the adjusted R^2 (2.5%) and R^2 indicated age accounted for 3.2% of the variance in *satisfaction.* The positive standardized beta value (β = .178) symbolized a positive relationship between the variables. Based on the result, Hypothesis H_{2a} was supported. The result of the regression analysis for H_{2a} is summarized in Table 4-85. The best explanatory model found was:

Satisfaction with the Alliance = 17.09 (*Constant*) + .85 (*Age*) + ε

Table 4-85

Summarized Hierarchical Multiple Regression Analysis of Alliance Manager Characteristics Age as a Variable Explaining Satisfaction with the Alliance, N = 150

Variable	*F*	*df*	*p*	*B*	*SE*	*β*	*t*	*p*	R^2	Adj. R^2
Model 1	4.861	1	.029						.032	.025
(Constant)				17.090	1.428		11.965	.000		
Age				.854	.387	.178	2.205	.029		

H2b: Alliance Manager Characteristics and Adjusted Satisfaction

H_{2b}: Alliance manager characteristics are significant explanatory variables of *adjusted satisfaction with the alliance* in the construction industry.

Alliance manager characteristics categorical variables of gender, ethnicity, and race showed no significant *eta* correlations with *adjusted satisfaction* (i.e., *success difference*), and thus, those variables were not included in either the Pearson *r* or regression analyses. The results of *eta* correlations using the means procedure in SPSS are shown in Table 4-86.

Table 4-86

Eta Correlations of the Categorical Variables with the Variable of Adjusted Satisfaction with the Alliance, N = 150

Categorical Variables	Eta (η)	Eta Squared ($\eta 2$)	*F*	*p* value
Correlations with Adjusted Satisfaction				
Gender	.056	.003	.464	.497
Ethnicity	.006	.000	.004	.947
Race	.108	.012	.575	.632

In addition to there being no significant or trend eta correlations among the categorical variables and *adjusted satisfaction*, *alliance manager characteristics* interval variables of age, job tenure, and job title showed no significant or trend Pearson *r* correlations with *adjusted satisfaction.* Education level did produce an inverse trend relationship with *adjusted satisfaction* (r = -.139, p = .090) while yearly income had a positive trend relationship with *adjusted satisfaction* (r =.139, p = .089). The results of Pearson *r* correlations among *alliance manager characteristics* variables of age,

education level, job tenure, job title, yearly income, and the dependent variable *adjusted satisfaction* are shown in Table 4-87.

Table 4-87

Pearson r Correlations of Alliance Manager Characteristics Variables of Age, Education, Job Tenure, Job Title, and Yearly Income with Adjusted Satisfaction with the Alliance, N = 150

Variable	Age	Education Level	Job Tenure	Job Title	Yearly Income
Adjusted Satisfaction					
Pearson *r*	.102	**-.139**	.050	-.046	**.139**
p	.210	**.090**	.544	.579	**.089**

The trend variables (there were no significant variables) from the Pearson *r* analysis were entered into a hierarchical regression model in order of significance from the strongest to the weakest. Two different models did not produce significant *F* values for the overall regression equation but did indicate trend significance ($F = 2.935$, $p = .089$; $F = 2.414$, $p = .093$ respectively). Based on these results, Hypothesis H_{2b} was not supported. The results of hierarchical multiple regression for H_{2b} are displayed in Table 4-88.

Table 4-88

Summarized Hierarchical Multiple Regression Analysis of Alliance Manager Characteristics Yearly Income and Education Level as a Variable Explaining Adjusted Satisfaction with the Alliance, N = 150

Variable	*F*	*df*	*p*	*B*	*SE*	*β*	*t*	*p*	R^2	Adj. R^2
Model 1	2.935	1	.089						.019	.013
Model 2	2.414	2	.093						.032	.019
(Constant)				-.547	.807		-.678	.499		
Yearly Income				.142	.103	.115	1.380	.170		
Education Level				-.128	.094	-.114	-1.369	.173		

H2c: Alliance Manager Characteristics and Financial Perspective

H_{2c}: Alliance manager characteristics are significant explanatory variables of *financial perspective with the alliance* in the construction industry.

Alliance manager characteristics categorical variables of gender, ethnicity, and race showed no significant *eta* correlations with *financial perspective performance*, and thus, those variables were not included in either the Pearson *r* or regression analyses. The results of *eta* correlations using the means procedure in SPSS are shown in Table 4-89.

Table 4-89

Eta Correlations of the Categorical Variables with the Variable of Financial Perspective Performance, N = 150

Categorical Variables	Eta (η)	Eta Squared ($\eta 2$)	*F*	*p* value
Correlations with Financial Perspective				
Gender	.043	.002	.277	.600
Ethnicity	.126	.016	2.400	.123
Race	.184	.034	1.711	.167

In addition to there being no significant or trend eta correlations among the categorical variables and *financial perspective performance*, *alliance manager characteristics* interval variables of age, job tenure, job title, and yearly income showed no significant or trend Pearson *r* correlations with *financial perspective*. Education level did produce a positive trend relationship with *financial perspective* ($r = .140$, $p = .088$). The results of Pearson *r* correlations among *alliance manager characteristics* variables of age, education level, job tenure, job title, yearly income, and the dependent variable *financial perspective performance* are shown in Table 4-90.

Table 4-90

Pearson r Correlations of Alliance Manager Characteristics Variables of Age, Education, Job Tenure, Job Title, and Yearly Income with Financial Perspective Performance, N = 150

Variable	Age	Education Level	Job Tenure	Job Title	Yearly Income
Financial Perspective					
Pearson *r*	-.005	**.140**	-.006	.024	-.097
p	.949	**.088**	.942	.769	.236

Simple regression analysis was used to test significant and trend explanatory variables in H_{2c} to determine the best explanatory model of the relationship between education level and *financial perspective performance*. One model was produced from the simple regression result. Model 1 did not have a significant *F* value, but did indicate trend significance ($F = 2.953$, $p = .088$). Based on these results, Hypothesis H_{2c} was not supported. The result of the regression analysis for H_{2c} is displayed in Table 4-91.

Table 4-91

Summarized Hierarchical Multiple Regression Analysis of Alliance Manager Characteristics Education Level as a Variable Explaining Financial Perspective Performance, N = 150

Variable	*F*	*df*	*p*	*B*	*SE*	*β*	*t*	*p*	R^2	Adj. R^2
Model 1	2.953	1	.088						.020	.013
(Constant)				18.588	.875		21.211	.000		
Education Level				.698	.406	.140	1.718	.088		

H2d: Alliance Manager Characteristics and Customer Perspective

H_{2d}: Alliance manager characteristics are significant explanatory variables of *customer perspective with the alliance* in the construction industry.

Alliance manager characteristics categorical variables of gender, ethnicity, and race showed no significant *eta* correlations with *customer perspective performance*, and thus, those variables were not included in either the Pearson *r* or regression analyses.

The results of *eta* correlations using the means procedure in SPSS are shown in Table 4-92.

Table 4-92

Eta Correlations of the Categorical Variables with the Variable of Customer Perspective Performance, N = 150

Categorical Variables	Eta (η)	Eta Squared ($\eta 2$)	*F*	*p* value
Correlations with Customer Perspective				
Gender	.079	.006	.918	.340
Ethnicity	.093	.009	1.287	.259
Race	.153	.023	1.166	.325

In addition to there being no significant or trend *eta* correlations among categorical variables and *customer perspective performance*, *alliance manager characteristics* variables of age, education level, job tenure, job title, and yearly income showed no significant or trend Pearson *r* correlations with *customer perspective performance*. Based on the small sample size and the lack of significant or trend relationships between the explanatory and dependent variables, hierarchical regression analysis was not conducted for H_{2d}. The results of Pearson *r* correlations of *alliance manager characteristics* variables of age, education level, job tenure, job title, and yearly income with *customer perspective performance* are shown in Table 4-93.

Table 4-93

Pearson r Correlations of Alliance Manager Characteristics Variables of Age, Education, Job Tenure, Job Title, and Yearly Income with Customer Perspective Performance, N = 150

Variable	Age	Education Level	Job Tenure	Job Title	Yearly Income
Customer Perspective					
Pearson *r*	.062	.129	.003	-.065	-.076
p	.448	.115	.969	.431	.357

H2e: Alliance Manager Characteristics and Internal-Business-Process Perspective

H_{2e}: Alliance manager characteristics are significant explanatory variables of *internal-business-process perspective with the alliance* in the construction industry.

Alliance manager characteristics categorical variables of gender (η = .160, F = 3.905, p = .050) and ethnicity (η = .184, F = 5.182, p = .024) showed significant *eta* correlations with *internal-business-process perspective performance.* Race did not have a significant eta correlation with *internal-business-process perspective performance*, and thus, this variable was not included in either the Pearson *r* or regression analyses. The results of *eta* correlations using the means procedure in SPSS are shown in Table 4-94.

Table 4-94

Eta Correlations of the Categorical Variables with the Variable of Internal-Business-Process Perspective Performance, N = 150

Categorical Variables	Eta (η)	Eta Squared ($\eta 2$)	*F*	*p* value
Correlations with Internal-Business-Process Perspective				
Gender	.160	.026	3.905	**.050**
Ethnicity	.184	.034	5.182	**.024**
Race	.169	.029	1.428	.237

Following the results from eta correlations, two dummy variables each were created for both gender and ethnicity, and these dummy variables were included in the Pearson *r* correlation analysis with *alliance manager characteristics* variables of age, education level, job tenure, job title, and yearly income. Results of Pearson *r* correlations of the dummy coded variables for gender indicated a significant relationship between male respondents and *internal-business-process perspective performance* ($r = .160$, $p = .050$), such that the higher the frequency of male construction managers, the higher the *internal-business-process perspective in alliance performance*. There was a significant correlation between the dummy coded variable for ethnicity and *internal-business-process perspective* ($r = .184$, $p = .024$), indicating that the higher the frequency of Hispanic construction managers, the higher the *internal-business-process perspective in alliance performance*. Both gender and ethnicity were dichotomous and only one of each categorical variable was entered into a regression model. The results of Pearson *r* correlations of *alliance manager characteristics* variables of age, education level, job tenure, job title, and yearly income with *internal-business-process perspective performance* are shown in Table 4-95.

Table 4-95

Pearson r Correlations of Alliance Manager Characteristics Variables of Age, Education, Job Tenure, Job Title, and Yearly Income with Internal-Business-Process Perspective Performance, N = 150

Variable	Gender		Ethnicity		Age	Education Level	Job Tenure	Job Title	Yearly Income
	Male	Female	Hispanic	Non-Hispanic					
Internal-Business-Process Perspective									
Pearson *r*	**.160**	**-.160**	**.184**	**-.184**	.021	.102	.082	.040	.006
p	**.050**	**.050**	**.024**	**.024**	.803	.214	.316	.623	.941

The significant variables (there were no trend variables) from the Pearson *r* analysis were entered into a hierarchical regression model in order of the strongest to the weakest correlation coefficients. Two different models had produced significant *F* values, and the *t*-statistic for both models was significant for the constant. The VIF values of the two models were all well below 10 and the tolerance statistics all well above .2, thus multicollinearity was not a problem.

Model 1 had one dummy variable, "Hispanic," for ethnicity as the explanatory variable ($F = 5.182, p = .024$) and produced R^2 of 3.4% and adjusted R^2 of 2.7%. Model 2 with two explanatory variables of "Hispanic" for ethnicity and "Male" for gender ($F = 4.348$, $p = .015$) produced the higher R^2 (5.6%) and adjusted R^2 (4.3%). Since the adjusted R^2 in Model 1 was lower than that of Model 2, Model 2 was selected as the best explanatory model for predicting *internal-business-process perspective performance*. The best explanatory model found was:

Internal-Business-Process Perspective Performance = 21.62 (*Constant*) + 6 (*Hispanic Ethnicity Dummy Variable*) + 2.38 (*Male Gender Dummy Variable*) + ε

To analyze the individual predictors in Model 2, the *t*-statistic, which is the ratio of the regression coefficient to its standard error (*B/SE*), indicated one predictor was significant and one a trend predictor with *internal-business-process perspective performance* based on *t*-test results: "Hispanic" for ethnicity ($t = 2.618, p = .010$) and "male" for gender ($t = 1.851, p = .066$). In terms of explaining the relationship between *internal-business-process perspective performance* and the predictor variables in Model 2, the order of importance according to the standardized beta coefficient (β) was: "Hispanic" for ethnicity ($\beta = .174$) and then "male" for gender ($\beta = .149$). Hispanic

construction alliance managers as it related to *internal-business-process perspective performance* indicated that an increase in participants of Hispanic construction managers who were engaged in strategic alliances provided more *internal-business-process perspective performance*. Male construction alliance managers as it related to *internal-business-process perspective performance* indicated that an increase in participants of male construction managers who were engaged in strategic alliances provided more *internal-business-process perspective performance*. Results of the regression analyses showed H_{2e} was supported. Table 4-96 displays the results of hierarchical multiple regression for H_{2e}.

Table 4-96

Summarized Hierarchical Multiple Regression Analysis of Alliance Manager Characteristics Ethnicity and Gender as Variables Explaining Internal-Business-Process Perspective Performance, N = 150

Variable	*F*	*df*	*p*	*B*	*SE*	*β*	*t*	*p*	R^2	Adj. R^2
Model 1	5.182	1	.024						.034	.027
Model 2	4.348	2	.015						.056	.043
(Constant)				21.619	1.190		18.168	.000		
Ethnicity: Hispanic				6.000	2.770	.174	2.166	.032		
Gender: Male				2.381	1.286	.149	1.851	.066		

H2f: Alliance Manager Characteristics and Learning and Growth Perspective

H_{2f}: Alliance manager characteristics are significant explanatory variables of *learning and growth perspective with the alliance* in the construction industry.

Alliance manager characteristics categorical variables of gender, ethnicity, and race showed no significant *eta* correlations with *learning and growth perspective performance*, and thus, those variables were not included in either the Pearson *r* or regression analyses. The results of *eta* correlations using the means procedure in SPSS are shown in Table 4-97.

Table 4-97

Eta Correlations of the Categorical Variables with the Variable of Learning and Growth Perspective Performance, N = 150

Categorical Variables	Eta (η)	Eta Squared ($\eta 2$)	*F*	*p* value
Correlations with Learning & Growth Perspective				
Gender	.016	.000	.039	.844
Ethnicity	.027	.001	.106	.745
Race	.125	.016	.777	.509

In addition to there being no significant or trend *eta* correlations among categorical variables and *learning and growth perspective performance*, *alliance manager characteristics* variables of age, education level, job tenure, job title, and yearly income showed no significant or trend Pearson *r* correlations with *learning and growth perspective performance*. Based on the small sample size and the lack of significant or trend relationships between the explanatory and dependent variables, hierarchical

regression analysis was not conducted for H_{2f}. The results of Pearson *r* correlations of *alliance manager characteristics* variables of age, education level, job tenure, job title, and yearly income with *learning and growth perspective performance* are shown in Table 4-98.

Table 4-98

Pearson r Correlations of Alliance Manager Characteristics Variables of Age, Education, Job Tenure, Job Title, and Yearly Income with Learning and Growth Perspective Performance, N = 150

Variable	Age	Education Level	Job Tenure	Job Title	Yearly Income
Learning & Growth Perspective					
Pearson *r*	.080	.134	.127	.006	-.081
p	.328	.102	.123	.944	.325

H2g: Alliance Manager Characteristics and Success of the Alliances (Total Score)

H_{2g}: Alliance manager characteristics are significant explanatory variables of *success of the alliance (total score)* in the construction industry.

Alliance manager characteristics categorical variables of gender, ethnicity, and race showed no significant *eta* correlations with *success of the alliance (total score)*, and thus, those variables were not included in either the Pearson *r* or regression analyses. The results of *eta* correlations using the means procedure in SPSS are shown in Table 4-99.

Table 4-99

Eta Correlations of the Categorical Variables with the Variable of Success of the Alliances (Total Score), N = 150

Categorical Variables	Eta (η)	Eta Squared ($\eta 2$)	*F*	*p* value
Correlations with Alliance Performance (Total Scale)				
Gender	.023	.001	.077	.781
Ethnicity	.119	.014	2.109	.149
Race	.153	.023	1.166	.325

In addition to there being no significant or trend eta correlations among the categorical variables and *success of the alliance (total score)*, *alliance manager characteristics* interval variables of age, job tenure, job title, and yearly income showed no significant or trend Pearson *r* correlations with *success of the alliance (total score)*. Education level did produce a positive trend relationship with *success of the alliance (total score)* ($r = .137$, $p = .096$). The results of Pearson *r* correlations among *alliance manager characteristics* variables of age, education level, job tenure, job title, yearly income, and the dependent variable *success of the alliance (total score)* are shown in Table 4-100.

Table 4-100

Pearson r Correlations of Alliance Manager Characteristics Variables of Age, Education, Job Tenure, Job Title, and Yearly Income with Success of the Alliances (Total Score), N = 150

Variable	Age	Education Level	Job Tenure	Job Title	Yearly Income
Alliance Performance (Total Scale)					
Pearson *r*	.087	**.137**	.072	-.035	-.012
p	.292	**.096**	.380	.670	.880

Simple regression analysis was used to test significant and trend explanatory variables in H_{2g} to determine the best explanatory model of the relationship between education level and *success of the alliance (total score)*. One model was produced from the simple regression result. Model 1 did not have a significant *F* value but did indicate trend significance ($F = 2.81$, $p = .096$). Based on these results, Hypothesis H_{2g} was not supported. The result of the regression analysis for H_{2g} is displayed in Table 4-101.

Table 4-101

Summarized Hierarchical Multiple Regression Analysis of Alliance Manager Characteristics Education Level as a Variable Explaining Success of the Alliances (Total Score), N = 150

Variable	*F*	*df*	*p*	*B*	*SE*	*β*	*t*	*p*	R^2	Adj. R^2
Model 1	2.813	1	.096						.019	.012
(Constant)				93.319	4.080		22.872	.000		
Education Level				3.177	1.894	.137	1.677	.096		

Hypothesis 3: Organizational Characteristics and Dimensions of Alliances

Organizational characteristics (number of employees, number of offices in the United States and other countries, region of United States, type of location area, total revenue, new contract, and alliance training programs) are significant explanatory variables of the dimensions of alliances (attributes of the alliance, communication behavior, conflict resolution techniques, and commodity/supplier selection process) in the construction industry.

Five sets of analyses were conducted, one for each of the sub-hypotheses: H3a *attributes of the alliance*, H3b *communication behavior*, H3c *conflict resolution techniques*, H3d *commodity/supplier selection process*, and H3e *dimensions of alliances total scale*.

H3a: Organizational characteristics and Attributes of the Alliance

H_{3a}: Organizational characteristics are significant explanatory variables of *attributes of the alliance* in the construction industry.

Organizational characteristics categorical variables of U.S. region, type of location area, and new contracts showed no significant *eta* correlations with *attributes of alliance*, and thus, those variables were not included in either the Pearson *r* or regression analyses. Alliance training programs did have a significant eta correlation ($\eta = .188$, $F = 5.403$, $p = .021$) with *attributes of alliance*. The results of *eta* correlations using the means procedure in SPSS are shown in Table 4-102.

Table 4-102

Eta Correlations of the Categorical Variables with the Variable of Attributes of the Alliance, N = 150

Categorical Variables	Eta (η)	Eta Squared ($\eta 2$)	*F*	*p* value
Correlations with Attributes of Alliance				
U.S. Region	.193	.037	1.402	.236
Type of Location Area	.083	.007	.505	.605
New Contracts	.038	.001	.217	.642
Alliance Training Programs	.188	.035	**5.403**	**.021**

Following the results from *eta* correlations, two dummy variables were created for alliance training programs, and these dummy variables were included in the Pearson *r* correlation analysis of *organizational characteristics* variables of number of employees, number of U.S. offices, number of foreign offices, and total revenue with *attributes of alliance*. Results of Pearson *r* correlations of the dummy coded variables for alliance training programs showed a positive, significant correlation between construction managers whose business units offered alliance training programs ($r = .188, p = .021$) and *attributes of alliance*. Whether offering alliance training programs in respondents' business units was dichotomous (i.e., yes/no question) and only one of this categorical variable was entered into a regression model. *Organizational characteristics* variables of number of employees ($r = .164$, $p = .044$) also showed a positive, significant Pearson *r* correlation with *attributes of alliance*. The results of Pearson *r* correlations of alliance training programs dummy coded variables, *organizational characteristics* variables of number of employees, number of U.S. offices, number of foreign offices, and total revenue with *attributes of alliance* are shown in Table 4-103.

Table 4-103

Pearson r Correlations of Dummy-Coded Variables, Organizational Characteristics Variables of U.S. Region, Type of Location Area, New Contracts, and Alliance Training Programs with Attributes of Alliances, N = 150

Variable	Alliance Training Programs		Number of Employees	Number of U.S. Offices	Number of Foreign Offices	Total Revenue
	Yes	No				
Attributes of Alliances						
Pearson *r*	**.188**	**-.188**	**.164**	.009	.099	.083
p	**.021**	**.021**	**.044**	.915	.230	.314

Significant variables (there were no trend variables) from the Pearson *r* analysis were entered into a hierarchical regression model in order of significance from the strongest to the weakest; alliance training programs (yes) was entered into the first block and number of employees into the second block of the regression model. Two different models had produced significant *F* values, and the *t*-statistic for both models was significant for the constant. The VIF values of the two models were all well below 10 and the tolerance statistics all well above .2, thus multicollinearity was not a problem.

Model 1 had one dummy variables "Yes" for alliance training programs as explanatory variables ($F = 5.4.3, p = .021$) and produced R^2 of 3.5% and an adjusted R^2 of 2.9%. Model 2 with two explanatory variables of "Yes" for alliance training programs and number of employees ($F = 4.304$, $p = .015$) produced the higher R^2 (5.5%) and adjusted R^2 (4.2%). Since the adjusted R^2 in Model 1 was lower than that of Model 2, Model 2 was selected as the best explanatory model for predicting *attributes of alliance*. The best explanatory model found was:

Attributes of Alliance = 51.23 (*Constant*) + 2.69 (*Offering Alliance Training Programs Dummy Variable*) + .85 (*Number of Employees*) + ε

The *t*-statistic, which is the ratio of the regression coefficient to its standard error (*B/SE*), was used to analyze the individual predictors in Model 2. Analysis of individual predictors indicated one predictor was significant and one a trend predictor with *attributes of alliances.* The standardized beta coefficient (β) for the one significant predictor and the one non-significant predictor indicated their relative importance in explaining *attributes of alliance.* "Yes" for alliance training programs (t = 2.098, p = .038, β = .170) was the most important predictor in the model. Offering alliance training programs as it related to *attributes of alliances* indicated that the higher the frequency of the respondents with alliance training programs, the more the *attributes of alliance.* The second most important variable was number of employees (t = 1.768, p = .079, β = .143). Number of employees as it related to *attributes of alliances* indicated that the more the employees in construction firms, the higher the *attributes of alliance.* Results of the regression analyses showed H_{3a} was supported because alliance training programs and number of employees were explanatory variables of expected *attributes of alliance.* The other variables were excluded from the regression model as explanatory variables. Table 4-104 displays the results of hierarchical multiple regression for H_{3a}.

Table 4-104

Summarized Hierarchical Multiple Regression Analysis of Organizational Characteristics Alliance Training Programs and Number of Employees as Variables Explaining Attributes of Alliances, N = 150

Variable	*F*	*df*	*p*	*B*	*SE*	*β*	*t*	*p*	R^2	Adj. R^2
Model 1	5.403	1	.021						.035	.029
Model 2	4.304	2	.015						.055	.042
(Constant)				51.229	1.488		34.429	.000		
Alliance Training Programs: Yes				2.687	1.280	.170	2.098	.038		
Number of Employees				.854	.483	.143	1.768	.079		

H3b: Organizational characteristics and Communication Behavior

H_{3b}: Organizational characteristics are significant explanatory variables of *communication behavior* in the construction industry.

Organizational characteristics categorical variables of U.S. region, type of location area, new contracts, and alliance training programs showed no significant *eta* correlations with *communication behavior*, and thus, those variables were not included in either the Pearson *r* or regression analyses. The results of *eta* correlations using the means procedure in SPSS are shown in Table 4-105.

Table 4-105

Eta Correlations of the Categorical Variables with the Variable of Communication Behavior, N = 150

Categorical Variables	Eta (η)	Eta Squared ($\eta 2$)	*F*	*p* value
Correlations with Communication Behavior				
U.S. Region	.215	.046	1.752	.142
Type of Location Area	.176	.031	2.342	.100
New Contracts	.043	.002	.272	.603
Alliance Training Programs	.124	.015	2.312	.131

In addition to there being no significant or trend *eta* correlations among categorical variables and *communication behavior*, *organizational characteristics* variables of number of employees, number of U.S. offices, number of foreign offices, and total revenue showed no significant or trend Pearson *r* correlations with *communication behavior*. Based on the small sample size and the lack of significant or trend relationships between the explanatory and dependent variables, hierarchical regression analysis was not conducted for H_{3b}. The results of Pearson *r* correlations of *organizational characteristics* variables of number of employees, number of U.S. offices, number of foreign offices, and total revenue with *communication behavior* are shown in Table 4-106.

Table 4-106

Pearson r Correlations of Dummy-Coded Variables, Organizational Characteristics Variables of U.S. Region, Type of Location Area, New Contracts, and Alliance Training Programs with Communication Behavior, N = 150

Variable	Number of Employees	Number of U.S. Offices	Number of Foreign Offices	Total Revenue
Communication Behavior				
Pearson *r*	.074	-.005	.080	-.064
p	.367	.948	.333	.440

H3c: Organizational characteristics and Conflict Resolution Techniques

H_{3c}: Organizational characteristics are significant explanatory variables of *conflict resolution techniques* in the construction industry.

Organizational characteristics categorical variables of U.S. region, type of location area, new contracts, and alliance training programs showed no significant *eta* correlations with *conflict resolution techniques*, and thus, those variables were not included in either the Pearson *r* or regression analyses. The results of *eta* correlations using the means procedure in SPSS are shown in Table 4-107.

Table 4-107

Eta Correlations of the Categorical Variables with the Variable of Conflict Resolution Techniques, N = 150

Categorical Variables	Eta (η)	Eta Squared ($\eta 2$)	*F*	*p* value
Correlations with Conflict Resolution Techniques				
U.S. Region	.088	.008	.284	.888
Type of Location Area	.041	.002	.124	.884
New Contracts	.044	.002	.283	.596
Alliance Training Programs	.028	.001	.120	.729

In addition to there being no significant or trend *eta* correlations among categorical variables and *conflict resolution techniques*, *organizational characteristics* variables of number of employees, number of U.S. offices, number of foreign offices, and total revenue showed no significant or trend Pearson *r* correlations with *conflict resolution techniques*. Based on the small sample size and the lack of significant or trend relationships between the explanatory and dependent variables, hierarchical regression analysis was not conducted for H_{3c}. The results of Pearson *r* correlations of *organizational characteristics* variables of number of employees, number of U.S. offices, number of foreign offices, and total revenue with *conflict resolution techniques* are shown in Table 4-108.

Table 4-108

Pearson r Correlations of Dummy-Coded Variables, Organizational Characteristics Variables of U.S. Region, Type of Location Area, New Contracts, and Alliance Training Programs with Conflict Resolution Techniques, N = 150

Variable	Number of Employees	Number of U.S. Offices	Number of Foreign Offices	Total Revenue
Conflict Resolution Techniques				
Pearson *r*	.050	-.029	-.042	.077
p	.544	.723	.610	.350

H3d: Organizational characteristics and Commodity/Supplier Selection Process

H_{3d}: Organizational characteristics are significant explanatory variables of *commodity/supplier selection process* in the construction industry.

Organizational characteristics categorical variables of U.S. region, type of location area, and new contracts showed no significant *eta* correlations with *commodity/supplier selection process*, and thus, those variables were not included in either the Pearson *r* or regression analyses. Alliance training programs did have a significant eta correlation (η = .222, F = 7.640, p = .006) with *commodity/supplier selection process*. The results of *eta* correlations using the means procedure in SPSS are shown in Table 4-109.

Table 4-109

Eta Correlations of the Categorical Variables with the Variable of Commodity/Supplier Selection Process, N = 150

Categorical Variables	Eta (η)	Eta Squared ($\eta 2$)	*F*	*p* value
Correlations with Commodity /Supplier Selection Process				
U.S. Region	.152	.023	.856	.492
Type of Location Area	.044	.002	.141	.869
New Contracts	.007	.000	.007	.933
Alliance Training Programs	.222	.049	**7.640**	**.006**

Following the results from *eta* correlations, two dummy variables were created for alliance training programs, and these dummy variables were included in the Pearson *r* correlation analysis of *organizational characteristics* variables of number of employees, number of U.S. offices, number of foreign offices, and total revenue with

commodity/supplier selection process. Results of Pearson *r* correlations of the dummy coded variables for alliance training programs showed a positive, significant correlation between construction managers whose business units offered alliance training programs ($r = .222$, $p = .006$) and *commodity/supplier selection process*, such that the higher the frequency of the respondents with alliance training programs, the higher the *commodity/supplier selection process*. Whether or not offering alliance training programs in respondents' business units was dichotomous (i.e., yes/no question) and only one of this categorical variable was entered into a regression model. The results of Pearson *r* correlations of alliance training programs dummy coded variables, *organizational characteristics* variables of number of employees, number of U.S. offices, number of foreign offices, and total revenue with *commodity/supplier selection process* are shown in Table 4-110.

Table 4-110

Pearson r Correlations of Dummy-Coded Variables, Organizational Characteristics Variables of U.S. Region, Type of Location Area, New Contracts, and Alliance Training Programs with Commodity/Supplier Selection Process, N = 150

Variable	Alliance Training Programs		Number of Employees	Number of U.S. Offices	Number of Foreign Offices	Total Revenue
	Yes	No				
Commodity/Supplier Selection Process						
Pearson *r*	**.222**	**-.222**	.042	-.019	.037	.016
p	**.006**	**.006**	.607	.819	.653	.849

Simple regression analysis was used to test significant explanatory variables in H_{3d} to determine the best explanatory model of the relationship between alliance training programs (yes) and *commodity/supplier selection process*. One model was produced from the simple regression result. The VIF values of the model were all well below 10 and the tolerance statistics all well above .2, thus multicollinearity was not a problem. Model 1 did have a significant F value ($F = 7.640$, $p = .006$), and the t statistic for this model was significant for the constant. A significant explanatory relationship was found between the variable *organizational characteristics* alliance training programs (yes) and *commodity/supplier selection process*, indicating that the higher the frequency of the respondents with alliance training programs in their firms, the more comprehensive the *commodity/supplier selection process*. Model 1 produced an adjusted R^2 of 4.3% and the R^2 indicated alliance training programs (yes) accounted for 4.9% of the variance in *commodity/supplier selection process*. The positive standardized beta value ($\beta = .222$) symbolized a positive relationship between the variables. Results of the regression analyses showed H_{3d} was supported. The result of the regression analysis for H_{3d} is summarized in Table 4-111. The best explanatory model found was:

Commodity/Supplier Selection Process = 8.88 (*Constant*) + 1.14 (*Offering Alliance Training Programs Dummy Variable*) + ε

Table 4-111

Summarized Hierarchical Multiple Regression Analysis of Organizational Characteristics Alliance Training Programs as a Variable Explaining Dimensions of Alliances (total score), N = 150

Variable	*F*	*df*	*p*	*B*	*SE*	*β*	*t*	*p*	R^2	Adj. R^2
Model 1	7.640	1	.006						.049	.043
(Constant)				8.875	.248		35.753	.000		
Alliance Training Programs: Yes				1.144	.414	.222	2.764	.006		

H3e: Organizational characteristics and Dimensions of Alliances (Total Score)

H_{3e}: Organizational characteristics are significant explanatory variables of *dimensions of alliance (total score)* in the construction industry.

Organizational characteristics categorical variables of U.S. region, type of location area, and new contracts showed no significant *eta* correlations with *dimensions of alliances (total score)*, and thus, those variables were not included in either the Pearson *r* or regression analyses. Alliance training programs did have a significant eta correlation ($\eta = .164$, $F = 4.096$, $p = .045$) with *dimensions of alliances (total score)*. The results of *eta* correlations using the means procedure in SPSS are shown in Table 4-112.

Table 4-112

Eta Correlations of the Categorical Variables with the Variable of Dimensions of Alliances (Total Score), N = 150

Categorical Variables	Eta (η)	Eta Squared ($\eta 2$)	*F*	*p* value
Correlations with Dimensions of Alliance (Total Scale)				
U.S. Region	.207	.043	1.629	.170
Type of Location Area	.137	.019	1.406	.248
New Contracts	.008	.000	.009	.925
Alliance Training Programs	.164	.027	**4.096**	**.045**

Following the results from *eta* correlations, two dummy variables were created for alliance training programs, and these dummy variables were included in the Pearson *r* correlation analysis of *organizational characteristics* variables of number of employees, number of U.S. offices, number of foreign offices, and total revenue with *dimensions of alliances (total score)*. Results of Pearson *r* correlations of the dummy coded variables for alliance training programs showed a positive, significant correlation between construction managers whose business units offered alliance training programs ($r = .164$, $p = .045$) and *dimensions of alliances (total score)*, such that the higher the frequency of the respondents with alliance training programs, the higher the *dimensions of alliances (total score)*. Whether or not offering alliance training programs in respondents' business units was dichotomous (i.e., yes/no question) and only one of this categorical variable was entered into a regression model. The results of Pearson *r* correlations of alliance training programs dummy coded variables, *organizational characteristics* variables of number of employees, number of U.S. offices, number of foreign offices, and total revenue with *dimensions of alliances (total score)*are shown in Table 4-113.

Table 4-113

Pearson r Correlations of Dummy-Coded Variables, Organizational Characteristics Variables of U.S. Region, Type of Location Area, New Contracts, and Alliance Training Programs with Dimensions of Alliances (Total Score), N = 150

Variable	Alliance Training Programs		Number of Employees	Number of U.S. Offices	Number of Foreign Offices	Total Revenue
	Yes	No				
Dimensions of Alliances (Total Scale)						
Pearson *r*	**.164**	**-.164**	.111	-.008	.078	-.001
p	**.045**	**.045**	.177	.924	.345	.991

Simple regression analysis was used to test significant explanatory variables in H_{3e} to determine the best explanatory model of the relationship between alliance training programs (yes) and *dimensions of alliances (total score)*. One model was produced from the simple regression result. The VIF values of the model were all well below 10 and the tolerance statistics all well above .2, thus multicollinearity was not a problem. Model 1 did have a significant F value ($F = 4.096$, $p = .045$), and the t statistic for this model was significant for the constant. A significant explanatory relationship was found between the variable *organizational characteristics* alliance training programs (yes) and *dimensions of alliances (total score)*, indicating that the higher the frequency of the respondents with alliance training programs in their firms, the higher *dimensions of alliances (total score)*. Model 1 produced the adjusted R^2 of 2.0% and the R^2 indicated alliance training programs (yes) accounted for 2.7% of the variance in *dimensions of alliances (total score)*. The positive standardized beta value ($\beta = .164$) symbolized a positive relationship between the variables. Results of the regression analyses showed

H_{3e} was supported. The result of the regression analysis for H_{3d} is summarized in Table 4-114. The best explanatory model found was:

Dimensions of Alliances = 178.05 (*Constant*) + 8.58 (*Offering Alliance Training Programs Dummy Variable*) + ε

Table 4-114

Summarized Hierarchical Multiple Regression Analysis of Organizational Characteristics Alliance Training Programs as a Variable Explaining Dimensions of Alliances (total score), N = 150

Variable	*F*	*df*	*p*	*B*	*SE*	*β*	*t*	*p*	R^2	Adj. R^2
Model 1	4.096	1	.045						.027	.020
(Constant)				178.052	2.543		70.019	.000		
Alliance Training Programs: Yes				8.578	4.238	.164	2.024	.045		

Hypothesis 4: Organizational Characteristics and Success of the Alliances

Organizational characteristics (number of employees, number of offices in the United States and other countries, region of United States, type of location area, total revenue, new contract, and alliance training programs) are significant explanatory variables of success of the alliance (satisfaction, adjusted satisfaction, financial perspective, customer perspective, internal-business-process perspective, and learning and growth perspective) in the construction industry.

Seven sets of analyses were conducted, one for each of the sub-hypotheses: H4a *satisfaction with the alliance*, H4b *adjusted satisfaction with the alliance*, H4c *financial perspective performance*, H4d *customer perspective performance*, H4e *internal-business-*

process perspective performance, H4f *learning and growth perspective performance*, and H4g *success of alliances total score.*

H4a: Organizational Characteristics and Satisfaction

H_{4a}: Organizational characteristics are significant explanatory variables of the *satisfaction with the alliance* in the construction industry.

Organizational characteristics categorical variables of U.S. region and type of location area showed no significant *eta* correlations with *satisfaction with the alliance (i.e., past success)*, and thus, those variables were not included in either the Pearson *r* or regression analyses. New contracts (η = .190, F = 5.541, p = .020) and alliance training programs (η = .183, F = 5.153, p = .025) did have significant eta correlations with *satisfaction with the alliance.* The results of *eta* correlations using the means procedure in SPSS are shown in Table 4-115.

Table 4-115

Eta Correlations of the Categorical Variables with the Variable of Satisfaction with the Alliance, N = 150

Categorical Variables	Eta (η)	Eta Squared ($\eta 2$)	*F*	*p* value
Correlations with Satisfaction				
U.S. Region	.148	.022	.816	.517
Type of Location Area	.159	.025	1.899	.153
New Contracts	.190	.036	**5.541**	**.020**
Alliance Training Programs	.183	.034	**5.153**	**.025**

Following the results from eta correlations, two dummy variables each were created for both new contracts and alliance training programs, and these dummy variables

were included in the Pearson *r* correlation analysis of *organizational characteristics* variables of number of employees, number of U.S. offices, number of foreign offices, and total revenue with *satisfaction with the alliance*. Results of Pearson *r* correlations of the dummy coded variables for new contracts indicated a significant relationship between receiving new contracts and *satisfaction with the alliance* ($r = .190$, $p = .020$), such that the construction managers recently received new contracts within strategic alliances experienced a higher level of *satisfaction with the alliance depending on past success*. There was a significant correlation between the dummy coded variable for alliance training programs and *satisfaction with the alliance* ($r = .183$, $p = .025$), indicating that the construction managers with alliance training programs in their firms perceived more *satisfaction with the alliance based on past success*. Both new contracts and alliance training programs were dichotomous (i.e., yes/no questions) and only one of each categorical variable was entered into a regression model. The results of Pearson *r* correlations of *organizational characteristics* variables of number of employees, number of U.S. offices, number of foreign offices, and total revenue with *satisfaction with the alliance* are shown in Table 4-116.

Table 4-116

Pearson r Correlations of Dummy-Coded Variables, Organizational Characteristics Variables of U.S. Region, Type of Location Area, New Contracts, and Alliance Training Programs with Satisfaction with the Alliance, N = 150

Variable	New Contracts		Alliance Training Programs		Number of Employees	Number of U.S. Offices	Number of Foreign Offices	Total Revenue
	Yes	No	Yes	No				
Satisfaction								
Pearson *r*	**.190**	**-.190**	**.183**	**-.183**	.026	.033	.002	.026
p	**.020**	**.020**	**.025**	**.025**	.749	.690	.981	.755

Significant variables (there were no trend variables) from the Pearson *r* analysis were entered into a hierarchical regression model in order of significance from the strongest to the weakest; new contracts (yes) was entered into the first block and alliance training programs (yes) into the second block of the regression model. Two different models had produced significant *F* values, and the *t*-statistic for both models was significant for the constant. The VIF values of the two models were all well below 10 and the tolerance statistics all well above .2, thus multicollinearity was not a problem.

Model 1 had one dummy variables "Yes" for new contracts as an explanatory variable ($F = 5.541$, $p = .020$) and produced an R^2 of 3.6% and an adjusted R^2 of 3.0%. Model 2 with two explanatory variables of "Yes" for new contracts and "Yes" for alliance training programs ($F = 4.824$, $p = .009$) produced the higher R^2 (6.2%) and adjusted R^2 (4.9%). Since the adjusted R^2 in Model 1 was lower than that of Model 2, Model 2 was selected as the best explanatory model for predicting *satisfaction with the alliance*. The best explanatory model found was:

Satisfaction with the Alliance = 16.91 (*Constant*) + 2.88 (*Receiving New Contracts Dummy Variable*) + 1.61 (*Offering Alliance Training Programs Dummy Variable*) + ε

To analyze the individual predictors in Model 2, the *t*-statistic, which is the ratio of the regression coefficient to its standard error (*B/SE*), indicated each of the two predictor was significant with *satisfaction with the alliance* based on *t*-test results: "Yes" for new contracts ($t = 2.092$, $p = .038$, positively related) and "Yes" for alliance training programs ($t = 1.999$, $p = .047$, positively related). In terms of explaining the relationship between *satisfaction with the alliance* and the predictor variables in Model 2, the order of importance according to the standardized beta coefficient (β) was: "Yes" for new contracts ($\beta = .169$) and then "Yes" for alliance training programs ($\beta = .161$). Receiving new contracts as it related to *satisfaction with the alliance* indicated that the construction managers whose business units recently received new contracts within strategic alliances experienced a higher level of *satisfaction with the alliance depending on past success* than those who received no contracts. Offering alliance training programs as it related to *satisfaction with the alliance* indicated that the construction managers whose business units offer alliance training programs perceived more *satisfaction with the alliance based on past success* than those with no training. Results of the regression analyses showed H_{4a} was supported. Table 4-117 displays the results of hierarchical multiple regression for H_{4a}.

Table 4-117

Summarized Hierarchical Multiple Regression Analysis of Organizational Characteristics Alliance New Contracts and Training Programs as Variables Explaining Satisfaction with the Alliance, N = 150

Variable	*F*	*df*	*p*	*B*	*SE*	*β*	*t*	*p*	R^2	Adj. R^2
Model 1	5.541	1	.020						.036	.030
Model 2	4.824	2	.009						.062	.049
(Constant)				16.905	1.311		12.893	.000		
New Contracts: Yes				2.883	1.378	.169	2.092	.038		
Alliance Training Programs: Yes				1.614	.808	.161	1.999	.047		

H4b: Organizational Characteristics and Adjusted Satisfaction

H_{4b}: Organizational characteristics are significant explanatory variables of the *adjusted satisfaction with the alliance* in the construction industry.

Organizational characteristics categorical variables of U.S. region, type of location area, new contracts, and alliance training programs showed no significant *eta* correlations with *adjusted satisfaction with the alliance (i.e., success difference)*, and thus, those variables were not included in either the Pearson *r* or regression analyses. The results of *eta* correlations using the means procedure in SPSS are shown in Table 4-118.

Table 4-118

Eta Correlations of the Categorical Variables with the Variable of Adjusted Satisfaction with the Alliance, N = 150

Categorical Variables	Eta (η)	Eta Squared ($\eta 2$)	*F*	*p* value
Correlations with Adjusted Satisfaction				
U.S. Region	.148	.022	.808	.522
Type of Location Area	.065	.004	.316	.730
New Contracts	.030	.001	.133	.716
Alliance Training Programs	.033	.001	.158	.691

In addition to there being no significant or trend eta correlations among the categorical variables and *adjusted satisfaction with the alliance*, *organizational characteristics* variables of number of employees, number of U.S. offices, and number of foreign offices showed no significant or trend Pearson *r* correlations with *adjusted satisfaction with the alliance*, although total revenue did produce an positive trend relationship ($r = .159$, $p = .052$). The results of Pearson *r* correlations among *organizational characteristics* variables of number of employees, number of U.S. offices, number of foreign offices, total revenue, and the dependent variable *adjusted satisfaction with the alliance* are shown in Table 4-119.

Table 4-119

Pearson r Correlations of Dummy-Coded Variables, Organizational Characteristics Variables of U.S. Region, Type of Location Area, New Contracts, and Alliance Training Programs with Adjusted Satisfaction with the Alliance, N = 150

Variable	Number of Employees	Number of U.S. Offices	Number of Foreign Offices	Total Revenue
Adjusted Satisfaction				
Pearson *r*	.132	.076	.095	**.159**
p	.107	.353	.248	**.052**

The trend variable of total revenue from the Pearson *r* analysis was entered into a hierarchical regression model. One model was produced from the simple regression result in H_{4b} to determine the best explanatory model of the relationship between total revenue and *adjusted satisfaction with the alliance*. Model 1 did not produce a significant *F* value for the overall regression equation but did indicate trend significance ($F = 3.838$, $p = .052$). This trend explanatory relationship between the variable *organizational characteristics* total revenue and *adjusted satisfaction with the alliance* indicated that the construction alliance managers whose organizations reported higher total revenue might perceive more *adjusted satisfaction with the alliance* based on success difference than those who had lower total revenue. According to Monczka et al. (1998), success difference was measured by taking the difference between SU6 and SU6a (i.e., SU6a – SU6). Model 1 produced the adjusted R^2 (1.9%) and R^2 indicated total revenue accounted for 2.5% of the variance in *adjusted satisfaction with the alliance*. The positive standardized beta value represented a positive relationship between the variables ($t = 1.959$, $p = .052$, $\beta = .159$).

Based on the results, H_{4b} was not supported, although there was a trend relationship between the variables. The results of hierarchical multiple regression for H_{4b} are displayed in Tables 4-120.

Table 4-120

Summarized Hierarchical Multiple Regression Analysis of Organizational Characteristics Alliance Total Revenue as a Variable Explaining Adjusted Satisfaction with the Alliance, N = 150

Variable	*F*	*df*	*p*	*B*	*SE*	*β*	*t*	*p*	R^2	Adj. R^2
Model 1	3.838	1	.052						.025	.019
(Constant)				-.996	.625		-1.594	.113		
Total Revenue				.168	.086	.159	1.959	.052		

H4c: Organizational Characteristics and Financial Perspective

H_{4c}: Organizational characteristics are significant explanatory variables of the *financial perspective with the alliance* in the construction industry.

Organizational characteristics categorical variables of U.S. region, type of location area, new contracts, and alliance training programs showed no significant *eta* correlations with *financial perspective performance*, and thus, those variables were not included in either the Pearson *r* or regression analyses. The results of *eta* correlations using the means procedure in SPSS are shown in Table 4-121.

Table 4-121

Eta Correlations of the Categorical Variables with the Variable of Financial Perspective Performance, N = 150

Categorical Variables	Eta (η)	Eta Squared ($\eta 2$)	*F*	*p* value
Correlations with Financial Perspective				
U.S. Region	.099	.010	.361	.836
Type of Location Area	.058	.003	.246	.782
New Contracts	.091	.008	1.246	.266
Alliance Training Programs	.099	.010	1.472	.227

In addition to there being no significant or trend *eta* correlations among categorical variables and *financial perspective performance*, *organizational characteristics* variables of number of employees, number of U.S. offices, number of foreign offices, and total revenue showed no significant or trend Pearson *r* correlations with *financial perspective performance*. Based on the small sample size and the lack of significant or trend relationships between the explanatory and dependent variables, hierarchical regression analysis was not conducted for H_{4c}. The results of Pearson *r* correlations of *organizational characteristics* variables of number of employees, number of U.S. offices, number of foreign offices, and total revenue with *financial perspective performance* are shown in Table 4-122.

Table 4-122

Pearson r Correlations of Dummy-Coded Variables, Organizational Characteristics Variables of U.S. Region, Type of Location Area, New Contracts, and Alliance Training Programs with Financial Perspective Performance, N = 150

Variable	Number of Employees	Number of U.S. Offices	Number of Foreign Offices	Total Revenue
Financial Perspective				
Pearson *r*	-.066	-.019	-.089	-.040
p	.419	.816	.281	.628

H4d: Organizational Characteristics and Customer Perspective

H_{4d}: Organizational characteristics are significant explanatory variables of the *customer perspective with the alliance* in the construction industry.

Organizational characteristics categorical variables of U.S. region, type of location area, new contracts, and alliance training programs showed no significant *eta* correlations with *customer perspective performance*, and thus, those variables were not included in either the Pearson *r* or regression analyses. The results of *eta* correlations using the means procedure in SPSS are shown in Table 4-123.

Table 4-123

Eta Correlations of the Categorical Variables with the Variable of Customer Perspective Performance, N = 150

Categorical Variables	Eta (η)	Eta Squared ($\eta 2$)	*F*	*p* value
Correlations with Customer Perspective				
U.S. Region	.139	.019	.711	.586
Type of Location Area	.086	.007	.548	.580
New Contracts	.090	.008	1.207	.274
Alliance Training Programs	.101	.010	1.522	.219

In addition to there being no significant or trend *eta* correlations among categorical variables and *customer perspective performance*, *organizational characteristics* variables of number of employees, number of U.S. offices, number of foreign offices, and total revenue showed no significant or trend Pearson *r* correlations with *customer perspective performance*. Based on the small sample size and the lack of significant or trend relationships between the explanatory and dependent variables, hierarchical regression analysis was not conducted for H_{4d}. The results of Pearson *r* correlations of *organizational characteristics* variables of number of employees, number of U.S. offices, number of foreign offices, and total revenue with *customer perspective performance* are shown in Table 4-124.

Table 4-124

Pearson r Correlations of Dummy-Coded Variables, Organizational Characteristics Variables of U.S. Region, Type of Location Area, New Contracts, and Alliance Training Programs with Customer Perspective Performance, N = 150

Variable	Number of Employees	Number of U.S. Offices	Number of Foreign Offices	Total Revenue
Customer Perspective				
Pearson *r*	-.039	.001	-.064	-.093
p	.639	.989	.435	.256

H4e: Organizational Characteristics and Internal-Business-Process Perspective

H_{4e}: Organizational characteristics are significant explanatory variables of the *internal-business-process perspective with the alliance* in the construction industry.

Organizational characteristics categorical variables of U.S. region, type of location area, and new contracts showed no significant *eta* correlations with *internal-business-process perspective performance*, and thus, those variables were not included in either the Pearson *r* or regression analyses. Alliance training programs did have a significant eta correlation ($\eta = .228$, $F = 8.146$, $p = .005$) with *internal-business-process perspective performance*. The results of *eta* correlations using the means procedure in SPSS are shown in Table 4-125.

Table 4-125

Eta Correlations of the Categorical Variables with the Variable of Internal-Business-Process Perspective Performance, N = 150

Categorical Variables	Eta (η)	Eta Squared ($\eta 2$)	*F*	*p* value
Correlations with Internal-Business-Process Perspective				
U.S. Region	.103	.011	.386	.818
Type of Location Area	.083	.007	.516	.598
New Contracts	.025	.001	.089	.766
Alliance Training Programs	.228	.052	**8.146**	**.005**

Following the results from *eta* correlations, two dummy variables were created for alliance training programs, and these dummy variables were included in the Pearson *r* correlation analysis of *organizational characteristics* variables of number of employees, number of U.S. offices, number of foreign offices, and total revenue with *internal-business-process perspective performance*. Results of Pearson *r* correlations of the dummy coded variables for alliance training programs showed a positive, significant correlation between construction managers with alliance training programs ($r = .228$, $p = .005$) and *internal-business-process perspective performance*, as well as an inverse relationship between construction managers with no alliance training programs ($r = -.228$, $p = .005$) and *internal-business-process perspective performance*. The inverse relationship indicated that construction managers without alliance training programs obtained a lower level of *internal-business-process perspective performance*. Whether or not offering alliance training programs in respondents' business units was dichotomous (i.e., yes/no question) and only one of this categorical variable was entered into a regression model. The results of Pearson *r* correlations of alliance training programs

dummy coded variables, *organizational characteristics* variables of number of employees, number of U.S. offices, number of foreign offices, and total revenue with *internal-business-process perspective performance* are shown in Table 4-126.

Table 4-126

Pearson r Correlations of Dummy-Coded Variables, Organizational Characteristics Variables of U.S. Region, Type of Location Area, New Contracts, and Alliance Training Programs with Internal-Business-Process Perspective Performance, N = 150

Variable	Alliance Training Programs		Number of Employees	Number of U.S. Offices	Number of Foreign Offices	Total Revenue
	Yes	No				
Internal-Business-Process Perspective						
Pearson *r*	**.228**	**-.228**	.098	.032	.105	.087
p	**.005**	**.005**	.233	.700	.200	.287

Simple regression analysis was used to test significant and trend explanatory variables in H_{4e} to determine the best explanatory model of the relationship between alliance training programs and *internal-business-process perspective performance*. One model was produced from the simple regression result. The VIF values of the model were all well below 10 and the tolerance statistics all well above .2, thus multicollinearity was not a problem. Model 1 did have a significant F value ($F = 8.146$, $p = .005$). A significant explanatory relationship was found between the variable *organizational characteristics* alliance training programs and *internal-business-process perspective performance*, indicating that the construction managers whose business units provided alliance training programs obtained a higher level of *internal-business-process*

perspective performance than those with no alliance training programs. Model 1 produced the adjusted R^2 of 4.6% and the R^2 indicated age accounted for 5.2% of the variance in *internal-business-process perspective performance.* The positive standardized beta value (β = .228) symbolized a positive relationship between the variables. Based on a significant relationship between the explanatory and dependent variable, hierarchical regression analyses showed H_{4e} was supported. The result of the regression analysis for H_{4e} is summarized in Table 4-127. The best explanatory model found was:

Internal-Business-Process Perspective Performance = 22.88 (*Constant*) + 2.64 (*Offering Alliance Training Programs Dummy Variable*) + ε

Table 4-127

Summarized Hierarchical Multiple Regression Analysis of Organizational Characteristics Alliance Training Programs as a Variable Explaining Internal-Business-Process Perspective Performance with the Alliance, N = 150

Variable	*F*	*df*	*p*	*B*	*SE*	*β*	*t*	*p*	R^2	Adj. R^2
Model 1	8.146	1	.005						.052	.046
(Constant)				22.875	.556		41.162	.000		
Alliance Training Programs: Yes				2.644	.926	.228	2.854	.005		

H4f: Organizational Characteristics and Learning and Growth Perspective

H_{4f}: Organizational characteristics are significant explanatory variables of the *learning and growth perspective with the alliance* in the construction industry.

Organizational characteristics categorical variables of U.S. region, type of location area, new contracts, and alliance training programs showed no significant *eta* correlations with *learning and growth perspective performance*, and thus, those variables were not included in either the Pearson *r* or regression analyses. The results of *eta* correlations using the means procedure in SPSS are shown in Table 4-128.

Table 4-128

Eta Correlations of the Categorical Variables with the Variable of Learning and Growth Perspective Performance, N = 150

Categorical Variables	Eta (η)	Eta Squared ($\eta 2$)	*F*	*p* value
Correlations with Learning & Growth Perspective				
U.S. Region	.180	.033	1.219	.305
Type of Location Area	.090	.008	.606	.547
New Contracts	.012	.000	.020	.887
Alliance Training Programs	.093	.009	1.290	.258

In addition to there being no significant or trend *eta* correlations among categorical variables and *learning and growth perspective performance*, *organizational characteristics* variables of number of employees, number of U.S. offices, number of foreign offices, and total revenue showed no significant or trend Pearson *r* correlations with *learning and growth perspective performance*. Based on the small sample size and the lack of significant or trend relationships between the explanatory and dependent variables, hierarchical regression analysis was not conducted for H_{4f}. The results of Pearson *r* correlations of *organizational characteristics* variables of number of

employees, number of U.S. offices, number of foreign offices, and total revenue with *learning and growth perspective performance* are shown in Table 4-129.

Table 4-129

Pearson r Correlations of Dummy-Coded Variables, Organizational Characteristics Variables of U.S. Region, Type of Location Area, New Contracts, and Alliance Training Programs with Learning and Growth Perspective Performance, N = 150

Variable	Number of Employees	Number of U.S. Offices	Number of Foreign Offices	Total Revenue
Learning & Growth Perspective				
Pearson *r*	-.083	-.057	-.085	-.101
p	.315	.488	.299	.219

H4g: Organizational Characteristics and Success of the Alliances (Total Score)

H_{4g}: Organizational characteristics are significant explanatory variables of *success of the alliance (total score)* in the construction industry.

Organizational characteristics categorical variables of U.S. region, type of location area, and new contracts showed no significant *eta* correlations with *success of the alliance (total score)*, and thus, those variables were not included in either the Pearson *r* or regression analyses. Alliance training programs did have a significant eta correlation ($\eta = .181$, $F = 5.018$, $p = .027$) with *success of the alliance (total score)*. The results of *eta* correlations using the means procedure in SPSS are shown in Table 4-130.

Table 4-130

Eta Correlations of the Categorical Variables with the Variable of Success of the Alliances (Total Score), N = 150

Categorical Variables	Eta (η)	Eta Squared ($\eta 2$)	*F*	*p* value
Correlations with Alliance Performance (Total Scale)				
U.S. Region	.107	.012	.423	.792
Type of Location Area	.082	.007	.495	.611
New Contracts	.095	.009	1.353	.247
Alliance Training Programs	.181	.033	**5.018**	**.027**

Following the results from *eta* correlations, two dummy variables were created for alliance training programs, and these dummy variables were included in the Pearson *r* correlation analysis of *organizational characteristics* variables of number of employees, number of U.S. offices, number of foreign offices, and total revenue with *success of the alliance (total score)*. Results of Pearson *r* correlations of the dummy coded variables for alliance training programs showed a positive, significant correlation between construction managers with alliance training programs ($r = .181$, $p = .027$) and *success of the alliance (total score)*, as well as an inverse relationship between construction managers with no alliance training programs ($r = -.181$, $p = .027$) and *success of the alliance (total score)*. The inverse relationship indicated that construction managers without alliance training programs obtained a lower level of *success of the alliance (total score)*. Whether offering alliance training programs in respondents' business units was dichotomous (i.e., yes/no question) and only one of this categorical variable was enter into a regression model. The results of Pearson *r* correlations of alliance training programs dummy coded variables, *organizational characteristics* variables of number of employees, number of

U.S. offices, number of foreign offices, and total revenue with *success of the alliance (total score)* are shown in Table 4-131.

Table 4-131

Pearson r Correlations of Dummy-Coded Variables, Organizational Characteristics Variables of U.S. Region, Type of Location Area, New Contracts, and Alliance Training Programs with Success of the Alliances (Total Score), N = 150

Variable	Alliance Training Programs		Number of Employees	Number of U.S. Offices	Number of Foreign Offices	Total Revenue
	Yes	No				
Alliance Performance (Total Scale)						
Pearson *r*	**.181**	**-.181**	.003	.007	-.014	-.010
p	**.027**	**.027**	.968	.929	.861	.900

Simple regression analysis was used to test significant and trend explanatory variables in H_{4g} to determine the best explanatory model of the relationship between alliance training programs and *success of the alliance (total score)*. One model was produced from the simple regression result. The VIF values of the model were all well below 10 and the tolerance statistics all well above .2, thus multicollinearity was not a problem. Model 1 did have a significant F value ($F = 5.018$, $p = .027$). A significant explanatory relationship was found between the variable *organizational characteristics* alliance training programs and *success of the alliance (total score)*, indicating that the construction managers whose business units provided alliance training programs obtained a higher level of *success of the alliance (total score)* than those with no alliance training programs. Model 1 produced the adjusted R^2 of 2.6% and the R^2 indicated age accounted

for 3.3% of the variance in *success of the alliance (total score).* The positive standardized beta value (β = .181) symbolized a positive relationship between the variables. Based on a significant relationship between the explanatory and dependent variable, hierarchical regression analyses showed H_{4g} was supported. The result of the regression analysis for H_{4g} is summarized in Table 4-132. The best explanatory model found was:

Success of the Alliance (Total Score) = 97.15 (*Constant*) + 7.02 (*Offering Alliance Training Programs Dummy Variable*) + ε

Table 4-132

Summarized Hierarchical Multiple Regression Analysis of Organizational Characteristics Alliance Training Programs as a Variable Explaining Success of the Alliances (Total Score) with the Alliance, N = 150

Variable	*F*	*df*	*p*	*B*	*SE*	*β*	*t*	*p*	R^2	Adj. R^2
Model 1	5.018	1	.027						.033	.026
(Constant)				97.146	1.880		51.661	.000		
Alliance Training Programs: Yes				7.021	3.134	.181	2.240	.027		

Hypothesis 5: Dimensions of Alliances and Success of the Alliances

Dimensions of alliances (attributes of the alliance, communication behavior, conflict resolution techniques, and commodity/supplier selection process) are significant explanatory variables of the success of the alliance (satisfaction, adjusted satisfaction, financial perspective, customer perspective, internal-business-process perspective, and learning and growth perspective) in the construction industry.

The goal of this hypothesis was to test whether establishing strategic alliances (dimensions of alliances) did in fact reflect the organizational performance (success of the alliance) in the construction companies based on the previous Mohr and Spekman model (1994), the Monczka et al. model (1998), and the Kauser and Shaw model (2004) in manufacturing companies. Seven sets of analyses were conducted, one for each of the sub-hypotheses: H4a *satisfaction with the alliance*, H4b *adjusted satisfaction with the alliance*, H4c *financial perspective performance*, H4d *customer perspective performance*, H4e *internal-business-process perspective performance*, H4f *learning and growth perspective performance*, and H4g *success of alliances total score*. Eta correlations were not tested and dummy variables were not created in each sub-hypotheses of this study because there were no dimensions of alliances categorical variables.

H5a: Dimensions of Alliances and Satisfaction

H_{5a}: Dimensions of alliance are significant explanatory variables of *satisfaction with the alliance* in the construction industry.

Attributes of the alliance (trust & coordination, commitment from the least and the most successful alliance, and interdependence), *communication behavior* (information quality from the least and the most successful alliance, information sharing, information participation, and proprietary information sharing), *conflict resolution techniques* (avoidance & constructive and destructive), and *commodity/supplier selection process* were correlated with *satisfaction with the alliance* based on past success using Pearson *r*. Results of Pearson *r* analyses showed significant correlations between *attributes of the alliance* trust & coordination ($r = .636$, $p = .000$) and commitment from the most successful alliance ($r = .453$, $p = .000$) with *satisfaction with the alliance*. There was also

a trend relationship between *attributes of the alliance* commitment from the least successful alliance ($r = .135, p = .099$) with *satisfaction with the alliance*. The results of Pearson *r* correlations of *attributes of the alliance* (trust & coordination, commitment from the least and the most successful alliance, and interdependence), and the dependent variable *satisfaction with the alliance* are shown in Table 4-133.

Table 4-133

Pearson r Correlations of Dimensions of Alliances Variables of Attributes of the Alliance (Trust & Coordination, Commitment from the Most/Least Successful Alliance, and Interdependence) with Satisfaction, N = 150

Variable	Attributes of the Alliance			
	Trust & Coordination	Commitment (the Least)	Commitment (the Most)	Interdependence
Satisfaction				
Pearson *r*	**.636**	**.135**	**.453**	-.034
p	**.000**	**.099**	**.000**	.677

Communication behavior (information quality from the most successful alliance, information sharing, information participation, and proprietary information sharing), *conflict resolution techniques* (avoidance & constructive and destructive), and *commodity/supplier selection process* had significant Pearson r correlations with *satisfaction with the alliance* based on past success. Destructive c*onflict resolution techniques* had an inverse relation ($r = -.370, p = .000$) with *satisfaction*, indicating that the more destructive c*onflict resolution techniques* the construction alliance managers used, the lower the *satisfaction with the alliance* they experienced. While avoidance & constructive had a positive relationship ($r = .411, p = .000$) with *satisfaction*, indicating

that the more avoidance & constructive c*onflict resolution techniques* the construction alliance managers employed, the more the *satisfaction with the alliance* they felt. The results of Pearson *r* correlations of *communication behavior* (information quality from the most and the least successful alliance, information sharing, information participation, and proprietary information sharing), *conflict resolution techniques* (avoidance & constructive and destructive), *commodity/supplier selection process*, and the dependent variable *satisfaction with the alliance* are shown in Table 4-134.

Table 4-134

Pearson r Correlations of Dimensions of Alliances Variables of Communication Behavior (Information Quality from the Most/Least Successful Alliance, Information Sharing, Information Participation, and Proprietary Information Sharing), Conflict Resolution Techniques (Avoidance & Constructive and Destructive), and Commodity/Supplier Selection Process with Satisfaction, N = 150

Variable	Communication Behavior					Conflict Resolution Techniques		Commodity/Supplier Selection Process
	Information Quality (the Least)	Information Quality (the Most)	Information Sharing	Information Participation	Proprietary Information Sharing	Avoidance & Constructive	Destructive	
Satisfaction								
Pearson *r*	-.019	**.439**	**.468**	**.525**	**.203**	**.411**	**-.370**	**.411**
p	.821	**.000**	**.000**	**.000**	**.013**	**.000**	**.000**	**.000**

Significant and trend variables from the Pearson *r* analysis were entered into a hierarchical regression model in order of significance from the strongest to the weakest. Variables with the same significance level were organized hierarchy based on the strength of the Pearson correlation value. There were 10 predictors entered into the regression model. Because only nine separate blocks exist for hierarchical regression in SPSS 17.0, the two weakest variables (proprietary information sharing and commitment from the least successful alliance) were entered into the last block simultaneously. Nine different models were produced from the hierarchical (enter) regression results. The VIF values of these nine models were all well below 10 (ranging from 1.214 to 2.930) and the tolerance statistics all well above .2 (ranging from .341 to .824), thus multicollinearity was not a problem.

All nine of the models produced significant *F* values, testing for the significance of R^2, which is the significance of the regression model as a whole. Model 8 with eight explanatory variables including two variables from *attributes of the alliance* (trust & coordination and commitment from the most successful alliance), four variables from *communication behavior* (information quality from the most successful alliance, information sharing, information participation, and proprietary information sharing), entire *conflict resolution techniques* (avoidance & constructive and destructive), and *commodity/supplier selection process* was the best explanatory model to explain the *satisfaction with the alliance* based on past success ($F = 20.374$, $p = .000$). As shown in Table 4-135, the R^2 increased with each entry of a variable into the model and the adjusted R^2 increased with each new model, except for Model 3 (information sharing), Model 5 (information quality from the most successful alliance), and Model 9

(proprietary information sharing). Model 8 produced the highest R^2 of 53.6% and an adjusted R^2 of 51%. Model 9 also produced a R^2 of 53.9%; however, the model was not considered as the best explanatory model since the adjusted R^2 decreased to 50.6%. As a result, Model 8 was selected as the best explanatory model for predicting *satisfaction with the alliance*. The best explanatory model found was:

Satisfaction with the Alliance = 2.93 (*Constant*) + .69 (*Trust & Coordination*) + .08 (*Information Participation*) – .06 (*Information Sharing*) + .31 (*Commitment from the Most Successful Alliance*) – .11 (*Information Quality from the Most Successful Alliance*) + .28 (*Avoidance & Constructive Conflict Resolution Techniques*) + .13 (*Commodity/Supplier Selection Process*) – .42 (*Destructive Conflict Resolution Techniques*) + ε

To analyze the individual predictors in Model 8, the *t*-statistic, which is the ratio of the regression coefficient to its standard error (*B/SE*), was significant for four of the eight predictor variables based on *t*-test results. In terms of explaining the relationship between *satisfaction with the alliance* and the predictor variables in Model 8, the order of importance according to the standardized beta coefficient (β) was: trust & coordination (t = 4.259, p = .000, β = .412), destructive conflict resolution techniques (t = -3.942, p = .000, β = -.249), commitment from the most successful alliance (t = 3.512, p = .001, β = .227), avoidance & constructive conflict resolution techniques (t = 2.824, p = .005, β = .194), information quality from the most successful alliance (t = -1.426, p = .156, β = -.119), information participation (t = 1.050, p = .296, β = .094), *commodity/supplier selection process* (t = .893, p = .373, β = .066), and information sharing (t = -.596, p

= .552, β = -.052). Results of the regression analyses showed H_{5a} was supported. Table 4-135 displays the results of hierarchical multiple regression for H_{5a}.

Table 4-135

Summarized Hierarchical Multiple Regression Analysis of the Explanatory Variables and Satisfaction, N = 150

Model	*F*	*p*	*df*	*B*	*SE*	*β*	*t*	*p*	R^2	Adj. R^2
Model 1	100.305	.000	1						.404	.400
Model 2	54.198	.000	2						.424	.417
Model 3	35.946	.000	3						.425	.413
Model 4	31.507	.000	4						.465	.450
Model 5	25.230	.000	5						.467	.448
Model 6	22.016	.000	6						.480	.458
Model 7	19.108	.000	7						.485	.460
Model 8	20.374	.000	8						.536	.510
(Constant)				2.927	2.156		1.358	.177		
Trust & Coordination				.688	.162	.412	4.259	.000		
Information Participation				.084	.080	.094	1.050	.296		
Information Sharing				-.058	.097	-.052	-.596	.552		
Commitment (from the Most Successful Alliance)				.305	.087	.227	3.512	.001		
Information Quality (from the Most Successful Alliance)				-.112	.078	-.119	-1.426	.156		
Avoidance & Constructive Conflict Resolution Techniques				.284	.101	.194	2.824	.005		
Commodity/Supplier Selection Process				.129	.145	.066	.893	.373		
Destructive Conflict Resolution Techniques				-.423	.107	-.249	-3.942	.000		
Model 9	16.242	.000	10						.539	.506

H5b: Dimensions of Alliances and Adjusted Satisfaction

H_{5b}: Dimensions of alliance are significant explanatory variables of the *adjusted satisfaction with the alliance* in the construction industry.

Attributes of the alliance (trust & coordination, commitment from the least and the most successful alliance, and interdependence), *communication behavior* (information quality from the least and the most successful alliance, information sharing, information participation, and proprietary information sharing), *conflict resolution techniques* (avoidance & constructive and destructive), and *commodity/supplier selection process* were correlated with *adjusted satisfaction with the alliance* based on success difference using Pearson *r*. Results of Pearson *r* analyses showed significant correlations between *attributes of the alliance* trust & coordination ($r = .251$, $p = .002$), interdependence ($r = .165$, $p = .044$), and commitment from the least successful alliance ($r = .162$, $p = .048$) with *adjusted satisfaction with the alliance*. The results of Pearson *r* correlations of *attributes of the alliance* (trust & coordination, commitment from the least and the most successful alliance, and interdependence), and the dependent variable *adjusted satisfaction with the alliance* are shown in Table 4-136.

Table 4-136

Pearson r Correlations of Dimensions of Alliances Variables of Attributes of the Alliance (Trust & Coordination, Commitment from Most/Least Successful Alliance, and Interdependence) with Adjusted Satisfaction, N = 150

Variable	Attributes of the Alliance			
	Trust & Coordination	Commitment (the Least)	Commitment (the Most)	Interdependence
Adjusted Satisfaction				
Pearson *r*	**.251**	**.162**	.037	**.165**
p	**.002**	**.048**	.654	**.044**

Communication behavior (information quality from the most successful alliance and information participation) had significant Pearson r correlations with *adjusted satisfaction with the alliance* based on success difference. *Conflict resolution techniques* (avoidance & constructive), and *commodity/supplier selection process* showed a trend relationship with *adjusted satisfaction with the alliance.* The significant and trend variables in order of the strongest to the weakest correlation coefficients were: information participation (r = .234, p = .004), information quality from the most successful alliance (r = .231, p = .005), *commodity/supplier selection process* (r = .165, p = .077), and avoidance & constructive *conflict resolution techniques* (r = .138, p = .091). The results of Pearson r correlations of *communication behavior* (information quality from the most and the least successful alliance, information sharing, information participation, and proprietary information sharing), *conflict resolution techniques* (avoidance & constructive and destructive), *commodity/supplier selection process*, and the dependent variable *adjusted satisfaction with the alliance* are shown in Table 4-137.

Table 4-137

Pearson r Correlations of Dimensions of Alliances Variables of Communication Behavior (Information Quality from the Most/Least Successful Alliance, Information Sharing, Information Participation, and Proprietary Information Sharing), Conflict Resolution Techniques (Avoidance & Constructive and Destructive), and Commodity/Supplier Selection Process with Adjusted Satisfaction, N = 150

Variable	Communication Behavior					Conflict Resolution Techniques		Commodity/Supplier Selection Process
	Information Quality (the Least)	Information Quality (the Most)	Information Sharing	Information Participation	Proprietary Information Sharing	Avoidance & Constructive	Destructive	
Adjusted Satisfaction								
Pearson *r*	.052	**.231**	.107	**.234**	-.007	**.138**	-.027	**.165**
p	.525	**.005**	.191	**.004**	.933	**.091**	.741	**.077**

Significant and trend variables from the Pearson *r* analysis were entered into a hierarchical regression model in order of significance from the strongest to the weakest. Variables with the same significance level were organized hierarchy based on the strength of the Pearson correlation value. There were 7 predictors entered into the regression model. Seven different models were produced from the hierarchical (enter) regression results. The VIF values of these nine models were all well below 10 (ranging from 1.071 to 2.604) and the tolerance statistics all well above .2 (ranging from .384 to .934), thus multicollinearity was not a problem.

All seven of the models produced significant *F* values, testing for the significance of R^2, which is the significance of the regression model as a whole. Model 5 with five explanatory variables including three variables from *attributes of the alliance* (trust & coordination, commitment from the least successful alliance, and interdependence), two variables from *communication behavior* (information quality from the most successful alliance and information participation) was the best explanatory model to explain the *adjusted satisfaction with the alliance* based on success difference ($F = 3.222$, $p = .009$). With each entry of a variable into the model as shown in Table 4-138, the R^2 increased in Model 1 through Model 7. The adjusted R^2 increased with each new model in the first five of seven models, except for Model 3 (information quality from the most successful alliance), which had a decreased R^2 (5.7%), and then began to decrease in Model 6 and 7. Model 5 produced the R^2 of 10.1% and the highest adjusted R^2 of 6.9%. Although Model 7 had the highest R^2 (10.2%), the increase in R^2 from Model 6 to Model 7 (0.1%) was less than the decrease in adjusted R^2 between Model 6 and Model 7 (0.7%). As a result,

Model 5 was selected as the best explanatory model for predicting *adjusted satisfaction with the alliance*. The best explanatory model found was:

Adjusted Satisfaction with the Alliance = -1.70 (*Constant*) + .04 (*Trust & Coordination*) + .02 (*Information Participation*) + .01 (*Information Quality from the Most Successful Alliance*) + .04 (*Interdependence*) + .03 (*Commitment from the Most Successful Alliance*) + ε

The *t*-statistic, which is the ratio of the regression coefficient to its standard error (*B/SE*), was used to analyze the individual predictors in Model 5. Analysis of individual predictors indicated none of the five predictors and constant were significant with *adjusted satisfaction with the alliance*. The standardized beta coefficient (β) for each of the five non-significant predictors indicated their relative importance in explaining *adjusted satisfaction with the alliance*. In terms of explaining the relationship between *adjusted satisfaction with the alliance* and the predictor variables in Model 5, the order of importance according to the standardized beta coefficient (β) was: interdependence (t = 1.396, p = .165, β = .115), trust & coordination (t = .923, p = .358, β = .115), commitment from the least successful alliance (t = 1.219, p = .225, β = .101), information participation (t = .867, p = .387, β = .094), and information quality from the most successful alliance (t = .547, p = .585, β = .062). Results of the regression analyses showed H_{5b} was partially supported. Table 4-138 displays the results of hierarchical multiple regression for H_{5b}.

Table 4-138

Summarized Hierarchical Multiple Regression Analysis of the Explanatory Variables and Adjusted Satisfaction, N = 150

Model	*F*	*p*	*df*	*B*	*SE*	*β*	*t*	*p*	R^2	Adj. R^2
Model 1	9.913	.002	1						.063	.056
Model 2	5.645	.004	2						.071	.059
Model 3	3.990	.009	3						.076	.057
Model 4	3.644	.007	4						.091	.066
Model 5	3.222	.009	5						.101	.069
(Constant)				-1.702	.489		-3.481	.001		
Trust & Coordination				.036	.039	.115	.923	.358		
Information Participation				.016	.018	.094	.867	.387		
Information Quality (from the Most Successful Alliance)				.011	.020	.062	.547	.585		
Interdependence				.043	.031	.115	1.396	.165		
Commitment (from the Least Successful Alliance)				.026	.021	.101	1.219	.225		
Model 6	2.691	.017	6						.101	.064
Model 7	2.296	.030	7						.102	.057

H5c: Dimensions of Alliances and Financial Perspective

H_{5c}: Dimensions of alliance are significant explanatory variables of the *financial perspective with the alliance* in the construction industry.

Attributes of the alliance (trust & coordination, commitment from the least and the most successful alliance, and interdependence), *communication behavior* (information quality from the least and the most successful alliance, information sharing, information participation, and proprietary information sharing), *conflict resolution techniques* (avoidance & constructive and destructive), and *commodity/supplier selection process* were correlated with *financial perspective performance* using Pearson *r*. Results of

Pearson *r* analyses showed significant correlations between *attributes of the alliance* trust & coordination ($r = .532$, $p = .000$), commitment from the most successful alliance ($r = .416$, $p = .000$), and commitment from the least successful alliance ($r = .260$, $p = .001$) with *financial perspective performance.* The results of Pearson *r* correlations of *attributes of the alliance* (trust & coordination, commitment from the least and the most successful alliance, and interdependence), and the dependent variable *financial perspective performance* are shown in Table 4-139.

Table 4-139

Pearson r Correlations of Dimensions of Alliances Variables of Attributes of the Alliance (Trust & Coordination, Commitment from the Most/Least Successful Alliance, and Interdependence) with Financial Perspective Performance, N = 150

Variable	Attributes of the Alliance			
	Trust & Coordination	Commitment (the Least)	Commitment (the Most)	Interdependence
Financial Perspective				
Pearson *r*	**.532**	**.260**	**.416**	.046
p	**.000**	**.001**	**.000**	.578

Communication behavior (information quality from the most successful alliance, information sharing, information participation, and proprietary information sharing), *conflict resolution techniques* (avoidance & constructive and destructive), and *commodity/supplier selection process* had significant Pearson r correlations with *financial perspective performance. Communication behavior* information quality from the least successful alliance showed a trend relationship with *financial perspective*

performance. The significant and trend variables in order of the strongest to the weakest correlation coefficients were: information participation (r = .594, p = .000), information sharing (r = .577, p = .000), *commodity/supplier selection process* (r = .568, p = .000), information quality from the most successful alliance (r = .527, p = .000), avoidance & constructive *conflict resolution techniques* (r = .402, p = .000), proprietary information sharing (r = .351, p = .000), destructive *conflict resolution techniques* (r = -238, p = .003, inverse), and information quality from the least successful alliance (r = .135, p = .099). The results of Pearson r correlations of *communication behavior* (information quality from the most and the least successful alliance, information sharing, information participation, and proprietary information sharing), *conflict resolution techniques* (avoidance & constructive and destructive), *commodity/supplier selection process*, and the dependent variable *financial perspective performance* are shown in Table 4-140.

Table 4-140

Pearson r Correlations of Dimensions of Alliances Variables of Communication Behavior (Information Quality from the Most/Least Successful Alliance, Information Sharing, Information Participation, and Proprietary Information Sharing), Conflict Resolution Techniques (Avoidance & Constructive and Destructive), and Commodity/Supplier Selection Process with Financial Perspective Performance, N = 150

Variable	Communication Behavior					Conflict Resolution Techniques		Commodity/Supplier Selection Process
	Information Quality (the Least)	Information Quality (the Most)	Information Sharing	Information Participation	Proprietary Information Sharing	Avoidance & Constructive	Destructive	
Financial Perspective								
Pearson *r*	**.135**	**.527**	**.577**	**.594**	**.351**	**.402**	**-.238**	**.568**
p	**.099**	**.000**	**.000**	**.000**	**.000**	**.000**	**.003**	**.000**

Significant and trend variables from the Pearson *r* analysis were entered into a hierarchical regression model in order of significance from the strongest to the weakest. Variables with the same significance level were organized hierarchy based on the strength of the Pearson correlation value. There were 11 predictors entered into the regression model. Because only nine separate blocks exist for hierarchical regression in SPSS 17.0, the three weakest variables (commitment from the least successful alliance, destructive *conflict resolution techniques*, and information quality from the least successful alliance) were entered into the last block simultaneously. Nine different models were produced from the hierarchical (enter) regression results. The VIF values of these nine models were all well below 10 (ranging from 1.265 to 3.062) and the tolerance statistics all well above .2 (ranging from .327 to .791), thus multicollinearity was not a problem.

All nine of the models produced significant *F* values, testing for the significance of R^2, which is the significance of the regression model as a whole. Model 9 with eleven explanatory variables including three variables from *attributes of the alliance* (trust & coordination and commitment from the most/least successful alliance), five variables from *communication behavior* (information quality from the most/least successful alliance, information sharing, information participation, and proprietary information sharing), two from *conflict resolution techniques* (avoidance & constructive and destructive), and *commodity/supplier selection process* was the best explanatory model to explain the *financial perspective performance* ($F = 14.174$, $p = .000$). With each entry of a variable into the model as shown in Table 4-141, the R^2 increased in Model 1 through Model 9. The adjusted R^2 increased with each new model in the first seven of nine

models, except for Model 8 (proprietary information sharing), which had a decreased adjusted R^2 (48.4%), and then began to increase in Model 9. Model 9 produced the highest R^2 of 53% and the highest adjusted R^2 of 49.3%. As a result, Model 9 was selected as the best explanatory model for predicting *financial perspective performance*. The best explanatory model found was:

Financial Perspective Performance = 2.73 (*Constant*) + .10 (*Information Participation*) + .13 (*Information Sharing*) + .29 (*Commodity/Supplier Selection Process*) – .005 (*Trust & Coordination*) + .12 (*Information Quality from the Most Successful Alliance*) + .12 (*Commitment from the Most Successful Alliance*) + .17 (*Avoidance & Constructive Conflict Resolution Techniques*) + .14 (*Proprietary Information Sharing*) + .16 (*Commitment from the Least Successful Alliance*) – .16 (*Destructive Conflict Resolution Techniques*) – .02 (*Information Quality from the Least Successful Alliance*) + ε

The *t*-statistic, which is the ratio of the regression coefficient to its standard error (*B/SE*), was used to analyze the individual predictors in Model 9. Analysis of individual predictors indicated one of the eleven predictors was significant with *financial perspective performance*. The standardized beta coefficient (β) for one significant predictor, three trend predictors, and the remaining seven predictors indicated their relative importance in explaining *financial perspective performance*. Commodity/supplier selection process (t = 2.314, p = .022, β = .181) was the most important predictor in the model. The second most important predictor was information quality from the most successful alliance (t = 1.746, p = .083, β = .149). The third most important predictor was commitment from the least successful alliance (t = 1.896, p =

.060, β = .143). While neither a significant nor trend predictor, information sharing was the fourth most important predictor (t = 1.556, p = .122, β = .143) in the model. The fifth most important variable was avoidance & constructive *conflict resolution techniques* (t = 1.944, p = .054, β = .138). Although not significant, the sixth most important predictor was information participation (t = 1.409, p = .161, β = .134). While neither a significant nor trend predictor, destructive *conflict resolution techniques* (t = -1.606, p = .111, β = -.111) was the seventh most important predictor in the model, and had an inverse relationship with *financial perspective performance*. The inverse relationship indicated that the more destructive *conflict resolution techniques* the construction alliance managers used, the lower *financial perspective performance* they experienced. Although not significant, the eighth and ninth most important predictors were commitment from the most successful alliance (t = 1.561, p = .121, β = .108) and proprietary information sharing (t = 1.205, p = .230, β = .086). The tenth most important predictor was information quality from the least successful alliance (t = -.487, p = .627, β = -.038) in the model. The inverse relationship indicated that the greater the information quality received from the least successful alliance by construction alliance managers, the lower the *financial perspective performance* they experienced. The eleventh and final predictor was trust & coordination (t = -.036, p = .972, β = -.004). The inverse relationship indicated that the more trust & coordination the construction alliance managers felt, the lower the *financial perspective performance* they experienced. Results of the regression analyses showed H_{5c} was supported. Table 4-141 displays the results of hierarchical multiple regression for H_{5c}.

Table 4-141

Summarized Hierarchical Multiple Regression Analysis of the Explanatory Variables and Financial Perspective Performance, N = 150

Model	*F*	*p*	*df*	*B*	*SE*	*β*	*t*	*p*	R^2	Adj. R^2
Model 1	80.667	.000	1						.353	.348
Model 2	51.089	.000	2						.410	.402
Model 3	41.413	.000	3						.460	.449
Model 4	32.227	.000	4						.471	.456
Model 5	27.158	.000	5						.485	.467
Model 6	24.048	.000	6						.502	.481
Model 7	21.034	.000	7						.509	.485
Model 8	18.486	.000	8						.512	.484
Model 9	14.174	.000	11						.530	.493
(Constant)				2.727	1.845		1.478	.142		
Information Participation				.099	.070	.134	1.409	.161		
Information Sharing				.131	.084	.143	1.556	.122		
Commodity/Supplier Selection Process				.292	.126	.181	2.314	.022		
Trust & Coordination				-.005	.142	-.004	-.036	.972		
Information Quality (from the Most Successful Alliance)				.116	.067	.149	1.746	.083		
Commitment (from the Most Successful Alliance)				.120	.077	.108	1.561	.121		
Avoidance & Constructive Conflict Resolution Techniques				.168	.086	.138	1.944	.054		
Proprietary Information Sharing				.137	.114	.086	1.205	.230		
Commitment (from the Least Successful Alliance)				.162	.085	.143	1.896	.060		
Destructive Conflict Resolution Techniques				-.157	.098	-.111	-1.606	.111		
Information Quality (from the Least Successful Alliance)				-.023	.048	-.038	-.487	.627		

H5d: Dimensions of Alliances and Customer Perspective

H_{5d}: Dimensions of alliance are significant explanatory variables of the *customer perspective with the alliance* in the construction industry.

Attributes of the alliance (trust & coordination, commitment from the least and the most successful alliance, and interdependence), *communication behavior* (information quality from the least and the most successful alliance, information sharing, information participation, and proprietary information sharing), *conflict resolution techniques* (avoidance & constructive and destructive), and *commodity/supplier selection process* were correlated with *customer perspective performance* using Pearson *r*. Results of Pearson *r* analyses showed significant correlations between *attributes of the alliance* trust & coordination ($r = .558$, $p = .000$), commitment from the most successful alliance ($r = .437$, $p = .000$), and commitment from the least successful alliance ($r = .190$, $p = .020$) with *customer perspective performance*. The results of Pearson *r* correlations of *attributes of the alliance* (trust & coordination, commitment from the least and the most successful alliance, and interdependence), and the dependent variable *customer perspective performance* are shown in Table 4-142.

Table 4-142

Pearson r Correlations of Dimensions of Alliances Variables of Attributes of the Alliance (Trust & Coordination, Commitment from the Most/Least Successful Alliance, and Interdependence) with Customer Perspective Performance, N = 150

Variable	Attributes of the Alliance			
	Trust & Coordination	Commitment (the Least)	Commitment (the Most)	Interdependence
Customer Perspective				
Pearson *r*	**.558**	**.190**	**.437**	.072
p	**.000**	**.020**	**.000**	.384

Communication behavior (information quality from the most successful alliance, information sharing, information participation, and proprietary information sharing), *conflict resolution techniques* (avoidance & constructive and destructive), and *commodity/supplier selection process* had significant Pearson r correlations with *customer perspective performance.* The significant and trend variables in order of the strongest to the weakest correlation coefficients were: information participation (r = .599, p = .000), information sharing (r = .588, p = .000), information quality from the most successful alliance (r = .586, p = .000), *commodity/supplier selection process* (r = .550, p = .000), avoidance & constructive *conflict resolution techniques* (r = .385, p = .000), proprietary information sharing (r = .325, p = .000), and destructive *conflict resolution techniques* (r = -.282, p = .000, inverse). The results of Pearson *r* correlations of *communication behavior* (information quality from the most and the least successful alliance, information sharing, information participation, proprietary information sharing), *conflict resolution techniques* (avoidance & constructive and destructive),

commodity/supplier selection process, and the dependent variable *customer perspective performance* are shown in Table 4-143.

Table 4-143

Pearson r Correlations of Dimensions of Alliances Variables of Communication Behavior (Information Quality from the Most/Least Successful Alliance, Information Sharing, Information Participation, and Proprietary Information Sharing), Conflict Resolution Techniques (Avoidance & Constructive and Destructive), and Commodity/Supplier Selection Process with Customer Perspective Performance, N = 150

Variable	Communication Behavior					Conflict Resolution Techniques		Commodity/Supplier Selection Process
	Information Quality (the Least)	Information Quality (the Most)	Information Sharing	Information Participation	Proprietary Information Sharing	Avoidance & Constructive	Destructive	
Customer Perspective								
Pearson *r*	.081	**.586**	**.588**	**.599**	**.325**	**.385**	**-.282**	**.550**
p	.322	**.000**	**.000**	**.000**	**.000**	**.000**	**.000**	**.000**

Significant and trend variables from the Pearson *r* analysis were entered into a hierarchical regression model in order of significance from the strongest to the weakest. Variables with the same significance level were organized in a hierarchy based on the strength of the Pearson correlation value. There were 10 predictors entered into the regression model. As only nine separate blocks exist for hierarchical regression in SPSS 17.0, the two weakest variables (commitment from the least successful alliance and destructive *conflict resolution techniques*) were entered into the last block simultaneously. Nine different models were produced from the hierarchical (enter) regression results. The VIF values of these nine models were all well below 10 (ranging from 1 to 2.930) and the tolerance statistics all well above .2 (ranging from .363 to 1), thus multicollinearity was not a problem.

All nine of the models produced significant *F* values, testing for the significance of R^2, which is the significance of the regression model as a whole. Model 6 with ten explanatory variables including two variables from *attributes of the alliance* (trust & coordination and commitment from the most successful alliance), three variables from *communication behavior* (information quality from the most successful alliance, information sharing, and information participation), and *commodity/supplier selection process* was the best explanatory model to explain the *customer perspective performance* ($F = 27.111, p = .000$). With each entry of a variable into the model as shown in Table 4-144, the R^2 increased in Model 1 through Model 9. The adjusted R^2 increased with each new model in the first six of the nine models, except for Model 4 (trust & coordination), which had a slightly decreased adjusted R^2 (47.3%), and then began to decrease in Model 7 and Model 8. Although Model 9 produced the highest R^2 of 54.7% and the highest

adjusted R^2 of 54.1%, the adjusted R^2 in Model 7 through Model 9 were in floating condition. As a result, Model 6 was selected as the best explanatory model for predicting *customer perspective performance*. The best explanatory model found was:

> *Customer Perspective Performance* = -.66 (*Constant*) + .14 (*Information Participation*) + .19 (*Information Sharing*) + .23 (*Information Quality from the Most Successful Alliance*) + .03 (*Trust & Coordination*) + .36 (*Commodity/Supplier Selection Process*) + .21 (*Commitment from the Most Successful Alliance*) + ε

The *t*-statistic, which is the ratio of the regression coefficient to its standard error (*B/SE*), was used to analyze the individual predictors in Model 6. Analysis of individual predictors indicated four of the six predictors were significant with *customer perspective performance*. The standardized beta coefficient (β) for four significant predictors, one trend predictor, and one non-significant predictor indicated their relative importance in explaining *customer perspective performance*. Information quality from the most successful alliance ($t = 3.062$, $p = .003$, $\beta = .252$) was the most important predictor in the model. The second most important predictor was commodity/supplier selection process ($t = 2.560$, $p = .011$, $\beta = .188$). The third most important predictor was information sharing ($t = 1.992$, $p = .048$, $\beta = .172$). Information participation ($t = 1.834$, $p = .069$, $\beta = .164$) was the fourth most important predictor in the model. The fifth most important variable was commitment from the most successful alliance ($t = 2.517$, $p = .013$, $\beta = .162$). Although not significant, trust & coordination ($t = .206$, $p = .837$, $\beta = .019$) was the sixth and final predictor in the model. Results of the regression analyses showed H_{5d}

was partially supported. Table 4-144 displays the results of hierarchical multiple regression for H_{5d}.

Table 4-144

Summarized Hierarchical Multiple Regression Analysis of the Explanatory Variables and Customer Perspective Performance, N = 150

Model	*F*	*p*	*df*	*B*	*SE*	*β*	*t*	*p*	R^2	Adj. R^2
Model 1	82.846	.000	1						.359	.355
Model 2	53.422	.000	2						.421	.413
Model 3	46.230	.000	3						.487	.477
Model 4	34.465	.000	4						.487	.473
Model 5	30.149	.000	5						.511	.494
Model 6	27.111	.000	6						.532	.513
(Constant)				-.656	1.822		-.360	.719		
Information Participation				.143	.078	.164	1.834	.069		
Information Sharing				.187	.094	.172	1.992	.048		
Information Quality (from the Most Successful Alliance)				.232	.076	.252	3.062	.003		
Trust & Coordination				.032	.153	.019	.206	.837		
Commodity/Supplier Selection Process				.358	.140	.188	2.560	.011		
Commitment (from the Most Successful Alliance)				.213	.084	.162	2.517	.013		
Model 7	23.285	.000	7						.534	.511
Model 8	20.277	.000	8						.535	.509
Model 9	16.776	.000	10						.547	.514

H5e: Dimensions of Alliances and Internal-Business-Process Perspective

H_{5e}: Dimensions of alliance are significant explanatory variables of the *internal-business-process perspective with the alliance* in the construction industry.

Attributes of the alliance (trust & coordination, commitment from the least and the most successful alliance, and interdependence), *communication behavior* (information quality from the least and the most successful alliance, information sharing, information participation, and proprietary information sharing), *conflict resolution techniques* (avoidance & constructive and destructive), and *commodity/supplier selection process* were correlated with *internal-business-process perspective performance* using Pearson *r*. Results of Pearson *r* analyses showed significant correlations between *attributes of the alliance* trust & coordination ($r = .427$, $p = .000$), commitment from the most successful alliance ($r = .414$, $p = .000$), and commitment from the least successful alliance ($r = .206$, $p = .011$) with *internal-business-process perspective performance*. The results of Pearson *r* correlations of *attributes of the alliance* (trust & coordination, commitment from the least and the most successful alliance, and interdependence), and the dependent variable *internal-business-process perspective performance* are shown in Table 4-145.

Table 4-145

Pearson r Correlations of Dimensions of Alliances Variables of Attributes of the Alliance (Trust & Coordination, Commitment from the Most/Least Successful Alliance, and Interdependence) with Internal-Business-Process Perspective Performance, N = 150

Variable	Attributes of the Alliance			
	Trust & Coordination	Commitment (the Least)	Commitment (the Most)	Interdependence
Internal-Business-Process Perspective				
Pearson *r*	**.427**	**.206**	**.414**	.130
p	**.000**	**.011**	**.000**	.113

Communication behavior (information quality from the most successful alliance, information sharing, information participation, and proprietary information sharing), *conflict resolution techniques* (avoidance & constructive), and *commodity/supplier selection process* had significant Pearson r correlations with *internal-business-process perspective performance*. The significant and trend variables in order of the strongest to the weakest correlation coefficients were: information quality from the most successful alliance (r = .484, p = .000), information sharing (r = .440, p = .000), information participation (r = .394, p = .000), *commodity/supplier selection process* (r = .385, p = .000), proprietary information sharing (r = .329, p = .000), and avoidance & constructive *conflict resolution techniques* (r = .311, p = .000). The results of Pearson r correlations of *communication behavior* (information quality from the most and the least successful alliance, information sharing, information participation, and proprietary information sharing), *conflict resolution techniques* (avoidance & constructive and destructive),

commodity/supplier selection process, and the dependent variable *internal-business-process perspective performance* are shown in Table 4-146.

Table 4-146

Pearson r Correlations of Dimensions of Alliances Variables of Communication Behavior (Information Quality from the Most/Least Successful Alliance, Information Sharing, Information Participation, and Proprietary Information Sharing), Conflict Resolution Techniques (Avoidance & Constructive and Destructive), and Commodity/Supplier Selection Process with Internal-Business-Process Perspective Performance, N = 150

Variable	Communication Behavior					Conflict Resolution Techniques		Commodity/Supplier Selection Process
	Information Quality (the Least)	Information Quality (the Most)	Information Sharing	Information Participation	Proprietary Information Sharing	Avoidance & Constructive	Destructive	
Internal-Business-Process Perspective								
Pearson *r*	.116	**.484**	**.440**	**.394**	**.329**	**.311**	-.100	**.385**
p	.157	**.000**	**.000**	**.000**	**.000**	**.000**	.224	**.000**

Significant and trend variables from the Pearson *r* analysis were entered into a hierarchical regression model in order of significance from the strongest to the weakest. Variables with the same significance level were organized in a hierarchy based on the strength of the Pearson correlation value. There were 9 predictors entered into the regression model. Nine different models were produced from the hierarchical (enter) regression results. The VIF values of these nine models were all well below 10 (ranging from 1.124 to 2.876) and the tolerance statistics all well above .2 (ranging from .348 to .889), thus multicollinearity was not a problem.

All nine of the models produced significant *F* values, testing for the significance of R^2, which is the significance of the regression model as a whole. Model 9 with nine explanatory variables including three variables from *attributes of the alliance* (trust & coordination and commitment from the most/least successful alliance), four variables from *communication behavior* (information quality from the most successful alliance, information sharing, information participation, and proprietary information sharing), one from *conflict resolution techniques* (avoidance & constructive), and *commodity/supplier selection process* was the best explanatory model to explain the *internal-business-process perspective performance* ($F = 8.972$, $p = .000$). With each entry of a variable into the model as shown in Table 4-147, the R^2 increased in Model 1 through Model 9. The adjusted R^2 increased with each new model in the first four of nine models, except for Model 3 (trust & coordination), which had a decreased adjusted R^2 (26.7%), and then began to increase in Model 6 through Model 9. Model 9 produced the highest R^2 of 36.6% and the highest adjusted R^2 of 32.5%. As a result, Model 9 was selected as the

best explanatory model for predicting *internal-business-process perspective performance.* The best explanatory model found was:

Internal-Business-Process Perspective Performance = 5.0 (*Constant*) + .29 (*Information Quality from the Most Successful Alliance*) + .20 (*Information Sharing*) + .09 (*Trust & Coordination*) + .30 (*Commitment from the Most Successful Alliance*) – .11 (*Information Participation*) + .12 (*Commodity/Supplier Selection Process*) + .34 (*Proprietary Information Sharing*) + .12 (*Avoidance & Constructive Conflict Resolution Techniques*) + .13 (*Commitment from the Least Successful Alliance*) + ε

The *t*-statistic, which is the ratio of the regression coefficient to its standard error (*B/SE*), was used to analyze the individual predictors in Model 9. Analysis of individual predictors indicated one of the nine predictors was significant with *internal-business-process perspective performance.* The standardized beta coefficient (β) for two significant predictors, one trend predictor, and the remaining six predictors indicated their relative importance in explaining *internal-business-process perspective performance.* Information quality from the most successful alliance ($t = 2.730$, $p = .007$, $\beta = .266$) was the most important predictor in the model. The second most important predictor was information quality from the most successful alliance ($t = 1.746$, $p = .083$, $\beta = .149$). While neither a significant nor trend predictor, information sharing was the third most important predictor ($t = 1.556$, $p = .122$, $\beta = .143$) in the model. The fourth most important variable was proprietary information sharing ($t = 1.902$, $p = .059$, $\beta = .153$). While neither a significant nor trend predictor, information participation ($t = -.979$, $p = .329$, $\beta = -.107$) was the fifth most important predictor in the model, and had an inverse

relationship with *internal-business-process perspective performance*. The inverse relationship indicated that the higher level of information participation, the lower the level of the *internal-business-process perspective performance*. Although not significant, the sixth and seventh most important predictors were commitment from the least successful alliance (t = 1.134, p = .259, β = .081) and avoidance & constructive *conflict resolution techniques* (t = .914, p = .362 β = .071). The eighth most important predictor was commodity/supplier selection process (t = .590, p = .556, β = .053) in the model. The ninth and final predictor was trust & coordination (t = .392, p = .695, β = .045). Results of the regression analyses showed H_{5e} was supported. Table 4-141 displays the results of hierarchical multiple regression for H_{5e}.

Table 4-147

Summarized Hierarchical Multiple Regression Analysis of the Explanatory Variables and Internal-Business-Process Perspective Performance, N = 150

Model	*F*	*p*	*df*	*B*	*SE*	*β*	*t*	*p*	R^2	Adj. R^2
Model 1	45.317	.000	1						.234	.229
Model 2	28.636	.000	2						.280	.271
Model 3	19.077	.000	3						.282	.267
Model 4	18.199	.000	4						.334	.316
Model 5	14.462	.000	5						.334	.311
Model 6	12.311	.000	6						.341	.313
Model 7	11.235	.000	7						.560	.325
Model 8	9.913	.000	8						.360	.324
Model 9	8.972	.000	9						.366	.325
(Constant)				.500	2.737		.183	.855		
Information Quality (from the Most Successful Alliance)				.289	.106	.266	2.730	.007		
Information Sharing				.204	.132	.159	1.551	.123		
Trust & Coordination				.086	.221	.045	.392	.695		
Commitment (from the Most Successful Alliance)				.301	.122	.194	2.461	.015		
Information Participation				-.110	.113	-.107	-.979	.329		
Commodity/Supplier Selection Process				.118	.200	.053	.590	.556		
Proprietary Information Sharing				.338	.178	.153	1.902	.059		
Avoidance & Constructive Conflict Resolution Techniques				.121	.132	.071	.914	.362		
Commitment (from the Least Successful Alliance)				.127	.112	.081	1.134	.259		

H5f: Dimensions of Alliances and Learning and Growth Perspective

H_{5f}: Dimensions of alliance are significant explanatory variables of the *learning and growth perspective with the alliance* in the construction industry.

Attributes of the alliance (trust & coordination, commitment from the least and the most successful alliance, and interdependence), *communication behavior* (information quality from the least and the most successful alliance, information sharing, information participation, and proprietary information sharing), *conflict resolution techniques* (avoidance & constructive and destructive), and *commodity/supplier selection process* were correlated with *learning and growth perspective performance* using Pearson *r*. Results of Pearson *r* analyses showed significant correlations between *attributes of the alliance* trust & coordination ($r = .462$, $p = .000$), commitment from the most successful alliance ($r = .345$, $p = .000$), and commitment from the least successful alliance ($r = .286$, $p = .000$) with *learning and growth perspective performance*. The results of Pearson *r* correlations of *attributes of the alliance* (trust & coordination, commitment from the least and the most successful alliance, and interdependence), and the dependent variable *learning and growth perspective performance* are shown in Table 4-148.

Table 4-148

Pearson r Correlations of Dimensions of Alliances Variables of Attributes of the Alliance (Trust & Coordination, Commitment from the Most/Least Successful Alliance, and Interdependence) with Learning and Growth Perspective Performance, N = 150

Variable	Attributes of the Alliance			
	Trust & Coordination	Commitment (the Least)	Commitment (the Most)	Interdependence
Learning & Growth Perspective				
Pearson *r*	**.462**	**.286**	**.345**	.031
p	**.000**	**.000**	**.000**	.706

Communication behavior (information quality from the most and the least successful alliance, information sharing, information participation, and proprietary information sharing), *conflict resolution techniques* (avoidance & constructive and destructive), and *commodity/supplier selection process* had significant Pearson r correlations with *learning and growth perspective performance.* The significant and trend variables in order of the strongest to the weakest correlation coefficients were: *commodity/supplier selection process* (r = .520, p = .000), information quality from the most successful alliance (r = .471, p = .000), information participation (r = .465, p = .000), information sharing (r = .434, p = .000), proprietary information sharing (r = .364, p = .000), avoidance & constructive *conflict resolution techniques* (r = .285, p = .000), destructive *conflict resolution techniques* (r = -.227, p = .005, inverse), and information quality from the least successful alliance (r = .186, p = .022). The results of Pearson *r* correlations of *communication behavior* (information quality from the most and the least successful alliance, information sharing, information participation, and proprietary

information sharing), *conflict resolution techniques* (avoidance & constructive and destructive), *commodity/supplier selection process*, and the dependent variable *learning and growth perspective performance* are shown in Table 4-149.

Table 4-149

Pearson r Correlations of Dimensions of Alliances Variables of Communication Behavior (Information Quality from the Most/Least Successful Alliance, Information Sharing, Information Participation, and Proprietary Information Sharing), Conflict Resolution Techniques (Avoidance & Constructive and Destructive), and Commodity/Supplier Selection Process with Learning and Growth Perspective Performance, N = 150

Variable	Communication Behavior					Conflict Resolution Techniques		Commodity/Supplier Selection Process
	Information Quality (the Least)	Information Quality (the Most)	Information Sharing	Information Participation	Proprietary Information Sharing	Avoidance & Constructive	Destructive	
Learning & Growth Perspective								
Pearson *r*	**.186**	**.471**	**.434**	**.465**	**.364**	**.285**	**-.227**	**.520**
p	**.022**	**.000**	**.000**	**.000**	**.000**	**.000**	**.005**	**.000**

Significant and trend variables from the Pearson *r* analysis were entered into a hierarchical regression model in order of significance from the strongest to the weakest. Variables with the same significance level were organized hierarchy based on the strength of the Pearson correlation value. There were 11 predictors entered into the regression model. As only nine separate blocks exist for hierarchical regression in SPSS 17.0, the two variables with similar significances (commitment from the most/least successful alliance) were grouped into the seventh block simultaneously and the other two variables with similar significances (avoidance & constructive and destructive *conflict resolution techniques*) were entered into the eighth block. Nine different models were produced from the hierarchical (enter) regression results. The VIF values of these nine models were all well below 10 (ranging from 1.124 to 3.062) and the tolerance statistics all well above .2 (ranging from .327 to .890), thus multicollinearity was not a problem.

All nine of the models produced significant *F* values, testing for the significance of R^2, which is the significance of the regression model as a whole. Model 8 with ten explanatory variables including three variables from *attributes of the alliance* (trust & coordination and commitment from the most/least successful alliance), four variables from *communication behavior* (information quality from the most successful alliance, information sharing, information participation, and proprietary information sharing), two from *conflict resolution techniques* (avoidance & constructive and destructive), and *commodity/supplier selection process* was the best explanatory model to explain the *learning and growth perspective performance* ($F = 14.174$, $p = .000$). With each entry of a variable into the model as shown in Table 4-150, the R^2 increased in Model 1 through

Model 9. The adjusted R^2 increased with each new model in Model 1 through Model 8. Although Model 9 produced the highest R^2 of 42.8%, the increase in R^2 between Model 8 and Model 9 (0.1%) was less than the decrease in adjusted R^2 between Model 8 and Model 9 (0.3%). As a result, Model 8 was selected as the best explanatory model for predicting *learning and growth perspective performance*. The best explanatory model found was:

Learning and Growth Perspective Performance = 2.33 (*Constant*) + .32 (*Commodity/Supplier Selection Process*) – .01 (*Information Participation*) – .02 (*Information Sharing*) + .14 (*Trust & Coordination*) + .11 (*Information Quality from the Most Successful Alliance*) + .25 (*Proprietary Information Sharing*) + .05 (*Commitment from the Most Successful Alliance*) + .18 (*Commitment from the Least Successful Alliance*) + .07 (*Avoidance & Constructive Conflict Resolution Techniques*) – .19 (*Destructive Conflict Resolution Techniques*) + ε

The *t*-statistic, which is the ratio of the regression coefficient to its standard error (*B/SE*), was used to analyze the individual predictors in Model 8. Analysis of individual predictors indicated four of the ten predictors were significant with *learning and growth perspective performance*. The standardized beta coefficient (β) for four significant predictors, one trend predictor, and the remaining five predictors indicated their relative importance in explaining *learning and growth perspective performance*. Commodity/supplier selection process (t = 2.703, p = .008, β = .321) was the most important predictor in the model. The second and third most important predictors were commitment from the least successful alliance (t = 2.676, p = .008, β = .190) and proprietary information sharing (t = 2.395, p = .018, β = .186). The fourth most

important predictor was information quality from the most successful alliance (t = 1.788, p = .076, β = .167). The fifth most important variable was destructive *conflict resolution techniques* (t = -2.069, p = .040, β = -.155), which had an inverse relationship with *learning and growth perspective performance*. The inverse relationship indicated that the more destructive *conflict resolution techniques* the construction alliance managers used, the lower *learning and growth perspective performance* they experienced. Although not significant, the sixth and seventh most important predictors were trust & coordination (t = 1.083, p = .281, β = .119) and avoidance & constructive *conflict resolution techniques* (t = .843, p = .401, β = .066). The eighth most important predictor was commitment from the most successful alliance (t = .631, p = .529, β = .048) in the model. While neither a significant nor trend predictor, information sharing (t = -.245, p = .807, β = -.024) was the ninth most important predictor in the model, and had an inverse relationship with *learning and growth perspective performance*. The inverse relationship indicated that the higher level of information sharing, the lower the level of the *learning and growth perspective performance*. Although not significant, the tenth and final predictor was information participation (t = -.186, p = .853, β = -.019). The inverse relationship indicated that the higher level of information participation, the lower the *learning and growth perspective performance* they experienced. Results of the regression analyses showed H_{5f} was supported. Table 4-150 displays the results of hierarchical multiple regression for H_{5f}.

Table 4-150

Summarized Hierarchical Multiple Regression Analysis of the Explanatory Variables and Learning and Growth Perspective Performance, N = 150

Model	*F*	*p*	*df*	*B*	*SE*	*β*	*t*	*p*	R^2	Adj. R^2
Model 1	54.981	.000	1						.271	.266
Model 2	33.918	.000	2						.316	.306
Model 3	22.947	.000	3						.320	.306
Model 4	18.970	.000	4						.344	.325
Model 5	16.178	.000	5						.360	.337
Model 6	14.892	.000	6						.385	.359
Model 7	12.204	.000	8						.409	.376
Model 8	10.359	.000	10						.427	.386
(Constant)				2.328	1.739		1.339	.183		
Commodity/Supplier Selection Process				.321	.119	.232	2.703	.008		
Information Participation				-.012	.066	-.019	-.186	.853		
Information Sharing				-.019	.078	-.024	-.245	.807		
Trust & Coordination				.142	.131	.119	1.083	.281		
Information Quality (from the Most Successful Alliance)				.111	.062	.167	1.788	.076		
Proprietary Information Sharing				.253	.106	.186	2.395	.018		
Commitment (from the Most Successful Alliance)				.045	.072	.048	.631	.529		
Commitment (from the Least Successful Alliance)				.184	.069	.190	2.673	.008		
Avoidance & Constructive Conflict Resolution Techniques				.069	.081	.066	.843	.401		
Destructive Conflict Resolution Techniques				-.187	.091	-.155	-2.069	.040		
Model 9	9.404	.000	11						.428	.383

H5g: Dimensions of Alliances and Success of the Alliances (Total Score)

H_{5g}: Dimensions of alliance are significant explanatory variables of the *success of the alliance (total score)* in the construction industry.

Attributes of the alliance (trust & coordination, commitment from the least and the most successful alliance, and interdependence), *communication behavior* (information quality from the least and the most successful alliance, information sharing, information participation, and proprietary information sharing), *conflict resolution techniques* (avoidance & constructive and destructive), and *commodity/supplier selection process* were correlated with the *success of the alliance (total score)* using Pearson *r*. Results of Pearson *r* analyses showed significant correlations between *attributes of the alliance* trust & coordination ($r = .644$, $p = .000$), commitment from the most successful alliance ($r = .506$, $p = .000$), and commitment from the least successful alliance ($r = .261$, $p = .001$) with the modified *success of the alliance (total score)*. The results of Pearson *r* correlations of *attributes of the alliance* (trust & coordination, commitment from the least and the most successful alliance, and interdependence), and the dependent variable the *success of the alliance (total score)* are shown in Table 4-151.

Table 4-151

Pearson r Correlations of Dimensions of Alliances Variables of Attributes of the Alliance (Trust & Coordination, Commitment from the Least and the Most Successful Alliance, and Interdependence) with Success of the Alliances (Total Score), N = 150

Variable	Attributes of the Alliance			
	Trust & Coordination	Commitment (the Least)	Commitment (the Most)	Interdependence
Alliance Performance (Total Scale)				
Pearson *r*	**.644**	**.261**	**.506**	.072
p	**.000**	**.001**	**.000**	.384

Communication behavior (information quality from the most successful alliance, information sharing, information participation, and proprietary information sharing), *conflict resolution techniques* (avoidance & constructive and destructive), and *commodity/supplier selection process* had significant Pearson r correlations with *success of the alliance (total score).* The significant and trend variables in order of the strongest to the weakest correlation coefficients were: information participation (r = .629, p = .000), information quality from the most successful alliance (r = .617, p = .000), information sharing (r = .610, p = .000), *commodity/supplier selection process* (r = .585, p = .000), avoidance & constructive *conflict resolution techniques* (r = .442, p = .000), proprietary information sharing (r = .375, p = .000), and destructive *conflict resolution techniques* (r = -.291, p = .000, inverse). The results of Pearson r correlations of *communication behavior* (information quality from the most and the least successful alliance, information sharing, information participation, and proprietary information sharing), *conflict resolution techniques* (avoidance & constructive and destructive),

commodity/supplier selection process, and the dependent variable *success of the alliance (total score)* are shown in Table 4-152.

Table 4-152

Pearson r Correlations of Dimensions of Alliances Variables of Communication Behavior (Information Quality from the Least and the Most Successful Alliance, Information Sharing, Information Participation, and Proprietary Information Sharing), Conflict Resolution Techniques (Avoidance & Constructive and Destructive), and Commodity/Supplier Selection Process with Success of the Alliances (Total Score), N = 150

Variable	Communication Behavior					Conflict Resolution Techniques		Commodity/Supplier Selection Process
	Information Quality (the Least)	Information Quality (the Most)	Information Sharing	Information Participation	Proprietary Information Sharing	Avoidance & Constructive	Destructive	
Alliance Performance (Total Scale)								
Pearson *r*	.116	**.617**	**.610**	**.629**	**.375**	**.442**	**-.291**	**.585**
p	.157	**.000**	**.000**	**.000**	**.000**	**.000**	**.000**	**.000**

Significant and trend variables from the Pearson *r* analysis were entered into a hierarchical regression model in order of significance from the strongest to the weakest. Variables with the same significance level were organized in a hierarchy based on the strength of the Pearson correlation value. There were 10 predictors entered into the regression model. Because only nine separate blocks exist for hierarchical regression in SPSS 17.0, the two variables with the similar significances (information quality from the most successful alliance and information sharing) were grouped into the third block simultaneously. Nine different models were produced from the hierarchical (enter) regression results. The VIF values of these nine models were all well below 10 (ranging from 1.225 to 2.930) and the tolerance statistics all well above .2 (ranging from .341 to .816), thus multicollinearity was not a problem.

All nine of the models produced significant *F* values, testing for the significance of R^2, which is the significance of the regression model as a whole. Model 9 with ten explanatory variables including three variables from *attributes of the alliance* (trust & coordination and commitment from the most/least successful alliance), four variables from *communication behavior* (information quality from the most successful alliance, information sharing, information participation, and proprietary information sharing), two from *conflict resolution techniques* (avoidance & constructive and destructive), and *commodity/supplier selection process* was the best explanatory model to explain the *success of the alliance (total score)* ($F = 25.960$, $p = .000$). With each entry of a variable into the model as shown in Table 4-141, the R^2 adjusted R^2 increased in Model 1 through Model 9. Model 9 produced the highest R^2 (80.7%) and the highest adjusted R^2 (65.1%).

As a result, Model 9 was selected as the best explanatory model for predicting *success of the alliance (total score)*. The best explanatory model found was:

Success of the Alliance (Total Score) = 7.25 (*Constant*) + .97 (*Trust & Coordination*) + .21 (*Information Participation*) + .64 (*Information Quality from the Most Successful Alliance*) + .36 (*Information Sharing*) + 1.14 (*Commodity/Supplier Selection Process*) + .90 (*Commitment from the Most Successful Alliance*) + .80 (*Avoidance & Constructive Conflict Resolution Techniques*) + .85 (*Proprietary Information Sharing*) – 1.0 (*Destructive Conflict Resolution Techniques*) + .62 (*Commitment from the Least Successful Alliance*) + ε

The *t*-statistic, which is the ratio of the regression coefficient to its standard error (*B/SE*), was used to analyze the individual predictors in Model 9. Analysis of individual predictors indicated six of the ten predictors were significant with *success of the alliance (total score)*. The standardized beta coefficient (β) for six significant predictors, two trend predictors, and the remaining predictors indicated their relative importance in explaining *success of the alliance (total score)*. Information quality from the most successful alliance ($t = 2.432$, $p = .016$, $\beta = .177$) was the most important predictor in the model. The second most important predictor was commitment from the most successful alliance ($t = 2.959$, $p = .004$, $\beta = .174$). Destructive *conflict resolution techniques* ($t = -2.611$, $p = .010$, $\beta = -.153$) was the third most important predictor in the model, and had an inverse relationship with *success of the alliance (total score)*. The inverse relationship indicated that the more destructive *conflict resolution techniques* the construction alliance managers used, the lower score of the *success of the alliance (total score)*. The fourth

most important predictor was commodity/supplier selection process (t = 2.265, p = .025, β = .152). The fifth and sixth most important variables were trust & coordination (t = 1.748, p = .083, β = .150) and avoidance & constructive *conflict resolution techniques* (t = 2.323, p = .022, β = .141). Commitment from the least successful alliance (t = 2.107, p = .037, β = .117) was the seventh most important predictor in the model. The eighth most important predictor was proprietary information sharing (t = 1.880, p = .062, β = .114). While neither a significant nor trend predictor, information sharing (t = 1.091, p = .277, β = .084) and information participation (t = .727, p = .468, β = .059) were the ninth and the tenth predictors in the model. Results of the regression analyses showed H_{5g} was supported. Table 4-153 displays the results of hierarchical multiple regression for H_{5g}.

Table 4-153

Summarized Hierarchical Multiple Regression Analysis of the Explanatory Variables and Success of the Alliances (Total Score), N = 150

Model	*F*	*p*	*df*	*B*	*SE*	*β*	*t*	*p*	R^2	Adj. R^2
Model 1	105.104	.000	1						.644	.415
Model 2	70.623	.000	2						.700	.490
Model 3	43.837	.000	4						.740	.547
Model 4	39.731	.000	5						.761	.580
Model 5	38.573	.000	6						.786	.618
Model 6	33.576	.000	7						.790	.623
Model 7	29.899	.000	8						.793	.629
Model 8	29.672	.000	9						.800	.640
Model 9	25.960	.000	10						.807	.651
(Constant)				7.248	7.384		.982	.328		
Trust & Coordination				.970	.555	.150	1.748	.083		
Information Participation				.205	.282	.059	.727	.468		
Information Quality (from the Most Successful Alliance)				.643	.264	.177	2.432	.016		
Information Sharing				.362	.332	.084	1.091	.277		
Commodity/Supplier Selection Process				1.140	.503	.152	2.265	.025		
Commitment (from the Most Successful Alliance)				.903	.305	.174	2.959	.004		
Avoidance & Constructive Conflict Resolution Techniques				.803	.346	.141	2.323	.022		
Proprietary Information Sharing				.845	.449	.114	1.880	.062		
Destructive Conflict Resolution Techniques				-1.003	.384	-.153	-2.611	.010		
Commitment (from the Least Successful Alliance)				.617	.293	.117	2.107	.037		

Hypothesis 6: Alliance Manager Characteristics, Organizational Characteristics, Dimensions of Alliances, and Success of the Alliances

Alliance manager characteristics (gender, age, level of education, race, ethnicity, job tenure, job title, and yearly income), organizational characteristics (organization name, the most and least successful alliance, number of employees, number of offices in the United States and other countries, region of United States, type of location area, total revenue, new contract, and alliance training programs), dimensions of alliances (attributes of the alliance, communication behavior, conflict resolution techniques, and commodity/supplier selection process) are significant explanatory variables of success of the alliance in the construction industry.

Seven sets of analyses were conducted, one for each of the sub-hypotheses: H6a *satisfaction with the alliance*, H6b *adjusted satisfaction with the alliance*, H6c *financial perspective performance*, H6d *customer perspective performance*, H6e *internal-business-process perspective performance*, H6f *learning and growth perspective performance*, and H6g *success of alliances total score*.

H6a: Alliance Manager Characteristics, Organizational Characteristics, Dimensions of Alliances, and Satisfaction

H_{6a}: Alliance manager characteristics, organizational characteristics, dimensions of alliance are significant explanatory variables of the *satisfaction with the alliance* in the construction industry.

Alliance manager characteristics categorical variables of gender, ethnicity, and race showed no significant *eta* correlations with *satisfaction with the alliance* based on past success, and thus, those variables were not included in either the Pearson *r* or

regression analyses. *Organizational characteristics* categorical variables of U.S. region and type of location area also showed no significant *eta* correlations with *satisfaction with the alliance*. New contracts (η = .190, F = 5.541, p = .020) and alliance training programs (η = .183, F = 5.153, p = .025) did have significant eta correlations with *satisfaction with the alliance*. The results of *eta* correlations using the means procedure in SPSS are shown in Table 4-154.

Table 4-154

Eta Correlations of the Categorical Variables with the Variable of Satisfaction with the Alliance, N = 150

Categorical Variables	Eta (η)	Eta Squared (η2)	F	p value
Correlations with Satisfaction				
Gender	.006	.000	.005	.943
Ethnicity	.030	.001	.136	.713
Race	.084	.007	.347	.792
U.S. Region	.148	.022	.816	.517
Type of Location Area	.159	.025	1.899	.153
New Contracts	.190	.036	**5.541**	**.020**
Alliance Training Programs	.183	.034	**5.153**	**.025**

Following the results from eta correlations, two dummy variables each were created for both new contracts and alliance training programs, and these dummy variables were included in the Pearson r correlation analysis of *organizational characteristics* categorical variables (number of employees, number of U.S. offices, number of foreign offices, total revenue), *alliance manager characteristics* interval variables (age, job tenure, job title, and yearly income), *dimensions of alliances* (*attributes of the alliance*, *communication behavior*, *conflict resolution techniques*, and *commodity/supplier*

selection process) with *satisfaction with the alliance* based on past success. There were no significant or trend relationships between *alliance manager characteristics* categorical variables (education level, job tenure, job title, and yearly income) and *satisfaction.* Age did have a positive, significant Pearson *r* correlation with *satisfaction* ($r = .178, p = .029$). Results of Pearson *r* correlations of the dummy coded variables for new contracts indicated a significant relationship between receiving new contracts and *satisfaction with the alliance* ($r = .190, p = .020$). There was a significant correlation between the dummy coded variable for alliance training programs and *satisfaction with the alliance* ($r = .183$, $p = .025$). Both new contracts and alliance training programs were dichotomous (i.e., yes/no questions) and only one of each categorical variable was entered into a regression model.

Results of Pearson *r* analyses showed significant correlations between *attributes of the alliance* trust & coordination ($r = .636, p = .000$) and commitment from the most successful alliance ($r = .453, p = .000$) with *satisfaction with the alliance.* There was also a trend relationship between *attributes of the alliance* commitment from the least successful alliance ($r = .135$, $p = .099$) with *satisfaction with the alliance. Communication behavior* (information quality from the most successful alliance, information sharing, information participation, and proprietary information sharing), *conflict resolution techniques* (avoidance & constructive and destructive), and *commodity/supplier selection process* had significant Pearson r correlations with *satisfaction with the alliance* based on past success. Destructive c*onflict resolution techniques* had an inverse relation ($r = -.370, p = .000$) with *satisfaction*, indicating that the more destructive c*onflict resolution techniques* the construction alliance managers

used, the lower the *satisfaction with the alliance* they experienced. Avoidance & constructive had a positive relationship ($r = .411, p = .000$) with *satisfaction.* A summary of the results of Pearson r correlations of these variables examined for Hypothesis H_{6a} is presented in Table 4-155.

Table 4-155

Pearson r Correlations of Continuous Variables and Significant Categorical Variables (Dummy) with the Variable of Satisfaction with the Alliance, N = 150

Variables	Pearson *r*	*p*
Alliance Manager Characteristics		
Age	**.178**	**.029**
Education Level	.099	.229
Job Tenure	.087	.291
Job Title	-.135	.100
Yearly Income	.131	.109
Organizational Characteristics Variables		
New Contracts		
Yes	**.190**	**.020**
No	**-.190**	**.020**
Alliance Training Programs		
Yes	**.183**	**.025**
No	**-.183**	**.025**
Number of Employees	.026	.749
Number of U.S. Offices	.033	.690
Number of Foreign Offices	.002	.981
Total Revenue	.026	.755
Attributes of the Alliance		
Trust & Coordination	**.636**	**.000**
Commitment (the Least)	**.135**	**.099**
Commitment (the Most)	**.453**	**.000**
Interdependence	-.034	.677
Communication Behavior		
Information Quality (the Least)	-.019	.821
Information Quality (the Most)	**.439**	**.000**
Information Sharing	**.468**	**.000**
Information Participation	**.525**	**.000**
Proprietary Information Sharing	**.203**	**.013**
Conflict Resolution Techniques		
Avoidance & Constructive	**.411**	**.000**
Destructive	**-.370**	**.000**
Commodity/Supplier Selection Process	**.411**	**.000**

Note. [a] coded dummy variable.

Significant and trend variables from the Pearson *r* analysis were entered into a hierarchical regression model in order of significance from the strongest to the weakest. Variables with the same significance level were organized in a hierarchy based on the strength of the Pearson correlation value. There were 13 predictors entered into the regression model. Because only nine separate blocks exist for hierarchical regression in SPSS 17.0, the five weakest variables (proprietary information sharing, new contracts dummy variable, age, alliance training programs dummy variable, and commitment from the least successful alliance) were entered into the last block simultaneously. Nine different models were produced from the hierarchical (enter) regression results. The VIF values of these nine models were all well below 10 (ranging from 1.214 to 2.930) and the tolerance statistics all well above .2 (ranging from .341 to .824), thus multicollinearity was not a problem.

All nine of the models produced significant *F* values, testing for the significance of R^2, which is the significance of the regression model as a whole. Model 8 with eight explanatory variables including two variables from *attributes of the alliance* (trust & coordination and commitment from the most successful alliance), four variables from *communication behavior* (information quality from the most successful alliance, information sharing, information participation, and proprietary information sharing), entire *conflict resolution techniques* (avoidance & constructive and destructive), and *commodity/supplier selection process* was the best explanatory model to explain the *satisfaction with the alliance* based on past success ($F = 20.374$, $p = .000$). As shown in Table 4-156, the R^2 gradually increased from Model 1 (40.4%) to Model 9 (55%) and the adjusted R^2 increased with each new model, except for Model 3 (information sharing),

Model 5 (information quality from the most successful alliance), and Model 9 (proprietary information sharing). Model 8 produced the highest R^2 of 53.6% and an adjusted R^2 of 51%. Model 9 also produced the highest R^2 of 55%; however, the model was not considered as the best explanatory model since the adjusted R^2 decreased to 50.7%. As a result, Model 8 was selected as the best explanatory model for predicting *satisfaction with the alliance*. The best explanatory model found was:

> *Satisfaction with the Alliance* = 2.93 (*Constant*) + .69 (*Trust & Coordination*) + .08 (*Information Participation*) – .06 (*Information Sharing*) + .31 (*Commitment from the Most Successful Alliance*) – .11 (*Information Quality from the Most Successful Alliance*) + .28 (*Avoidance & Constructive Conflict Resolution Techniques*) + .13 (*Commodity/Supplier Selection Process*) – .42 (*Destructive Conflict Resolution Techniques*) + ε

The *t*-statistic, which is the ratio of the regression coefficient to its standard error (*B/SE*), was used to analyze the individual predictors in Model 8. Analysis of individual predictors indicated four of the eight predictors were significant with *satisfaction with the alliance*. The standardized beta coefficient (β) for four significant predictors and the remaining predictors indicated their relative importance in explaining *satisfaction with the alliance*. Trust & coordination ($t = 4.259$, $p = .000$, $\beta = .412$) was the most important predictor in the model. Destructive conflict resolution techniques ($t = -3.942$, $p = .000$, $\beta = -.249$) was the second most important predictor in the model, and had an inverse relationship with *satisfaction with the alliance*. The inverse relationship indicated that the more destructive *conflict resolution techniques* the construction alliance managers employed, the lower their *satisfaction with the alliance* was. The third most important

predictor was commitment from the most successful alliance (t = 3.512, p = .001, β = .227). The fourth most important predictor was avoidance & constructive conflict resolution techniques (t = 2.824, p = .005, β = .194). While neither a significant nor trend predictor, information quality from the most successful alliance (t = -1.426, p = .156, β = -.119) was the fifth most important predictor in the model, and had an inverse relationship with *satisfaction with the alliance*. The inverse relationship indicated that the greater the information quality received from the most successful alliance by construction alliance managers, the lower the *satisfaction with the alliance* they experienced. The sixth and seventh most important variables were information participation (t = 1.050, p = .296, β = .094) and *commodity/supplier selection process* (t = .893, p = .373, β = .066). The eighth and final predictor in the model was information sharing (t = -.596, p = .552, β = -.052). The inverse relationship indicated that the higher level of information sharing, the lower level of the *satisfaction with the alliance*. Results of the regression analyses showed H_{6a} was partially supported. The results of hierarchical multiple regression for H_{6a} are displayed in Table 4-156.

Table 4-156

Summarized Hierarchical Multiple Regression Analysis the Explanatory Variables and Satisfaction with the Alliance, N = 150

Model	*F*	*p*	*df*	*B*	*SE*	*β*	*t*	*p*	R^2	Adj. R^2
Model 1	100.305	.000	1						.404	.400
Model 2	54.198	.000	2						.424	.417
Model 3	35.946	.000	3						.425	.413
Model 4	31.507	.000	4						.465	.450
Model 5	25.230	.000	5						.467	.448
Model 6	22.016	.000	6						.480	.458
Model 7	19.108	.000	7						.485	.460
Model 8	20.374	.000	8						.536	.510
(Constant)				2.927	2.156		1.358	.177		
Trust & Coordination				.688	.162	.412	4.259	.000		
Information Participation				.084	.080	.094	1.050	.296		
Information Sharing				-.058	.097	-.052	-.596	.552		
Commitment (from the Most Successful Alliance)				.305	.087	.227	3.512	.001		
Information Quality (from the Most Successful Alliance)				-.112	.078	-.119	-1.426	.156		
Avoidance & Constructive Conflict Resolution Techniques				.284	.101	.194	2.824	.005		
Commodity/Supplier Selection Process				.129	.145	.066	.893	.373		
Destructive Conflict Resolution Techniques				-.423	.107	-.249	-3.942	.000		
Model 9	12.776	.000	13						.550	.507

H6b: Alliance Manager Characteristics, Organizational Characteristics, Dimensions of Alliances, and Adjusted Satisfaction

H_{6b}: Alliance manager characteristics, organizational characteristics, dimensions of alliance are significant explanatory variables of the *adjusted satisfaction with the alliance* in the construction industry.

Alliance manager characteristics categorical variables of gender, ethnicity, and race showed no significant *eta* correlations with *adjusted satisfaction* (i.e., *success difference*). *Organizational characteristics* categorical variables of U.S. region, type of location area, new contracts, and alliance training programs also showed no significant *eta* correlations with *adjusted satisfaction with the alliance (i.e., success difference).* Thus, those variables were not included in either the Pearson *r* or regression analyses. The results of *eta* correlations using the means procedure in SPSS are shown in Table 4-157.

Table 4-157

Eta Correlations of the Categorical Variables with the Variable of Adjusted Satisfaction with the Alliance, N = 150

Categorical Variables	Eta (η)	Eta Squared ($\eta 2$)	*F*	*p* value
Correlations with Adjusted Satisfaction				
Gender	.056	.003	.464	.497
Ethnicity	.006	.000	.004	.947
Race	.108	.012	.575	.632
U.S. Region	.148	.022	.808	.522
Type of Location Area	.065	.004	.316	.730
New Contracts	.030	.001	.133	.716
Alliance Training Programs	.033	.001	.158	.691

In addition to there being no significant or trend eta correlations among the categorical variables and *adjusted satisfaction, alliance manager characteristics* interval variables (age, job tenure, and job title) and *organizational characteristics* variables (number of employees, number of U.S. offices, and number of foreign offices) showed no significant or trend Pearson *r* correlations with *adjusted satisfaction.* Education level did

produce an inverse trend relationship with *adjusted satisfaction* (r = -.139, p = .090) while yearly income had a positive trend relationship with *adjusted satisfaction* (r =.139, p = .089). Total revenue had a positive trend relationship (r = .159, p = .052).

Results of Pearson r analyses showed significant correlations between *attributes of the alliance* trust & coordination (r = .251, p = .002), interdependence (r = .165, p = .044), and commitment from the least successful alliance (r = .162, p = .048) with *adjusted satisfaction with the alliance*. *Communication behavior* (information quality from the most successful alliance and information participation) had significant Pearson r correlations with *adjusted satisfaction with the alliance* based on success difference. *Conflict resolution techniques* (avoidance & constructive), and *commodity/supplier selection process* showed a trend relationship with *adjusted satisfaction with the alliance*. The significant and trend variables in order of the strongest to the weakest correlation coefficients were: information participation (r = .234, p = .004), information quality from the most successful alliance (r = .231, p = .005), *commodity/supplier selection process* (r = .165, p = .077), and avoidance & constructive *conflict resolution techniques* (r = .138, p = .091). A summary of the results of Pearson r correlations of these variables examined for Hypothesis H_{6b} is presented in Table 4-158.

Table 4-158

Pearson r Correlations of Continuous Variables and Significant Categorical Variables (Dummy) with the Variable of Adjusted Satisfaction with the Alliance, N = 150

Variables	Pearson *r*	*p*
Alliance Manager Characteristics		
Age	.102	.210
Education Level	**-.139**	**.090**
Job Tenure	.050	.544
Job Title	-.046	.579
Yearly Income	**.139**	**.089**
Organizational Characteristics Variables		
Number of Employees	.132	.107
Number of U.S. Offices	.076	.353
Number of Foreign Offices	.095	.248
Total Revenue	**.159**	**.052**
Attributes of the Alliance		
Trust & Coordination	**.251**	**.002**
Commitment (the Least)	**.162**	**.048**
Commitment (the Most)	.037	.654
Interdependence	**.165**	**.044**
Communication Behavior		
Information Quality (the Least)	.052	.525
Information Quality (the Most)	**.231**	**.005**
Information Sharing	.107	.191
Information Participation	**.234**	**.004**
Proprietary Information Sharing	-.007	.933
Conflict Resolution Techniques		
Avoidance & Constructive	**.138**	**.091**
Destructive	-.027	.741
Commodity/Supplier Selection Process	**.165**	**.077**

Significant and trend variables from the Pearson *r* analysis were entered into a hierarchical regression model in order of significance from the strongest to the weakest. Variables with the same significance level were organized in a hierarchy based on the strength of the Pearson correlation value. There were 10 predictors entered into the regression model. Because only nine separate blocks exist for hierarchical regression in SPSS 17.0, the two weakest variables (education level and avoidance & constructive

conflict resolution techniques) were entered into the last block simultaneously. Nine different models were produced from the hierarchical (enter) regression results. The VIF values of these nine models were all well below 10 (ranging from 1 to 2.674) and the tolerance statistics all well above .2 (ranging from .374 to 1), thus multicollinearity was not a problem.

All seven of the models produced significant F values, testing for the significance of R^2, which is the significance of the regression model as a whole. Model 9 with ten explanatory variables including two variables from alliance manager characteristics categorical variables (education level and yearly income), one variable from organizational characteristics categorical variables (total revenue), three variables from *attributes of the alliance* (trust & coordination, commitment from the least successful alliance, and interdependence), two variables from *communication behavior* (information quality from the most successful alliance and information participation), one variable from *conflict resolution techniques* (avoidance & constructive), and *commodity/supplier selection process* was the best explanatory model to explain the *adjusted satisfaction with the alliance* based on success difference (F = 2.429, p = .011). With each entry of a variable into the model as shown in Table 4-159, the R^2 increased in Model 1 through Model 9. The adjusted R^2 increased with each new model in the first six of the nine models, except for Model 3 (information quality from the most successful alliance), which had a decreased adjusted R^2 (5.7%). Model 7 also had a decreased adjusted R^2 (7.8%). And then the adjusted R^2 began to increase in Model 8 and Model 9. Model 9 produced the R^2 of 14.9% and the highest adjusted R^2 of 8.8%. As a result, Model 9 was

selected as the best explanatory model for predicting *adjusted satisfaction with the alliance*. The best explanatory model found was:

Adjusted Satisfaction with the Alliance = -3.0 (*Constant*) + .04 (*Trust & Coordination*) + .02 (*Information Participation*) + .02 (*Information Quality from the Most Successful Alliance*) + .03 (*Interdependence*) + .03 (*Commitment from the Most Successful Alliance*) + .13 (*Total Revenue*) – .02 (*Commodity/Supplier Selection Process*) + .10 (*Yearly Income*) – .16 (*Education Level*) + ε

The *t*-statistic, which is the ratio of the regression coefficient to its standard error (*B/SE*), was used to analyze the individual predictors in Model 9. Analysis of individual predictors indicated none of the ten predictors were significant with *adjusted satisfaction with the alliance*. The standardized beta coefficient (β) for the nine non-significant predictors and one trend predictors indicated their relative importance in explaining *adjusted satisfaction with the alliance*. Education level (t = -1.689, p = .093, β = -.138) was the most important predictor in the model and had an inverse relationship with *adjusted satisfaction with the alliance*. The inverse relationship indicated that the construction alliance managers who had a higher level of education received a lower level of *adjusted satisfaction with the alliance*. The second most important predictor was trust & coordination (t = .968, p = .335, β = .124) in the model. While neither a significant nor trend predictor, information participation (t = 1.051, p = .295, β = .122) and total revenue (t = 1.471, p = .144, β = .121) were the third and fourth most important predictors in the model. The fifth and sixth most important predictors were information quality from the most successful alliance (t = .812, p = .418, β = .094) and yearly income (t = .928, p = .355, β = .077). Interdependence (t = .802, p = .424, β = .067) was the

seventh most important predictor. Commodity/supplier selection process (t = -.591, p = .555, β = -.058) was the eighth most important predictor in the model, and had an inverse relationship with *adjusted satisfaction with the alliance*. The inverse relationship indicated that the construction alliance managers who selected more comprehensive commodity/supplier selection process in their business units received less *adjusted satisfaction with the alliance* depending on success difference. The remaining predictor, avoidance & constructive *conflict resolution techniques* (r = .138, p = .091), was not significant as an individual predictor (t = .017, p = .987, β = .002). Results of the regression analyses showed H_{6b} was supported. The results of hierarchical multiple regression for H_{6b} are displayed in Table 4-159.

Table 4-159

Summarized Hierarchical Multiple Regression Analysis the Explanatory Variables and Adjusted Satisfaction with the Alliance, N = 150

Model	*F*	*p*	*df*	*B*	*SE*	*β*	*t*	*p*	R^2	Adj. R^2
Model 1	9.913	.002	1						.063	.056
Model 2	5.645	.004	2						.071	.059
Model 3	3.990	.009	3						.076	.057
Model 4	3.644	.007	4						.091	.066
Model 5	3.222	.009	5						.101	.069
Model 6	3.253	.005	6						.120	.083
Model 7	2.794	.009	7						.121	.078
Model 8	2.664	.009	8						.131	.082
Model 9	2.429	.011	10						.149	.088
(Constant)				-2.950	1.017		-2.900	.004		
Trust & Coordination				.039	.040	.124	.968	.335		
Information Participation				.020	.019	.122	1.051	.295		
Information Quality (from the Most Successful Alliance)				.017	.020	.094	.812	.418		
Interdependence				.025	.032	.067	.802	.424		
Commitment (from the Least Successful Alliance)				.025	.021	.097	1.153	.251		
Total Revenue				.128	.087	.121	1.471	.144		
Commodity/Supplier Selection Process				-.021	.036	-.058	-.591	.555		
Yearly Income				.095	.102	.077	.928	.355		
Education Level				-.155	.092	-.138	-1.689	.093		
Avoidance & Constructive Conflict Resolution Techniques				.000	.025	.002	.017	.987		

H6c: Alliance Manager Characteristics, Organizational Characteristics, Dimensions of Alliances, and Financial Perspective

H_{6c}: Alliance manager characteristics, organizational characteristics, dimensions of alliance are significant explanatory variables of the *financial perspective with the alliance* in the construction industry.

Alliance manager characteristics categorical variables of gender, ethnicity, and race showed no significant *eta* correlations with *financial perspective performance. Organizational characteristics* categorical variables of U.S. region, type of location area, new contracts, and alliance training programs showed no significant *eta* correlations with *financial perspective performance*. Thus, those variables were not included in either the Pearson *r* or regression analyses. The results of *eta* correlations using the means procedure in SPSS are shown in Table 4-160.

Table 4-160

Eta Correlations of the Categorical Variables with the Variable of Financial Perspective Performance, N = 150

Categorical Variables	Eta (η)	Eta Squared ($\eta 2$)	*F*	*p* value
Correlations with Financial Perspective				
Gender	.043	.002	.277	.600
Ethnicity	.126	.016	2.400	.123
Race	.184	.034	1.711	.167
U.S. Region	.099	.010	.361	.836
Type of Location Area	.058	.003	.246	.782
New Contracts	.091	.008	1.246	.266
Alliance Training Programs	.099	.010	1.472	.227

In addition to there being no significant or trend eta correlations among the categorical variables and *financial perspective performance, alliance manager characteristics* interval variables of age, job tenure, job title, and yearly income showed no significant or trend Pearson *r* correlations with *financial perspective. Organizational characteristics* variables of number of employees, number of U.S. offices, number of

foreign offices, and total revenue showed no significant or trend Pearson *r* correlations with *financial perspective performance*.

Results of Pearson *r* analyses showed that the significant and trend variables in order of the strongest to the weakest correlation coefficients were: information participation (r = .594, p = .000), information sharing (r = .577, p = .000), *commodity/supplier selection process* (r = .568, p = .000), trust & coordination (r = .532, p = .000), information quality from the most successful alliance (r = .527, p = .000), commitment from the most successful alliance (r = .416, p = .000), avoidance & constructive *conflict resolution techniques* (r = .402, p = .000), proprietary information sharing (r = .351, p = .000), commitment from the least successful alliance (r = .260, p = .001), destructive *conflict resolution techniques* (r = -238, p = .003, inverse), *alliance manager characteristics* education level (r = .140, p = .088), and information quality from the least successful alliance (r = .135, p = .099). A summary of the results of Pearson *r* correlations of these variables examined for Hypothesis H_{6b} is presented in Table 4-161.

Table 4-161

Pearson r Correlations of Continuous Variables and Significant Categorical Variables (Dummy) with the Variable of Financial Perspective Performance, N = 150

Variables	Pearson *r*	*p*
Alliance Manager Characteristics		
Age	-.005	.949
Education Level	**.140**	**.088**
Job Tenure	-.006	.942
Job Title	.024	.769
Yearly Income	-.097	.236
Organizational Characteristics Variables		
Number of Employees	-.066	.419
Number of U.S. Offices	-.019	.816
Number of Foreign Offices	-.089	.281
Total Revenue	-.040	.628
Attributes of the Alliance		
Trust & Coordination	**.532**	**.000**
Commitment (the Least)	**.260**	**.001**
Commitment (the Most)	**.416**	**.000**
Interdependence	.046	.578
Communication Behavior		
Information Quality (the Least)	**.135**	**.099**
Information Quality (the Most)	**.527**	**.000**
Information Sharing	**.577**	**.000**
Information Participation	**.594**	**.000**
Proprietary Information Sharing	**.351**	**.000**
Conflict Resolution Techniques		
Avoidance & Constructive	**.402**	**.000**
Destructive	**-.238**	**.003**
Commodity/Supplier Selection Process	**.568**	**.000**

All seven of the models produced significant *F* values, testing for the significance of R^2, which is the significance of the regression model as a whole. Model 9 with twelve explanatory variables including one variable from alliance manager characteristics categorical variables (education level), no variable from organizational characteristics categorical variables, three variables from *attributes of the alliance* (trust & coordination and commitment from the least/most successful alliance), five variables from

communication behavior (information quality from the least/most successful alliance, information sharing, information participation, and proprietary information sharing), entire *conflict resolution techniques* (avoidance & constructive and destructive), and *commodity/supplier selection process* was the best explanatory model to explain *financial perspective performance* ($F = 13.418$, $p = .000$). With each entry of a variable into the model as shown in Table 4-162, the R^2 increased in Model 1 through Model 9. The adjusted R^2 increased with each new model in the entire nine models, except for Model 8 (proprietary information sharing), which had a decreased adjusted R^2 (48.4%). Model 7 was not selected as the best model since the increase in R^2 (0.3%) was greater than the decreased in adjusted R^2 between Model 7 and Model 8 (0.1%). Model 9 produced the highest R^2 of 54% and the highest adjusted R^2 of 50%. As a result, Model 9 was selected as the best explanatory model for predicting *financial perspective performance*. The best explanatory model found was:

> *Financial Perspective Performance* = 2.07 (*Constant*) + .10 (*Information Participation*) + .12 (*Information Sharing*) + .31 (*Commodity/Supplier Selection Process*) – .01 (*Trust & Coordination*) + .11 (*Information Quality from the Most Successful Alliance*) + .10 (*Commitment from the Most Successful Alliance*) + .18 (*Avoidance & Constructive Conflict Resolution Techniques*) + .17 (*Proprietary Information Sharing*) + .16 (*Commitment from the Least Successful Alliance*) – .17 (*Destructive Conflict Resolution Techniques*) + .51 (*Education Level*) – .03 (*Information Quality from the Least Successful Alliance*) + ε

The *t*-statistic, which is the ratio of the regression coefficient to its standard error (*B/SE*), was used to analyze the individual predictors in Model 9. Analysis of individual

predictors indicated two of the twelve predictors were significant with *financial perspective performance*. The standardized beta coefficient (β) for the two significant predictors, four trend predictors, and the remaining predictors indicated their relative importance in explaining *financial perspective performance*. Commodity/supplier selection process (t = 2.428, p = .016, β = .189) was the most important predictor in the model. The second most important predictor was avoidance & constructive *conflict resolution techniques* (t = 2.070, p = .040, β = .146) in the model. Information quality from the most successful alliance (t = 1.701, p = .091, β = .144) and commitment from the least successful alliance (t = 1.870, p = .064, β = .140) were the third and fourth most important predictors in the model. Although not significant, information participation (t = 1.377, p = .171, β = .130) and information sharing (t = 1.398, p = .164, β = .128) were the fifth and sixth most important predictors. Destructive *conflict resolution techniques* (t = -1.715, p = .089, β = -.118) was the seventh most important predictor in the model, and had an inverse relationship with *financial perspective performance*. The inverse relationship indicated that the more destructive *conflict resolution techniques* the construction alliance managers employed, the lower their *financial perspective performance* was. While neither a significant nor trend predictor, proprietary information sharing (t = 1.488, p = .140, β = .107) was the eighth most important predictors in the model. Education level (t = -1.689, p = .093, β = -.138) was the ninth most important predictor. The tenth most important predictor was commitment from the most successful alliance (t = 1.334, p = .184, β = .092). While neither a significant nor trend predictor, information quality from the least successful alliance (t = -.530, p = .597, β = -.041) was the eleventh predictor in the model, and had an inverse relationship with *financial*

perspective performance. The inverse relationship indicated that the greater the information quality received from the least successful alliance by construction alliance managers, the lower the *financial perspective performance* they experienced. Trust & coordination (t = -.042, p = .966, β = -.004) was the twelfth and final predictor in the model. It had an inverse relationship to *financial perspective performance*, indicating that the more trust & coordination the construction alliance managers felt, the lower the *financial perspective performance* they experienced. Results of the regression analyses showed H_{6c} was partially supported. The results of hierarchical multiple regression for H_{6c} are displayed in Table 4-162.

Table 4-162

Summarized Hierarchical Multiple Regression Analysis the Explanatory Variables and Financial Perspective Performance, N = 150

Model	*F*	*p*	*df*	*B*	*SE*	*β*	*t*	*p*	R^2	Adj. R^2
Model 1	80.667	.000	1						.353	.348
Model 2	51.089	.000	2						.410	.402
Model 3	41.413	.000	3						.460	.449
Model 4	32.227	.000	4						.471	.456
Model 5	27.158	.000	5						.485	.467
Model 6	24.048	.000	6						.502	.481
Model 7	21.034	.000	7						.509	.485
Model 8	18.486	.000	8						.512	.484
Model 9	13.418	.000	12						.540	.500
(Constant)				2.071	1.872		1.106	.270		
Information Participation				.096	.070	.130	1.377	.171		
Information Sharing				.118	.084	.128	1.398	.164		
Commodity/Supplier Selection Process				.305	.126	.189	2.428	.016		
Trust & Coordination				-.006	.141	-.004	-.042	.966		
Information Quality (from the Most Successful Alliance)				.113	.066	.144	1.701	.091		
Commitment (from the Most Successful Alliance)				.103	.077	.092	1.334	.184		
Avoidance & Constructive Conflict Resolution Techniques				.178	.086	.146	2.070	.040		
Proprietary Information Sharing				.170	.115	.107	1.485	.140		
Commitment (from the Least Successful Alliance)				.159	.085	.140	1.870	.064		
Destructive Conflict Resolution Techniques				-.167	.097	-.118	-1.715	.089		
Education Level				.511	.299	.102	1.711	.089		
Information Quality (from the Least Successful Alliance)				-.025	.047	-.041	-.530	.597		

H6d: Alliance Manager Characteristics, Organizational Characteristics, Dimensions of Alliances, and Customer Perspective

H_{6d}: Alliance manager characteristics, organizational characteristics, dimensions of alliance are significant explanatory variables of the *customer perspective with the alliance* in the construction industry.

Alliance manager characteristics categorical variables of gender, ethnicity, and race showed no significant *eta* correlations with *customer perspective performance*. *Organizational characteristics* categorical variables of U.S. region, type of location area, new contracts, and alliance training programs showed no significant *eta* correlations with *customer perspective performance*. Thus, those variables were not included in either the Pearson *r* or regression analyses. The results of *eta* correlations using the means procedure in SPSS are shown in Table 4-163.

Table 4-163

Eta Correlations of the Categorical Variables with the Variable of Customer Perspective Performance, N = 150

Categorical Variables	Eta (η)	Eta Squared ($\eta 2$)	*F*	*p* value
Correlations with Customer Perspective				
Gender	.079	.006	.918	.340
Ethnicity	.093	.009	1.287	.259
Race	.153	.023	1.166	.325
U.S. Region	.139	.019	.711	.586
Type of Location Area	.086	.007	.548	.580
New Contracts	.090	.008	1.207	.274
Alliance Training Programs	.101	.010	1.522	.219

In addition to there being no significant or trend *eta* correlations among categorical variables and *customer perspective performance*, *alliance manager characteristics* variables (age, education level, job tenure, job title, and yearly income) and *organizational characteristics* variables (number of employees, number of U.S. offices, number of foreign offices, and total revenue) showed no significant or trend Pearson *r* correlations with *customer perspective performance*. Thus, these dummy variables were included in the Pearson *r* correlation analysis of *organizational characteristics* categorical variables (number of employees, number of U.S. offices, number of foreign offices, total revenue), *alliance manager characteristics* interval variables (age, job tenure, job title, and yearly income), *dimensions of alliances* (*attributes of the alliance*, *communication behavior*, *conflict resolution techniques*, and *commodity/supplier selection process*) with *customer perspective performance*.

Results of Pearson *r* analyses showed that the significant and trend variables in order of the strongest to the weakest correlation coefficients were: information participation ($r = .599$, $p = .000$), information sharing ($r = .588$, $p = .000$), information quality from the most successful alliance ($r = .586$, $p = .000$), trust & coordination ($r = .558$, $p = .000$), *commodity/supplier selection process* ($r = .550$, $p = .000$), commitment from the most successful alliance ($r = .437$, $p = .000$), avoidance & constructive *conflict resolution techniques* ($r = .385$, $p = .000$), proprietary information sharing ($r = .325$, $p = .000$), destructive *conflict resolution techniques* ($r = -.282$, $p = .000$, inverse), and commitment from the least successful alliance ($r = .190$, $p = .020$). A summary of the results of Pearson *r* correlations of these variables examined for Hypothesis H_{6b} is presented in Table 4-164.

Table 4-164

Pearson r Correlations of Continuous Variables and Significant Categorical Variables (Dummy) with the Variable of Customer Perspective Performance, N = 150

Variables	Pearson *r*	*p*
Alliance Manager Characteristics		
Age	.062	.448
Education Level	.129	.115
Job Tenure	.003	.969
Job Title	-.065	.431
Yearly Income	-.076	.357
Organizational Characteristics Variables		
Number of Employees	-.039	.639
Number of U.S. Offices	.001	.989
Number of Foreign Offices	-.064	.435
Total Revenue	-.093	.256
Attributes of the Alliance		
Trust & Coordination	**.558**	**.000**
Commitment (the Least)	**.190**	**.020**
Commitment (the Most)	**.437**	**.000**
Interdependence	.072	.384
Communication Behavior		
Information Quality (the Least)	.081	.322
Information Quality (the Most)	**.586**	**.000**
Information Sharing	**.588**	**.000**
Information Participation	**.599**	**.000**
Proprietary Information Sharing	**.325**	**.000**
Conflict Resolution Techniques		
Avoidance & Constructive	**.385**	**.000**
Destructive	**-.282**	**.000**
Commodity/Supplier Selection Process	**.550**	**.000**

All seven of the models produced significant *F* values, testing for the significance of R^2, which is the significance of the regression model as a whole. Model 9 with ten explanatory variables including no variables from both alliance manager characteristics categorical variables and organizational characteristics categorical variables, three variables from *attributes of the alliance* (trust & coordination and commitment from the least/most successful alliance), four variables from *communication behavior* (information

quality from the most successful alliance, information sharing, information participation, and proprietary information sharing), entire *conflict resolution techniques* (avoidance & constructive and destructive), and *commodity/supplier selection process* was the best explanatory model to explain *customer perspective performance* ($F = 16.776$, $p = .000$). With each entry of a variable into the model as shown in Table 4-165, the R^2 increased in Model 1 through Model 9. The adjusted R^2 increased with each new model in the first six of nine models, except for Model 4 (trust & coordination), which had a decreased adjusted R^2 (47.3%). The adjusted R^2 began to decrease in Model 7 through Model 8. Model 9 produced the highest R^2 of 54.7% and the highest adjusted R^2 of 51.4%. As a result, Model 9 was selected as the best explanatory model for predicting *customer perspective performance*. The best explanatory model found was:

Customer Perspective Performance = .27 (*Constant*) + .13 (*Information Participation*) + .15 (*Information Sharing*) + .22 (*Information Quality from the Most Successful Alliance*) – .02 (*Trust & Coordination*) + .29 (*Commodity/Supplier Selection Process*) + .19 (*Commitment from the Most Successful Alliance*) + .14 (*Avoidance & Constructive Conflict Resolution Techniques*) + .09 (*Proprietary Information Sharing*) – .21 (*Destructive Conflict Resolution Techniques*) + .07 (*Commitment from the Least Successful Alliance*) + ε

The *t*-statistic, which is the ratio of the regression coefficient to its standard error (*B/SE*), was used to analyze the individual predictors in Model 9. Analysis of individual predictors indicated three of the ten predictors were significant with *customer perspective performance*. The standardized beta coefficient (β) for the three significant predictors

and one trend predictors indicated their relative importance in explaining *customer perspective performance*. Information quality from the most successful alliance (t = 2.862, p = .005, β = .237) was the most important predictor in the model. The second most important predictor was commodity/supplier selection process (t = 1.993, p = .048, β = .152) in the model. Commitment from the most successful alliance (t = 2.141, p = .034, β = .144) was the third most important predictors. While neither a significant nor trend predictor, the fourth and fifth most important predictors were information participation (t = 1.544, p = .125, β = .144) and information sharing (t = 1.597, p = .113, β = .141). Destructive *conflict resolution techniques* (t = -1.892, p = .061, β = -.126) was the sixth most important predictor, and had an inverse relationship with *customer perspective performance*. The inverse relationship indicated that the more destructive *conflict resolution techniques* the construction alliance managers used, the lower their *customer perspective performance* was. Although not significant, avoidance & constructive *conflict resolution techniques* (t = 1.396, p = .165, β = .097) and commitment from the least successful alliance (t = .794, p = .429, β = .050) were the seventh and eighth most important predictors in the model. Proprietary information sharing (t = 1.880, p = .062, β = .114) was ninth most important predictor. The tenth and final predictor in the model was trust & coordination (t = -.107, p = .915, β = -.010). It had an inverse relationship to *customer perspective performance*, indicating that the more trust & coordination the construction alliance managers felt, the lower their *customer perspective performance* was. Results of the regression analyses showed H_{6d} was partially supported. The results of hierarchical multiple regression for H_{6d} are displayed in Table 4-165.

Table 4-165

Summarized Hierarchical Multiple Regression Analysis the Explanatory Variables and Customer Perspective Performance, N = 150

Model	*F*	*p*	*df*	*B*	*SE*	*β*	*t*	*p*	R^2	Adj. R^2
Model 1	82.846	.000	1						.359	.355
Model 2	53.422	.000	2						.421	.413
Model 3	46.230	.000	3						.487	.477
Model 4	34.465	.000	4						.487	.473
Model 5	30.149	.000	5						.511	.494
Model 6	27.111	.000	6						.532	.513
Model 7	23.285	.000	7						.534	.511
Model 8	20.277	.000	8						.535	.509
Model 9	16.776	.000	10						.547	.514
(Constant)				.274	2.132		.128	.898		
Information Participation				.126	.081	.144	1.544	.125		
Information Sharing				.153	.096	.141	1.597	.113		
Information Quality (from the Most Successful Alliance)				.218	.076	.237	2.862	.005		
Trust & Coordination				-.017	.160	-.010	-.107	.915		
Commodity/Supplier Selection Process				.290	.145	.152	1.993	.048		
Commitment (from the Most Successful Alliance)				.189	.088	.144	2.141	.034		
Avoidance & Constructive Conflict Resolution Techniques				.139	.100	.097	1.396	.165		
Proprietary Information Sharing				.093	.130	.049	.717	.474		
Destructive Conflict Resolution Techniques				-.210	.111	-.126	-1.892	.061		
Commitment (from the Least Successful Alliance)				.067	.084	.050	.794	.429		

H6e: Alliance Manager Characteristics, Organizational Characteristics, Dimensions of Alliances, and Internal-Business-Process Perspective

H_{6e}: Alliance manager characteristics, organizational characteristics, dimensions of alliance are significant explanatory variables of the *internal-business-process perspective with the alliance* in the construction industry.

Alliance manager characteristics categorical variables of gender (η = .160, F = 3.905, p = .050) and ethnicity (η = .184, F = 5.182, p = .024) showed significant *eta* correlations with *internal-business-process perspective performance*. Race did not have a significant eta correlation with *internal-business-process perspective performance*, and thus, this variable was not included in either the Pearson r or regression analyses. *Organizational characteristics* categorical variables of U.S. region, type of location area, and new contracts showed no significant *eta* correlations with *internal-business-process perspective performance*, and thus, those variables were not included in either the Pearson r or regression analyses. Alliance training programs did have a significant eta correlation (η = .228, F = 8.146, p = .005) with *internal-business-process perspective performance*. The results of *eta* correlations using the means procedure in SPSS are shown in Table 4-166.

Table 4-166

Eta Correlations of the Categorical Variables with the Variable of Internal-Business-Process Perspective Performance, N = 150

Categorical Variables	Eta (η)	Eta Squared ($\eta 2$)	*F*	*p* value
Correlations with Internal-Business-Process Perspective				
Gender	.160	.026	**3.905**	**.050**
Ethnicity	.184	.034	**5.182**	**.024**
Race	.169	.029	1.428	.237
U.S. Region	.103	.011	.386	.818
Type of Location Area	.083	.007	.516	.598
New Contracts	.025	.001	.089	.766
Alliance Training Programs	.228	.052	**8.146**	**.005**

Following the results from eta correlations, two dummy variables each were created for gender, ethnicity, and alliance training programs. These dummy variables were included in the Pearson *r* correlation analysis of *organizational characteristics* categorical variables (number of employees, number of U.S. offices, number of foreign offices, total revenue), *alliance manager characteristics* interval variables (age, job tenure, job title, and yearly income), *dimensions of alliances* (*attributes of the alliance*, *communication behavior*, *conflict resolution techniques*, and *commodity/supplier selection process*) with *internal-business-process perspective performance.* Results of Pearson *r* correlations of the dummy coded variables for gender indicated a significant relationship between male respondents and *internal-business-process perspective performance* (r = .160, p = .050). There was a significant correlation between the dummy coded variable for ethnicity and *internal-business-process perspective* (r = .184, p = .024). Results of Pearson *r* correlations of the dummy coded variables for alliance

training programs showed a positive, significant correlation between construction managers with and *internal-business-process perspective performance*, as well as an inverse relationship between construction managers with no alliance training programs (r = -.228, p = .005) and *internal-business-process perspective performance*. Gender, ethnicity, and whether offering alliance training programs in respondents' business units was dichotomous and only one of this categorical variable was enter into a regression model.

Results of Pearson r analyses showed that the significant and trend variables in order of the strongest to the weakest correlation coefficients were: information quality from the most successful alliance (r = .484, p = .000), information sharing (r = .440, p = .000), trust & coordination (r = .427, p = .000), commitment from the most successful alliance (r = .414, p = .000), information participation (r = .394, p = .000), *commodity/supplier selection process* (r = .385, p = .000), proprietary information sharing (r = .329, p = .000), avoidance & constructive *conflict resolution techniques* (r = .311, p = .000), alliance training programs (r = .228, p = .005), and commitment from the least successful alliance (r = .206, p = .011), ethnicity of Hispanic (r = .184, p = .024), and gender of male (r = .160, p = .050). A summary of the results of Pearson r correlations of these variables examined for Hypothesis H_{6b} is presented in Table 4-167.

Table 4-167

Pearson r Correlations of Continuous Variables and Significant Categorical Variables (Dummy) with the Variable of Internal-Business-Process Perspective Performance, N = 150

Variables	Pearson *r*	*p*
Alliance Manager Characteristics		
Gender		
Male [a]	**.160**	**.050**
Female [a]	**-.160**	**.050**
Ethnicity		
Hispanic [a]	**.184**	**.024**
Non-Hispanic [a]	**-.184**	**.024**
Age	.021	.803
Education Level	.102	.214
Job Tenure	.082	.316
Job Title	.040	.623
Yearly Income	.006	.941
Organizational Characteristics Variables		
Alliance Training Programs		
Yes [a]	**.228**	**.005**
No [a]	**-.228**	**.005**
Number of Employees	.098	.233
Number of U.S. Offices	.032	.700
Number of Foreign Offices	.105	.200
Total Revenue	.087	.287
Attributes of the Alliance		
Trust & Coordination	**.427**	**.000**
Commitment (the Least)	**.206**	**.011**
Commitment (the Most)	**.414**	**.000**
Interdependence	.130	.113
Communication Behavior		
Information Quality (the Least)	.116	.157
Information Quality (the Most)	**.484**	**.000**
Information Sharing	**.440**	**.000**
Information Participation	**.394**	**.000**
Proprietary Information Sharing	**.329**	**.000**
Conflict Resolution Techniques		
Avoidance & Constructive	**.311**	**.000**
Destructive	-.100	.224
Commodity/Supplier Selection Process	**.385**	**.000**

Note. [a] coded dummy variable.

All seven of the models produced significant F values, testing for the significance of R^2, which is the significance of the regression model as a whole. Model 9 with twelve explanatory variables including two variables from alliance manager characteristics categorical variables (gender and ethnicity), one variable from organizational characteristics categorical variables (alliance training programs), three variables from *attributes of the alliance* (trust & coordination and commitment from the least/most successful alliance), four variables from *communication behavior* (information quality from the most successful alliance, information sharing, information participation, and proprietary information sharing), one variable from *conflict resolution techniques* (avoidance & constructive), and *commodity/supplier selection process* was the best explanatory model to explain *internal-business-process perspective performance* (F = 8.449, p = .000). With each entry of a variable into the model as shown in Table 4-168, the R^2 increased in Model 1 through Model 9, except for Model 5, which had the same R^2 of 33.4% as Model 4. The adjusted R^2 increased in the first four of nine models, except for Model 3 (trust & coordination), which had a decreased adjusted R^2 (26.7%). Model 5 also had a decreased adjusted R^2 (31.1%). Then the adjusted R^2 began to increase in Model 6 through Model 9. Model 9 produced the highest R^2 of 42.5% and the highest adjusted R^2 of 37.5%. As a result, Model 9 was selected as the best explanatory model for predicting *internal-business-process perspective performance*. The best explanatory model found was:

Internal-Business-Process Perspective Performance = -.49 (*Constant*) + .27 (*Information Quality from the Most Successful Alliance*) + .17 (*Information Sharing*) + .19 (*Trust & Coordination*) + .25 (*Commitment from the Most*

Successful Alliance) – .12 (*Information Participation*) + .03 (*Commodity/Supplier Selection Process*) + .36 (*Proprietary Information Sharing*) + .16 (*Avoidance & Constructive Conflict Resolution Techniques*) + 1.52 (*Offering Alliance Training Programs Dummy Variable*) + .11 (*Commitment from the Least Successful Alliance*) + 6.52 (Hispanic *Ethnicity Dummy Variable*) + 1.28 (*Male Gender Dummy Variable*) + ε

The *t*-statistic, which is the ratio of the regression coefficient to its standard error (*B/SE*), was used to analyze the individual predictors in Model 9. Analysis of individual predictors indicated four of the twelve predictors were significant with *internal-business-process perspective performance*. The standardized beta coefficient (β) for the four non-significant predictors, one trend predictors, and the remaining predictors indicated their relative importance in explaining *internal-business-process perspective performance*. Information quality from the most successful alliance (t = .253, p = .016, β = .010) was the most important predictor in the model. The second most important predictor was the ethnicity dummy variable "Hispanic" (t = 2.834, p = .005, β = .189) in the model. The third and fourth most important predictors were proprietary information sharing (t = 1.880, p = .040, β = .162) and commitment from the most successful alliance (t = 2.502, p = .042, β = .161). While neither a significant nor trend predictor, information sharing (t = 1.355, p = .178, β = .135) was the fifth most important predictor in the model. The sixth most important predictor was the alliance training programs dummy variable "Yes" (t = 1.833, p = .069, β = .131) was the sixth most important predictors in the model. Although not significant, information participation (t = -1.056, p = .293, β = -.112) was the seventh most important predictor, and had an inverse relationship with *internal-*

business-process perspective performance. The inverse relationship indicated that the higher level of information participation, the lower the *internal-business-process perspective performance* they experienced. The order of the remaining predictors were trust & coordination (t = .859, p = .392, β = .096), avoidance & constructive *conflict resolution techniques* (t = 1.206, p = .230, β = .093), the gender dummy variable "Male" (t = 1.158, p = .249, β = .080), commitment from the least successful alliance (t = 1.041, p = .300, β = .072) and commodity/supplier selection process (t = .166, p = .868, β = .014). Results of the regression analyses showed H_{6e} was supported. The results of hierarchical multiple regression for H_{6e} are displayed in Table 4-168.

Table 4-168

Summarized Hierarchical Multiple Regression Analysis the Explanatory Variables and Internal-Business-Process Perspective Performance, N = 150

Model	*F*	*p*	*df*	*B*	*SE*	*β*	*t*	*p*	R^2	Adj. R^2
Model 1	45.317	.000	1						.234	.229
Model 2	28.636	.000	2						.280	.271
Model 3	19.077	.000	3						.282	.267
Model 4	18.199	.000	4						.334	.316
Model 5	14.462	.000	5						.334	.311
Model 6	12.311	.000	6						.341	.313
Model 7	11.235	.000	7						.356	.325
Model 8	9.913	.000	8						.360	.324
Model 9	8.449	.000	12						.425	.375
(Constant)				-.492	2.753		-.179	.858		
Information Quality (from the Most Successful Alliance)				.274	.106	.253	2.595	.010		
Information Sharing				.173	.128	.135	1.355	.178		
Trust & Coordination				.185	.215	.096	.859	.392		
Commitment (from the Most Successful Alliance)				.249	.121	.161	2.052	.042		
Information Participation				-.115	.109	-.112	-1.056	.293		
Commodity/Supplier Selection Process				.032	.194	.014	.166	.868		
Proprietary Information Sharing				.360	.173	.162	2.079	.040		
Avoidance & Constructive Conflict Resolution Techniques				.157	.130	.093	1.206	.230		
Alliance Training Programs (Yes)				1.515	.826	.131	1.833	.069		
Commitment (from the Least Successful Alliance)				.113	.109	.072	1.041	.300		
Ethnicity (Hispanic)				6.524	2.302	.189	2.834	.005		
Gender (Male)				1.277	1.102	.080	1.158	.249		

H6f: Alliance Manager Characteristics, Organizational Characteristics, Dimensions of Alliances, and Learning and Growth Perspective

H_{6f}: Alliance manager characteristics, organizational characteristics, dimensions of alliance are significant explanatory variables of the *learning and growth perspective with the alliance* in the construction industry.

Alliance manager characteristics categorical variables of gender, ethnicity, and race showed no significant *eta* correlations with *learning and growth perspective performance*. *Organizational characteristics* categorical variables of U.S. region, type of location area, new contracts, and alliance training programs showed no significant *eta* correlations with *learning and growth perspective performance*. Thus, those variables were not included in either the Pearson *r* or regression analyses. The results of *eta* correlations using the means procedure in SPSS are shown in Table 4-169.

Table 4-169

Eta Correlations of the Categorical Variables with the Variable of Learning and Growth Perspective Performance, N = 150

Categorical Variables	Eta (η)	Eta Squared ($\eta 2$)	*F*	*p* value
Correlations with Learning & Growth Perspective				
Gender	.016	.000	.039	.844
Ethnicity	.027	.001	.106	.745
Race	.125	.016	.777	.509
U.S. Region	.180	.033	1.219	.305
Type of Location Area	.090	.008	.606	.547
New Contracts	.012	.000	.020	.887
Alliance Training Programs	.093	.009	1.290	.258

In addition to there being no significant or trend *eta* correlations among categorical variables and *learning and growth perspective performance*, *alliance manager characteristics* variables (age, education level, job tenure, job title, and yearly income) and *organizational characteristics* variables (number of employees, number of U.S. offices, number of foreign offices, and total revenue) showed no significant or trend Pearson *r* correlations with *customer perspective performance*. Thus, these dummy variables were included in the Pearson *r* correlation analysis of *organizational characteristics* categorical variables (number of employees, number of U.S. offices, number of foreign offices, total revenue), *alliance manager characteristics* interval variables (age, job tenure, job title, and yearly income), *dimensions of alliances* (*attributes of the alliance*, *communication behavior*, *conflict resolution techniques*, and *commodity/supplier selection process*) with *learning and growth perspective performance*.

Results of Pearson *r* analyses showed that the significant and trend variables in order of the strongest to the weakest correlation coefficients were: *commodity/supplier selection process* (r = .520, p = .000), information quality from the most successful alliance (r = .471, p = .000), information participation (r = .465, p = .000), trust & coordination (r = .462, p = .000), information sharing (r = .434, p = .000), proprietary information sharing (r = .364, p = .000), commitment from the most successful alliance (r = .345, p = .000), commitment from the least successful alliance (r = .286, p = .000), avoidance & constructive *conflict resolution techniques* (r = .285, p = .000), destructive *conflict resolution techniques* (r = -.227, p = .005, inverse), and information quality from

the least successful alliance (r = .186, p = .022). A summary of the results of Pearson r correlations of these variables examined for Hypothesis H_{6b} is presented in Table 4-170.

Table 4-170

Pearson r Correlations of Continuous Variables and Significant Categorical Variables (Dummy) with the Variable of Learning and Growth Perspective Performance, N = 150

Variables	Pearson *r*	*p*
Alliance Manager Characteristics		
Age	.080	.328
Education Level	.134	.102
Job Tenure	.127	.123
Job Title	.006	.944
Yearly Income	-.081	.325
Organizational Characteristics Variables		
Number of Employees	-.083	.315
Number of U.S. Offices	-.057	.488
Number of Foreign Offices	-.085	.299
Total Revenue	-.101	.219
Attributes of the Alliance		
Trust & Coordination	**.462**	**.000**
Commitment (the Least)	**.286**	**.000**
Commitment (the Most)	**.345**	**.000**
Interdependence	.031	.706
Communication Behavior		
Information Quality (the Least)	**.186**	**.022**
Information Quality (the Most)	**.471**	**.000**
Information Sharing	**.434**	**.000**
Information Participation	**.465**	**.000**
Proprietary Information Sharing	**.364**	**.000**
Conflict Resolution Techniques		
Avoidance & Constructive	**.285**	**.000**
Destructive	**-.227**	**.005**
Commodity/Supplier Selection Process	**.520**	**.000**

All seven of the models produced significant F values, testing for the significance of R^2, which is the significance of the regression model as a whole. Model 9 with eleven explanatory variables including none variables from both alliance manager characteristics

categorical variables and organizational characteristics categorical variables, three variables from *attributes of the alliance* (trust & coordination, commitment from the least/most successful alliance), five variables from *communication behavior* (information quality from the least/most successful alliance, information sharing, information participation, and proprietary information sharing), entire *conflict resolution techniques* (avoidance & constructive and destructive), and *commodity/supplier selection process* was the best explanatory model to explain the *adjusted satisfaction with the alliance* based on success difference ($F = 9.404$, $p = .000$). With each entry of a variable into the model as shown in Table 4-171, the R^2 increased in Model 1 through Model 9. The adjusted R^2 also increased with each new model in Model 1 through Model 9, except for Model 5 (information sharing), which had a decreased adjusted R^2 (33.7%). Model 9 produced the highest R^2 of 42.8% and the highest adjusted R^2 of 38.3%. As a result, Model 9 was selected as the best explanatory model for predicting *learning and growth perspective performance*. The best explanatory model found was:

Learning and Growth Perspective Performance = 2.32 (*Constant*) + .33 (*Commodity/Supplier Selection Process*) + .11 (*Information Quality from the Most Successful Alliance*) – .01 (*Information Participation*) + .16 (*Trust & Coordination*) – .03 (*Information Sharing*) + .24 (*Proprietary Information Sharing*) + .04 (*Commitment from the Most Successful Alliance*) + .16 (*Commitment from the Least Successful Alliance*) + .07 (*Avoidance & Constructive Conflict Resolution Techniques*) – .20 (*Destructive Conflict Resolution Techniques*) + .03 (*Information Quality from the Least Successful Alliance*) + ε

The *t*-statistic, which is the ratio of the regression coefficient to its standard error (*B/SE*), was used to analyze the individual predictors in Model 9. Analysis of individual predictors indicated four of the eleven predictors were significant with *learning and growth perspective performance*. The standardized beta coefficient (β) for the four significant predictors, one trend predictors, and the remaining predictors indicated their relative importance in explaining *learning and growth perspective performance*. Commodity/supplier selection process (t = 2.740, p = .007, β = .237) was the most important predictor in the model. The second and third most important predictors were proprietary information sharing (t = 2.267, p = .025, β = .179) and commitment from the least successful alliance (t = 1.978, p = .050, β = .165) in the model. Destructive *conflict resolution techniques* (t = -2.139, p = .034, β = -.164) was the fourth most important predictor in the model, and had an inverse relationship with *learning and growth perspective performance*. The inverse relationship indicated that the more destructive *conflict resolution techniques* the construction alliance managers employed, the lower their *learning and growth perspective performance* was. The fifth most important predictor in the model was information quality from the most successful alliance (t = 1.689, p = .094, β = .159). While neither a significant nor trend predictor, the sixth most important predictor in the model was trust & coordination (t = 1.179, p = .240, β = .133). The order of the remaining predictors were avoidance & constructive *conflict resolution techniques* (t = .876, p = .382, β = .069), information quality from the least successful alliance (t = .589, p = .557, β = .051), commitment from the most successful alliance (t = .552, p = .582, β = .042), information sharing (t = -.349, p = .728, β = -.035), and information participation (t = -.178, p = .859, β = -.019). Results of the regression

analyses showed H_{6f} was partially supported. The results of hierarchical multiple regression for H_{6f} are displayed in Table 4-171.

Table 4-171

Summarized Hierarchical Multiple Regression Analysis the Explanatory Variables and Learning and Growth Perspective Performance, N = 150

Model	*F*	*p*	*df*	*B*	*SE*	*β*	*t*	*p*	R^2	Adj. R^2
Model 1	54.981	.000	1						.271	.266
Model 2	37.693	.000	2						.339	.330
Model 3	26.720	.000	3						.354	.341
Model 4	20.359	.000	4						.360	.342
Model 5	16.178	.000	5						.360	.337
Model 6	14.892	.000	6						.385	.359
Model 7	12.959	.000	7						.390	.360
Model 8	12.204	.000	8						.409	.376
Model 9	9.404	.000	11						.428	.383
(Constant)				2.317	1.743		1.329	.186		
Commodity/Supplier Selection Process				.327	.119	.237	2.740	.007		
Information Quality (from the Most Successful Alliance)				.106	.063	.159	1.689	.094		
Information Participation				-.012	.067	-.019	-.178	.859		
Trust & Coordination				.158	.134	.133	1.179	.240		
Information Sharing				-.028	.080	-.035	-.349	.728		
Proprietary Information Sharing				.244	.107	.179	2.267	.025		
Commitment (from the Most Successful Alliance)				.040	.073	.042	.552	.582		
Commitment (from the Least Successful Alliance)				.160	.081	.165	1.978	.050		
Avoidance & Constructive Conflict Resolution Techniques				.072	.082	.069	.876	.382		
Destructive Conflict Resolution Techniques				-.198	.093	-.164	-2.139	.034		
Information Quality (from the Least Successful Alliance)				.027	.045	.051	.589	.557		

H6g: Alliance Manager Characteristics, Organizational Characteristics, Dimensions of Alliances, and Success of the Alliances (Total Score)

H_{6g}: Alliance manager characteristics, organizational characteristics, dimensions of alliance are significant explanatory variables of the *success of the alliance (total score)* in the construction industry.

Alliance manager characteristics categorical variables of gender, ethnicity, and race showed no significant *eta* correlations with *success of the alliance (total score)*, and thus, those variables were not included in either the Pearson *r* or regression analyses. *Organizational characteristics* categorical variables of U.S. region, type of location area, and new contracts showed no significant *eta* correlations with *success of the alliance (total score)*. Alliance training programs did have a significant eta correlation ($\eta = .181$, $F = 5.018$, $p = .027$) with *success of the alliance (total score)*. The results of *eta* correlations using the means procedure in SPSS are shown in Table 4-172.

Table 4-172

Eta Correlations of the Categorical Variables with the Variable of Success of the Alliances (Total Score), N = 150

Categorical Variables	Eta (η)	Eta Squared ($\eta 2$)	*F*	*p* value
Correlations with Alliance Performance (Total Scale)				
Gender	.023	.001	.077	.781
Ethnicity	.119	.014	2.109	.149
Race	.153	.023	1.166	.325
U.S. Region	.107	.012	.423	.792
Type of Location Area	.082	.007	.495	.611
New Contracts	.095	.009	1.353	.247
Alliance Training Programs	.181	.033	**5.018**	**.027**

Following the results from *eta* correlations, two dummy variables were created for alliance training programs, and these dummy variables were included in the Pearson *r* correlation analysis of *organizational characteristics* categorical variables (number of employees, number of U.S. offices, number of foreign offices, total revenue), *alliance manager characteristics* interval variables (age, job tenure, job title, and yearly income), *dimensions of alliances* (*attributes of the alliance*, *communication behavior*, *conflict resolution techniques*, and *commodity/supplier selection process*) with *success of the alliance (total score)*. Results of Pearson *r* correlations of the dummy coded variables for alliance training programs showed a positive, significant correlation between construction managers with alliance training programs ($r = .181$, $p = .027$) and *success of the alliance (total score)*, as well as an inverse relationship between construction managers with no alliance training programs ($r = -.181$, $p = .027$) and *success of the alliance (total score)*. The inverse relationship indicated that construction managers without alliance training programs obtained a lower level of *success of the alliance (total score)*. Whether or not offering alliance training programs in respondents' business units was dichotomous (i.e., yes/no question) and only one of this categorical variable was entered into a regression model.

Results of Pearson *r* analyses showed that the significant and trend variables in order of the strongest to the weakest correlation coefficients were: trust & coordination ($r = .644$, $p = .000$), information participation ($r = .629$, $p = .000$), information quality from the most successful alliance ($r = .617$, $p = .000$), information sharing ($r = .610$, $p = .000$), *commodity/supplier selection process* ($r = .585$, $p = .000$), commitment from the most successful alliance ($r = .506$, $p = .000$), avoidance & constructive *conflict resolution*

techniques (r = .442, p = .000), proprietary information sharing (r = .375, p = .000), and destructive *conflict resolution techniques* (r = -.291, p = .000, inverse), commitment from the least successful alliance (r = .261, p = .001), alliance training programs (r = .181, p = .027) , and education (r = .137, p = .096) . A summary of the results of Pearson r correlations of these variables examined for Hypothesis H_{6b} is presented in Table 4-173.

Table 4-173

Pearson r Correlations of Continuous Variables and Significant Categorical Variables (Dummy) with the Variable of Success of the Alliances (Total Score), N = 150

Variables	Pearson *r*	*p*
Alliance Manager Characteristics		
Age	.087	.292
Education Level	**.137**	**.096**
Job Tenure	.072	.380
Job Title	-.035	.670
Yearly Income	-.012	.880
Organizational Characteristics Variables		
Alliance Training Programs		
Yes [a]	**.181**	**.027**
No [a]	**-.181**	**.027**
Number of Employees	.003	.968
Number of U.S. Offices	.007	.929
Number of Foreign Offices	-.014	.861
Total Revenue	-.010	.900
Attributes of the Alliance		
Trust & Coordination	**.644**	**.000**
Commitment (the Least)	**.261**	**.001**
Commitment (the Most)	**.506**	**.000**
Interdependence	.072	.384
Communication Behavior		
Information Quality (the Least)	.116	.157
Information Quality (the Most)	**.617**	**.000**
Information Sharing	**.610**	**.000**
Information Participation	**.629**	**.000**
Proprietary Information Sharing	**.375**	**.000**
Conflict Resolution Techniques		
Avoidance & Constructive	**.442**	**.000**
Destructive	**-.291**	**.000**
Commodity/Supplier Selection Process	**.585**	**.000**

Note. [a] coded dummy variable.

All seven of the models produced significant F values, testing for the significance of R^2, which is the significance of the regression model as a whole. Model 9 with twelve explanatory variables including one variable from alliance manager characteristics categorical variables (education level), one variable from organizational characteristics

categorical variables (alliance training programs), three variables from *attributes of the alliance* (trust & coordination, commitment from the least/most successful alliance), four variables from *communication behavior* (information quality from the most successful alliance, information sharing, information participation, and proprietary information sharing), entire *conflict resolution techniques* (avoidance & constructive and destructive), and *commodity/supplier selection process* was the best explanatory model to explain the *success of the alliance (total score)* ($F = 22.001, p = .000$). With each entry of a variable into the model as shown in Table 4-174, the R^2 and the adjusted R^2 increased in Model 1 through Model 9. Model 9 produced the highest R^2 of 65.8% and the highest adjusted R^2 of 62.8%. As a result, Model 9 was selected as the best explanatory model for predicting *success of the alliance (total score)*. The best explanatory model found was:

> *Success of the Alliance (Total Score)* = 4.92 (*Constant*) + .97 (*Trust & Coordination*) + .19 (*Information Participation*) + .64 (*Information Quality from the Most Successful Alliance*) + .30 (*Information Sharing*) + 1.17 (*Commodity/Supplier Selection Process*) + .82 (*Commitment from the Most Successful Alliance*) + .85 (*Avoidance & Constructive Conflict Resolution Techniques*) + .97 (*Proprietary Information Sharing*) – 1.05 (*Destructive Conflict Resolution Techniques*) + .60 (*Commitment from the Least Successful Alliance*) + .54 (*Offering Alliance Training Programs Dummy Variable*) + 1.94 (*Education Level*) + ε

The *t*-statistic, which is the ratio of the regression coefficient to its standard error (*B/SE*), was used to analyze the individual predictors in Model 9. Analysis of individual predictors indicated seven of the twelve predictors were significant with *success of the*

alliance (total score). The standardized beta coefficient (β) for the seven significant predictors, one trend predictors, and the remaining predictors indicated their relative importance in explaining *success of the alliance (total score)*. Information quality from the most successful alliance (t = 2.376, p = .019, β = .176) was the most important predictor in the model. Destructive *conflict resolution techniques* (t = -2.731, p = .007, β = -.160) was the second most important predictor in the model, and had an inverse relationship with *success of the alliance (total score)*. The inverse relationship indicated that the construction alliance managers who employed more destructive *conflict resolution techniques* received lower total score of *success of the alliance*. Commitment from the most successful alliance (t = 2.625, p = .010, β = .158) and commodity/supplier selection process (t = 2.295, p = .023, β = .156) were the third and fourth most important predictors in the model. The fifth most important predictor was avoidance & constructive *conflict resolution techniques* (t = 2.452, p = .015, β = .149). Although not significant, trust & coordination (t = 1.745, p = .083, β = .149) was the sixth important predictor in the model. The seventh and eighth important predictors were proprietary information sharing (t = 2.140, p = .034, β = .131) and commitment from the least successful alliance (t = 2.050, p = .042, β = .113). While neither a significant nor trend predictor, education level (t = 1.583, p = .116, β = .083) and information sharing (t = .890, p = .375, β = .069) were the ninth and tenth most important predictors in the model. The eleventh predictor was information participation (t = .682, p = .497, β = .055). The twelfth and final predictor was the alliance training programs dummy variable "Yes" (t = .254, p = .800, β = .014) in the model. Results of the regression analyses showed H_{6g} was partially

supported. The results of hierarchical multiple regression for H_{6g} are displayed in Table 4-174.

Table 4-174

Summarized Hierarchical Multiple Regression Analysis the Explanatory Variables and Success of the Alliances (Total Score), N = 150

Model	*F*	*p*	*df*	*B*	*SE*	*β*	*t*	*p*	R^2	Adj. R^2
Model 1	105.104	.000	1						.415	.411
Model 2	70.623	.000	2						.490	.483
Model 3	54.954	.000	3						.530	.521
Model 4	43.837	.000	4						.547	.535
Model 5	39.731	.000	5						.580	.565
Model 6	38.573	.000	6						.618	.602
Model 7	33.576	.000	7						.623	.605
Model 8	29.899	.000	8						.629	.608
Model 9	22.001	.000	12						.658	.628
(Constant)				4.920	7.582		.649	.518		
Trust & Coordination				.966	.554	.149	1.745	.083		
Information Participation				.192	.281	.055	.682	.497		
Information Quality (from the Most Successful Alliance)				.641	.270	.176	2.376	.019		
Information Sharing				.298	.334	.069	.890	.375		
Commodity/Supplier Selection Process				1.170	.510	.156	2.295	.023		
Commitment (from the Most Successful Alliance)				.820	.312	.158	2.625	.010		
Avoidance & Constructive Conflict Resolution Techniques				.848	.346	.149	2.452	.015		
Proprietary Information Sharing				.972	.454	.131	2.140	.034		
Destructive Conflict Resolution Techniques				-1.050	.385	-.160	-2.731	.007		
Commitment (from the Least Successful Alliance)				.599	.292	.113	2.050	.042		
Alliance Training Programs (Yes)				.542	2.134	.014	.254	.800		
Education Level				1.939	1.225	.083	1.583	.116		

Chapter IV presented a description of the sample, the psychometric evaluation of the measurement scales, results of the analysis of the research questions, and results of hypotheses testing for this study. Chapter V provides a discussion of the interpretations, limitations, practical implications, conclusions, and recommendations for future study, based on the review of literature and the findings related to the alliance manager characteristics, organizational characteristics, dimension of alliances (*attributes of the alliance*, *communication behavior*, *conflict resolution techniques*, and *commodity/supplier selection process, and the total score*), and success of the alliance (*satisfaction, adjusted satisfaction, financial perspective performance, customer perspective performance, internal-business-process perspective performance, learning and growth perspective performance, and the total score*).

CHAPTER V

DISCUSSION

Chapter V presents a discussion of the results reported in Chapter IV about the relationships among supply chain management, strategic alliances, and organizational performance with implications for the construction industry in the United States. The specific purposes of this non-experimental, mixed method, predominantly quantitative, descriptive, comparative (exploratory), and correlational (explanatory and predictive) survey research study were (1) to describe the perceptions of the alliance managers from USA-based general contractor companies in terms of alliance manager characteristics, organizational characteristics, dimension of alliances (attributes of the alliance, communication behavior, conflict resolution techniques, and commodity/supplier selection process), and success of the alliance (i.e., alliance performance), (2) to explore the relationships among alliance manager characteristics, organizational characteristics, dimension of alliances, and success of the alliance, (3) to examine whether the alliance manager characteristics, organizational characteristics, and dimensions of alliance influence the success of the alliance, and (4) to investigate whether establishing strategic alliances assists the execution of supply chain management and further enhances organizational performance including competitive advantages for achieving success and benefits of the alliance. The major purpose was to explain the differences in dimensions of alliances and success factors of the alliance among the demographics of the alliance managers, including, gender, age, education level, race, ethnicity, job tenure, job title and yearly income. In addition, this study examined the differences in dimensions of alliances and success factors among the alliance managers in relation to the number of

employees, number of U.S. offices, number of foreign offices, U.S. region, type of location area, total revenue, new contract, and alliance training programs. The summary and interpretations of findings, practical implications, conclusions, limitations, and recommendations for future study are also presented in this chapter.

Interpretations

Data Producing Sample

In this study, through three-stage sampling techniques, an estimated 3,434 USA-based general contractor companies focusing on strategic alliances from the 2008 Top Lists of *Engineering News Record (ENR)* and the *Blue Book of Building and Construction* online directory were invited to participate in the online survey and 197 responses were received (5.7% response rate). Because 47 responses were invalid, a total of 150 valid responses were used in the data analysis procedures. The final data producing sample consisted of alliance managers/executives whose companies were related to the building construction contractors under the supply chain management with annual revenues of more than $100 million and those managers/executives who were in charge of strategic alliances in their companies in both the local and international construction contracting industry from the United States and had been employed at their companies for the past six months.

Psychometric Evaluation of Measures

Dimension of alliances scales of this study adapted Monczka et al.'s modified model of successful strategic supplier alliance developed by Mohr and Spekman's (1994) *Characteristics of Partnership Success* model. In this study, to measure construction executives' perceptions toward experience and satisfaction with strategic alliances,

Monczka et al.'s (1998) *Indicators of Success Scale* was modified. The original scale consisted of seven items with two separate dimensions (factors) measuring past success (i.e., satisfaction) and success difference (i.e., adjusted satisfaction). As a result of EFA, the modification retained the six original items and resulted in two factors as originally expected. Exploratory factor analysis (EFA) supported the factor structure reported by Monczka et al. (1998) of independent past success and success difference subscales. Factor loadings further established construct validity for the two subscales, with factor loadings ranging from of .837 to .897 for factor 1 (past success) and from .491 to .713 for factor 2 (success difference). Reliability analysis revealed that Cronbach's alphas for the past success and success difference subscales were .933 and .752 respectively, while the total scale coefficient alpha was .899. These results were similar to findings reported in 1998 by Monczka et al. of .911 for past success. Thus, internal consistency reliability was estimated for the modified scale.

Attributes of the construction strategic alliance were measured by the *Attributes of the Alliance Scale* developed by Monczka et al. (1998). The original scale consisted of eleven items with four constructs measuring trust and coordination (4 items), commitment (4 items), and interdependence (3 items) as three separate dimensions. As a result of EFA, the modified scale retained the nine original items and additional three items with the same questions and resulted in a four factor structure—trust & coordination and interdependence in its original dimensions, and commitment from the least successful alliance and commitment from the most successful alliance as two re-named dimensions—because the study divided commitment into two groups. This result was somewhat consistent with the proposition that once trust is established, firms learn

that coordinated efforts will lead to better outcomes than they acted solely in their own best interests (Anderson & Narus, 1990). For the 3-item trust & coordination subscale, the factor loadings ranged from .749 to .873 and from .735 to .860 for the 3-item commitment (the least) subscale. For the 4-item commitment (the most) subscale, the factor loadings ranged from .565 to .866 and from .867 to .894 for the 2-item interdependence subscale. Thus, construct validity was established for the modified *Attributes of the Alliance Scale*. Reliability analysis revealed that Cronbach's alphas for the trust & coordination, commitment from the least/most successful alliance and interdependence subscales were .853, .806, .801 and .840 respectively, while the total scale coefficient alpha was .761. These results were similar to findings reported in 1998 by Monczka et al. of .811, .711, and .711 for trust & coordination, commitment, and interdependence respectively. Thus, internal consistency reliability was also estimated.

The extent of information communicated to the construction suppliers was measured by *Communication Behavior Scale* developed by Monczka et al. (1998). The original scale consisted of seventeen items with three constructs measuring information quality (5 items), information participation (5 items), and information sharing (7 items) in Mohr and Spekman's (1994) model, whereas Monczka et al. (1998) combined information quality and participation into a single construct. The study divided "information quality" into two groups with the same questions: one was from the most successful alliance and the other was from the least. As a result of EFA, the modified scale retained the sixteen original items and additional five items from information quality (the opposite side). The information quality (the least), information quality (the most), and information participation subscales loaded on Factors 1, 2, and 4 with factor

loadings of .908 to .942, .859 to .873, and .589 to .827, respectively. Five items of information sharing subscale loaded into Factor III, "information sharing," as expected and two of the other items loaded together into Factor V, which were named "proprietary information sharing." Reliability analysis revealed that Cronbach's alphas were .965 for information quality (the least), .943 for information quality (the most), .917 for information sharing, .896 for information participation, and .826 for proprietary information sharing respectively, while the total scale coefficient alpha was .915. These results were similar to findings reported in 1998 by Monczka et al. of .934 for information quality and participation and .849 for information sharing respectively. Construct validity was established and internal consistency reliability was estimated for the scale with satisfactory results, thus it was used to answer the research questions and test the hypotheses used in this study.

In this study, to measure the manner in which conflict is resolved by construction executives in the strategic alliances, Monczka et al.'s (1998) *Conflict Resolution Techniques Scale* was modified. The original scale consisted of five items with three dimensions (factors) measuring constructive, avoidance, and destructive conflict resolution techniques. As a result of EFA, the modified scale retained the five original items; however, the modification resulted in two factors combining constructive and avoidance as one dimension, and destructive in its original dimension. Exploratory factor analysis (EFA) did not support the factor structure reported by Monczka et al. (1998) of independent constructive, avoidance, and destructive subscales. Factor loadings for the two factors were sufficient to establish construct validity, with the factor loading ranging from .745 to .846 for factor 1 (avoidance and constructive) and ranging from .883 to .886

for factor 2 (destructive). Reliability analysis revealed that Cronbach's alphas for the avoidance & constructive and destructive subscales were .700 and .754 respectively, while the total scale coefficient alpha was .569 (close to a minimally acceptable .60). Thus, internal consistency reliability was also estimated for the modified scale.

EFA for the *Commodity/Supplier Selection Process Scale* developed by Monczka et al. (1998) to measure the business units' process within the buying companies to select commodities and assess appropriate suppliers (i.e., linking the alliance objectives to the business unit strategy and the procurement strategy) in the construction firms. Factor loadings further established construct validity for the unidimensional, semantic differential scale with factor loadings of .942. Reliability analysis revealed a total scale coefficient alpha of .873. Construct validity was established and internal consistency reliability was estimated for the scale with satisfactory results, thus it was used to answer the research questions and test the hypotheses used in this study. However, further studies are suggested to examine the multidimensional nature of the scale (e.g., negotiations).

A 16-item *Alliance Performance/Success of the Alliance Scale* was developed by the researcher based on Kaplan and Norton's (1996c) description of organizational performance. EFA confirmed the four factor structure (i.e., four performance perspectives) of the Balanced Scorecard reported by Kaplan and Norton (1996c) of independent customer, learning and growth, financial and internal-business-process performance subscales. Factor loadings for the two factors were sufficient to establish construct validity, with the factor loading ranging from .802 to .873 for Factor 1 (customer); from .763 to .819 for Factor 2 (learning and growth); from .599 to .782 for

Factor 3 (financial); from .735 to .855 for Factor 4 (internal-business-process). Reliability analysis revealed that Cronbach's alphas for the customer, learning and growth, financial and internal-business-process performance subscales were .948, .931, .893 and .916 respectively, while the total scale coefficient alpha was .955. Thus, the construct validity and demonstrated reliability were established for the *Alliance Performance Scale.*

Convergent validity was established using Pearson *r* intercorrelations, and as expected, positive relationships were found between the modified *Attributes of the Alliance Scale* and the following scales (the modified *Communication Behavior Scale*, *Conflict Resolution Techniques Scale*, and *Commodity/Supplier Selection Process Scale*) and between the modified *Communication Behavior Scale* and both the *Conflict Resolution Techniques Scale*, and the *Commodity/Supplier Selection Process Scale.* A summary of the psychometric evaluation of measures is presented in Table 5-1.

Table 5-1

Summary of the Psychometric Evaluation of Measures Using EFA and Coefficient Alpha

Scale	Reliability	Validity			Analysis
	α	Construct Validity			
		Exploratory Factor Analysis			
		Factors	Loadings	Variance Explained	
Modified Indicators of Success Scale (6 items)	.899	2	.491-.897	72.9%	Construct validity established. Strong reliability. Two dimensions supported with EFA. Modified scale used in regression.
Past Success (4 items)	.933		.837-.897		
Success Difference (2 items)	.752		.491-.713		
Modified Attributes of the Alliance Scale (12 items)	.761	4	.565-.894	66.0%	Construct validity established. Strong reliability. Four dimensions partially supported with EFA. Modified scale used in regression.
Trust and Coordination (3 items)	.853		.749-.873		
Commitment from the Least Successful Alliance (3 items)	.806		.735-.860		
Commitment from the Most Successful Alliance (4 items)	.801		.565-.866		
Interdependence (2 items)	.840		.867-.894		
Modified Communication Behavior Scale (21 items)	.915	5	.589-.942	79.7%	Construct validity established. Strong reliability. Five dimensions not supported with EFA. Modified scale used in regression.
Information Quality from the Least Successful Alliance (5 items)	.965		.908-.942		
Information Quality from the Most Successful Alliance (5 items)	.943		.859-.873		
Information Sharing (4 items)	.917		.702-.830		
Information Participation (5 items)	.896		.589-.827		
Proprietary Information Sharing (2 items)	.826		.851-.871		

Continued

Table 5-1 (Continued)

Scale	Reliability	Validity			Analysis
	α	Construct Validity			
		Exploratory Factor Analysis			
		Factors	Loadings	Variance Explained	
Modified Conflict Resolution Techniques Scale (5 items)	.569	2	.745-.886	71.7%	Construct validity established. Good reliability. Two dimensions not supported with EFA. Modified scale used in regression.
Avoidance and Constructive Conflict Resolution Techniques (3 items)	.700		.745-.846		
Destructive Conflict Resolution Techniques (2 items)	.754		.883-.886		
Commodity/Supplier Selection Process Scale (2 items)	.873	1	.942	88.8%	Construct validity established. Strong reliability. One dimensions supported with EFA. Scale used in regression.
Alliance Performance Scale (16 items)	.955	4	.735-.873	72.3%	Construct validity established and also confirmed multidimensional scale. Strong reliability. Four dimensions supported with EFA. Modified scale used in regression.
Customer Perspective (4 items)	.948		.802-.873		
Learning and Growth Perspective (3 items)	.931		.763-.819		
Financial Perspective (4 items)	.898		.599-.782		
Internal-Business-Process Perspective (5 items)	.916		.735-.855		

Summary and Interpretations of Research Questions

Research Question 1: Descriptive Characteristics of the Sample

Research Question 1 explored the alliance manager characteristics, organizational characteristics, dimensions of alliances, and success factors of alliances in the construction industry of USA-based contractor companies using frequency distributions,

measures of central tendency, and variability. The following provides the interpretations related to the findings reported in Chapter IV.

Alliance manager characteristics profile. The sociodemographic profiles of *Alliance Manager Characteristics* developed by the researcher, asked questions about gender, age, education level, race, ethnicity, job tenure, job title, and yearly income. Of the 150 respondents, the majority were male (86%) while females represented 14% of the participants. The largest age group was between 35 and 44 years old (31.3%). In terms of education, those who had one to three years of college, four-year college graduates or professional degrees accounted for approximately 95.3% of the respondents. The majority of respondents were white (92%). The Non-Hispanic (ethnicity) group accounted for the overwhelming majority of the respondents with a total of 97.3%. Respondents who had "10 or more years" job tenure were the largest group (35.3%). After re-categorization, the results of respondents' primary job title in their firm were as follows: top-level manager/corporate executive (38.7%), supervisor (27.3%), non-supervisory (21.3%), and middle-level manager (12.7%). In addition, most respondents (72.7%) reported that they did not have job titles within the construction supplier partnerships while the rest were alliance managers, alliance team members, or other title (27.3%). Finally, the majority (42%) of participants had yearly income in US dollars between 75,000 and 124,999. These results in terms of gender, race, and ethnicity were consistent with the employment by detailed occupation and minority groups (Bureau of Labor Statistics, 2009). A 2009 Current Population Survey (CPS) conducted by the Bureau of Census found that the percentage of females (gender) was 3.7% of the total 735 thousand first-line supervisors/managers of construction trades and extraction

workers, Blacks and Asians (race) accounted for 5.8% (5% and .08% respectively), and the Hispanic or Latino (ethnicity) group was 16.1% (http://www.bls.gov/cps/cpsaat11.pdf).

Organizational characteristics profile. The setting profile of *Organizational Characteristics* developed by the researcher, asked questions about the number of employees (i.e., organizational size), number of U.S. offices, number of foreign offices, U.S. region, location type, and total revenue (i.e., annual sales in dollars). Two questions also asked about whether receiving a new contract currently and whether the respondents' companies offer or develop alliance training programs. For the respondents' companies, the average number of employees was 23,538 with the highest percentage (34.7%) of firms having 1,001-5,000 employees. The majority of respondents reported their companies as having U.S. offices between 6 and 50 (49.4%) and the average number of U.S. offices was 43. The average number of foreign offices was 23 but one half of the total respondents identified that their companies had "zero" offices outside the U.S. The largest and the second largest number of selected companies were regionally located in the Midwest (25.3%) and the Southeast (24%), respectively, while the smallest number (13.3%) was in the West. Three types of location in the study included urban (48.7%), suburban (46.7%), and rural (4.6%). More than half of the respondents indicated that the total revenue including domestic and international in U.S. dollars for their firms was "more than $1 billion." Most respondents (91.3%) reported receiving new construction contracts in their companies recently and over half of the total sampled companies were "not" offering alliance training programs (64%). The results in terms of the number of foreign offices were consistent with the literature in that some U.S. contractors were

included in both local and international contractor lists. Sakar et al.'s (2001) study on the impact of partner characteristics on the performance of construction alliances had a sample represented by 68 participants from United States and 18 other countries as reported in the *Engineering News Record (ENR)*. The study indicated that the complexity of projects in the construction industry makes international alliances important and necessary to collaborate with other specialist firms not only locally but also internationally.

Dimensions of alliances. Four scales comprised the Dimensions of Alliances. First of all, the modified *Attributes of the Alliance Scale* was composed of four dimensions representing trust & coordination, commitment from the least/most successful alliance, and interdependence. Total possible scale scores ranged from 12 to 84. The average total modified *Attributes of the Alliance Scale* score for the total sample was 54.56 (SD = 7.630) and the average item mean in this study was 4.55 (range of 1 to 7). Results in this study were consistent with previous research findings that trust & coordination, commitment, and interdependence were important predictors in the working partnerships (Anderson & Narus, 1990; Dwyer, Schurr, & Oh, 1987; Frazier, Spekman, & O'Neal, 1988; Ring & Van de Ven, 1994; Mohr & Spekman, 1994; Monczka et al., 1998; Kauser & Shaw, 2004; Voss, Johnson, Cullen, Sakano, & Takenouchi, 2006). Individual subscale item means for this study ranged from 5.25 for trust & coordination to 3.98 for commitment from the least successful alliance. Higher scores are interpreted as greater perceptions of attributes of the buyer-supplier relationship, and therefore respondents in this study had higher perceptions of trust & coordination than commitment from the least successful alliance. This was consistent

with a study that successful strategic alliances were associated with high levels of trust & coordination and interdependence but the hypothesized relationship for commitment was not supported (Monczka et al., 1998). Additionally, the findings were inconsistent with Kauser and Shaw (2004), whose research was supported by Mohr and Spekman (1994), which found the negatively hypothesized relationship between independence and international strategic alliance performance and managers' satisfaction.

However, commitment in the study was divided into two situations—the least and most successful alliances—which would lead to response bias since participants answered the questions in the way they think the researcher wanted them to compare opposite conditions. Therefore, individual subscale item means for commitment from the most successful alliance (M = 4.59, SD = 3.601) was higher than that from the least successful alliance (M = 3.98, SD = 3.537). When ignoring commitment from the least successful alliance, individual subscale item means ranged from 5.25 for trust & coordination to 4.25 for independence. This was somewhat consistent with studies in which trust & coordination and commitment were positively associated with more successful partnerships, compared to less successful partnerships (Mohr & Spekman, 1994; Kauser & Shaw, 2004). According to Monczka et al. (1998), the relationship between commitment and successful strategic alliance appeared to be inconsistent with other studies, since the Monczka et al.'s study indicated no significant differences, while others had found significant differences (Mohr & Spekman, 1994; Kauser & Shaw, 2004).

Second, the modified *Communication Behavior Scale* was made up of five subscales organized as information quality from the least/most successful alliance, information sharing, information participation, and proprietary information sharing.

Total possible scale scores ranged from 21 to 147. The average total modified *Communication Behavior Scale* score for the total sample was 97.74 (SD = 16.298) and the average item mean in this study was 4.65 (range of 1 to 7). Individual subscale item means for this study ranged from 5.40 for information quality from the most successful alliance to 3.59 for information quality from the least successful alliance. Results were concurrent with previous studies where successful strategic alliances were associated with high levels of information sharing, information quality, and information participation (Monczka et al., 1998; Kauser & Shaw, 2004), and the higher information quality and participation, the more satisfaction for partnership success (Mohr & Spekman, 1994). This finding, however, was inconsistent with Mohr and Spekman's (1994), whose research indicated that information sharing was negatively associated with satisfaction with profit and manufacturer support in a working partnership.

Third, the *Conflict Resolution Techniques Scale* was comprised of five items organized as avoidance & constructive techniques (smoothing over, joint problem solving, and persuasion) and destructive techniques (harsh words and outside arbitration). Total possible scale scores ranged from 5 to 35. The average total modified *Conflict Resolution Techniques* score for the total sample was 19.55 (SD = 4.46) and the average item mean in this study was 3.91 (range of 1 to 7). Results were concurrent with a study where conflict showed a negative, significant relationship with the performance and satisfaction with the international strategic alliance (Kauser & Shaw, 2004). Individual subscale item means for this study ranged from 4.72 for avoidance & constructive conflict resolution techniques to 2.71 for destructive conflict resolution techniques. The findings were consistent with other studies where alliance success were

associated with low use of destructive conflict resolution techniques (Monczka et al., 1998; Kauser & Shaw, 2004). The findings were not concurrent with a study in which arbitration was positively related with satisfaction with profit in a partnership (Mohr & Spekman, 1994). However, the results were somewhat inconsistent with previous studies in which conflict avoidance techniques (smoothing over) were negatively associated with successful partnerships (Mohr & Spekman, 1994; Monczka et al., 1998). In terms of constructive techniques, there were discrepancies between this study and other researches. Monczka et al. (1998) was supported by Mohr and Spekman (1994) who found that joint problem solving was positively related to successful strategic alliance and satisfaction with manufacturer support. In Monczka et al.'s study, low use of persuasion was associated with a successful alliance; however, the hypothesized relationship for persuasion showed no support in Mohr and Spekman's research. Finally, on the *Commodity/Supplier Selection Process Scale*, the average total modified *Commodity/Supplier Selection Process* score for the total sample was 9.28 (SD = 2.486), out of a possible 14 points. The average item mean in this study was 4.64 (range of 1 to 7). The findings were consistent with previous studies where a formal purchasing commodity strategy development process and a formal supplier assessment and selection process were related to alliance success (Monczka et al., 1998).

Success factors. In order to measure alliance success factors, the study employed *Indicators of Success Scale* developed by Monczka et al. (1998) to assess past success and success difference between the respondents' overall satisfaction with all of their strategic supplier alliances and their overall satisfaction with the specific strategic alliance. Also used was the *Organizational Performance Scale* developed by the

researcher, based on the *Balanced Scorecard* (Kaplan & Norton, 1996c), to assess financial and non-financial perceptions of alliance performance. On the modified *Indicators of Success Scale*, the average total score for the total sample was 29.77 (SD = 6.000), out of a possible 42 points, and the average item mean in this study was 4.96 (range of 1 to 7). Individual subscale item means for this study ranged from 5.03 for past success to 4.83 for success difference. The respondents reported that they agreed with past success of strategic supplier alliance/partnership relationship through a fully integrated supply chain and that overall, they were satisfied with their alliances. The finding was consistent with a study that supplier alliance was found beneficial with the item mean of 4.68 for overall satisfaction with strategic alliances (Monczka et al., 1998).

On the *Organizational Performance Scale*, the average total score for the total sample was 79.33 (SD = 15.304), out of a possible 112 points, and the average item mean in this study was 4.96 (range of 1 to 7). Individual subscale item means for this study ranged from 5.15 for customer perspective performance to 4.77 for internal-business-process perspective performance. No previous study had investigated the relationship between strategic alliance and organizational performance. Therefore, this study provided new knowledge in this area. Table 5-2 presents the average item ratings and mean scores for the modified dimensions of alliance, and organizational performance scales.

Table 5-2

Average Item Ratings and Mean Scores for the Modified Dimensions of Alliance, and Organizational Performance Scales

Variable Name	Average Item Rating	Scale Mean	Conclusion
Modified Attributes of the Alliance			Agree
Trust and Coordination (Range 3 - 21)	5.25	15.75	
Commitment from the Least Successful Alliance (Range 3 - 21)	3.98	11.94	
Commitment from the Most Successful Alliance (Range 4 - 28)	4.59	18.37	
Interdependence (Range 2 - 14)	4.25	8.51	
Total Scale Score (Range 12 - 84)	**4.55**	**54.56**	
Modified Communication Behavior			Agree
Information Quality from the Least Successful Alliance (Range 5 - 35)	3.59	17.97	
Information Quality from the Most Successful Alliance (Range 5 - 35)	5.40	26.99	
Information Sharing (Range 4 - 28)	5.09	20.37	
Information Participation (Range 5 - 35)	4.82	24.11	
Proprietary Information Sharing (Range 2 - 14)	4.16	8.31	
Total Scale Score (Range 21 - 147)	**4.65**	**97.74**	
Modified Conflict Resolution Techniques			
Avoidance & Constructive Conflict Resolution Techniques (Range 3 - 21)	4.72	14.15	Tend to occasionally
Destructive Conflict Resolution Techniques (Range 2 - 14)	2.71	5.41	Tend to never
Total Scale Score (Range 5 - 35)	**3.91**	**19.55**	
Commodity/Supplier Selection Process			More
Total Scale Score (Range 2 - 14)	**4.64**	**9.28**	comprehensive
Modified Indicators of Success			Higher satisfied
Past Success (Range 4 - 28)	5.03	20.12	
Success Difference (Range 2 - 14)	4.83	9.65	
Total Scale Score (Range 6 - 42)	**4.96**	**29.77**	
Organizational Performance			Above the
Customer Perspective (Range 4 - 28)	5.15	20.61	average
Learning and Growth Perspective (Range 3 - 21)	4.98	14.95	
Financial Perspective (Range 4 - 28)	4.99	19.95	
Internal-Business-Process Perspective (Range 5 - 35)	4.77	23.83	
Total Scale Score (Range 16 - 112)	**4.96**	**79.33**	

Research Question 2: Differences in Alliance Dimensions and Success Factors According to Alliance Manager Characteristics

Research Question 2 explored differences in dimensions of alliance (*attributes of the alliance, communication behavior, conflict resolution techniques, commodity/supplier selection process*) and success factors of the alliance (*indicators of success* in terms of past success and success difference, and four perspectives of *organizational performance*) in the construction industry of USA-based contractor companies according to alliance manager characteristics using independent *t*-tests, and ANOVA with Tukey post hoc comparisons. In this study, the alliance manager profile included gender, age, education level, race, ethnicity, job tenure, job title, and yearly income. The following provides the interpretations related to the findings reported in Chapter IV.

Comparisons of alliance dimensions and success factors according to gender and ethnicity. Among 129 male and 21 female managers, male participants reported a higher level of conflict resolution techniques (M = 19.81, SE = .41) than their female counterparts (M = 17.95, SE = .49, p = .005). There was significant difference in conflict resolution techniques according to gender. However, gender did not have a significant effect on attributes of alliance, communication behavior, and commodity/supplier selection process in this study. In terms of success factors, male participants reported a higher level of alliance performance in terms of the internal-business-process perspective (M = 24.19, SE = .48) than their female counterparts (M = 21.62, SE = 1.28, p = .05). There was a highly significant difference in the internal-business-process performance. This study did not find significant effects on past success, success difference, customer perspective performance, learning and growth perspective performance, and financial

perspective performance according to gender. No previous research was found to investigate the views of gender about dimensions of alliance and success factors. Therefore, this study provided new knowledge in this area.

There was a significant effect on internal-business-process perspective performance by ethnicity, whereby Hispanic participants reported a higher level of alliance performance in terms of internal-business-process perspective than their non-Hispanic counterparts among 4 Hispanic and 146 non-Hispanic construction alliance managers. The results did not indicate any significant differences in alliance dimensions, past success, success difference, and customer perspective performance, learning and growth perspective performance, and financial perspective performance according to ethnicity. No previous studies had investigated the relationships among ethnicity, dimensions of alliance, and success factors. Therefore, this study provided new knowledge in this area. A summary of differences in alliance dimensions and success factors according to gender and ethnicity for Research Question 2 is presented in Table 5-3.

Comparisons of alliance dimensions and success factors according to age, education level, race, job tenure, job title, and yearly income. Previous research has not examined the dimensions of alliance and success factors in terms of age, education level, race, job tenure, job title, and yearly income. Thus, this study provided new knowledge in this area. For the age of construction managers who were engaged in strategic alliances under supply chain management, there was a significant difference in *proprietary information sharing* subscale of *communication behavior* where construction managers between the age of 35 and 44 rated *proprietary information sharing*

significantly higher than those between the age of 45 and 54. In this study, ANOVA showed no significant differences in the responses between *attributes of the alliance*, *conflict resolution techniques*, and *commodity/supplier selection process*, *indicators of success*, and *organizational performance* total scale and subscales according to age range. A summary of differences in alliance dimensions and success factors according to alliance manager characteristics for Research Question 2 is presented in Table 5-3.

About the educational background of construction managers, there were significant effects of education on the total *indicators of success* score, the total *organizational performance*, the *customer perspective* subscale of *organizational performance*, and the *financial perspective* subscale of *organizational performance*. The study results showed that construction managers with a high school diploma rated total *indicators of success* score significantly higher than those who were four-year college graduates. Construction managers with one to three years of college rated total *organizational performance*, *customer perspective performance*, and *financial perspective performance* significantly higher than those with four-year college degrees. However, ANOVA showed no significant differences in the responses between *attributes of the alliance*, *conflict resolution techniques*, and *commodity/supplier selection process* total scale and subscales according to educational level. In addition, there were no significant effects of education level on the learning and growth perspective and internal-business-process perspective subscales.

There were significant effects of the race of the construction managers on the total *attributes of the alliance* score, the *interdependence* subscale of the *attributes of the alliance*, and *proprietary information sharing* subscale of communication behavior. The

results showed that Asian construction managers rated total *attributes of the alliance* score, *interdependence*, and *proprietary information sharing* significantly higher than white construction managers. However, ANOVA showed no significant differences in the responses between *conflict resolution techniques*, *commodity/supplier selection process*, the total *indicators of success* score, and the *organizational performance* total scale and subscales according to the race of the construction managers who were engaged in strategic alliances. For the job tenure of construction managers, the results showed no significant differences in the responses between alliance dimensions and success factors according to job tenure with four response groups (less than 1 year, 1 to less than 5 years, 5 to less than 10 years, and 10 or more years).

In terms of the job title of construction managers, there was a significant difference in the *information quality from the least successful alliance* subscale of communication behavior and the *financial perspective* subscale of *organizational performance*. The results showed that the non-supervisory respondents rated *information quality from the least successful alliance* significantly higher than top-level managers/corporate executives. Simultaneously, top-level managers/corporate executives rated *financial perspective performance* significantly higher than middle-level managers, while non-supervisory staff felt their *financial perspective* subscale score significantly higher than middle-level managers. For the yearly income of construction managers, there was a significant difference in *information quality from the least successful alliance* subscale of communication behavior where the results indicated that the construction alliance managers who earned $75,000-$124,999 a year rated *information quality from*

the least successful alliance significantly higher than those who made $125,000 and more annual income.

Table 5-3

Summary of Differences in Alliance Dimensions and Success Factors According to Alliance Manager Characteristics (Question 2)

	Alliance Manager Characteristics							
Variables	**Gender**	**Ethnicity**	**Age**	**Education Level**	**Race**	**Job Tenure**	**Job Title**	**Yearly Income**
Modified Attributes of the Alliance								
Trust and Coordination								
Commitment (Least)								
Commitment (Most)								
Interdependence					√			
Total				√	√			
Modified Communication Behavior								
Information Quality (Least)							√	√
Information Quality (Most)								
Information Sharing								
Information Participation								
Proprietary Information Sharing			√		√			
Total								
Modified Conflict Resolution Techniques								
Avoidance & Constructive								
Destructive Conflict Resolution Techniques			√					
Total	√							
Commodity/Supplier Selection Process								
Modified Indicators of Success								
Past Success								
Success Difference								
Total				√				
Organizational Performance								
Customer				√				
Learning and Growth								
Financial				√			√	
Internal-Business-Process	√	√						
Total				√				

Research Question 3: Differences in Alliance Dimensions and Success Factors According to Organizational Characteristics

Research Question 3 explored differences in dimensions of alliance (*attributes of the alliance, communication behavior, conflict resolution techniques, commodity/supplier selection process*) and success factors of the alliance (*indicators of success* in terms of past success and success difference, and four perspectives of *organizational performance*) in the construction industry of USA-based contractor companies according to organizational characteristics using independent *t*-tests, and ANOVA with Tukey post hoc comparisons. In this study, organizational profile included number of employees, number of U.S. offices, number of foreign offices, U.S. region, location type, total revenue, new contracts, and alliance training programs. The following provides the interpretations related to the findings reported in Chapter IV.

Comparisons of alliance dimensions and success factors according to new contracts and alliance training programs. In this study, most respondents (91.3%) reported receiving new construction contracts in their companies recently while a total of 64% of participants reported "not" offering the alliance training programs in their companies. Independent t-tests indicated that there were no significant effects of the participants whose business units recently received new contracts within strategic alliances on alliance dimensions, but there was a significant difference in *past success* according to new contracts. Construction managers whose business units recently received new contracts rated their companies' strategic alliance relationships with their construction suppliers as having a higher level of *past success* ($M = 20.40$, $SE = .40$) than those whose companies recently received no contract ($M = 17.15$, $SE = 1.45$, $p = .020$).

There were significant effects of alliance training programs on *attributes of the alliance*, *commodity/supplier selection process*, *past success*, and *internal-business-process perspective performance* in the study. The results illustrated that the construction managers whose business units offer alliance training programs rated their strategic alliances as having higher levels of trust and coordination, commitment, and interdependence (M = 56.46, SE = .92) than those with no training (M = 53.49, SE = .81, p = .021). The respondents with training programs showed a higher level of *commodity/supplier selection process* (M = 10.02, SE = .34) than their non-training counterparts (M = 8.88, SE = .24, p = .006). Construction managers whose business units offered alliance training programs showed higher levels of *past success* (M = 21.30, SE = .63) than those with no training (M = 19.46, SE = .49, p = .025). The participants whose business units offered alliance training programs reported a higher level of alliance performance in terms of *internal-business-process perspective* (M = 25.52, SE = .63) than those with no training (M = 22.88, SE = .60, p = .005). No previous studies had investigated the relationships among new contracts, alliance training programs, dimensions of alliance, and success factors. Therefore, this study provided new knowledge in this area.

Comparisons of alliance dimensions and success factors according to number of employees, number of U.S. offices, number of foreign offices, U.S. region, type of location area, and total revenue. Previous research has not examined the dimensions of alliance and success factors in terms of number of employees, number of U.S. offices, number of foreign offices, U.S. region, type of location area, and total revenue. Thus, this study provided new knowledge in this area. ANOVA showed that there were

significant differences in the total *attributes of the alliance* score, the *commitment from the least successful alliance* subscale, and the *interdependence* subscale according to number of employees (1-500, 501-1,000, 1,001-5,000, 5,001-50,000, and 50,001 and more) while there were no significant effects of the number of employees on *communication behavior*, *conflict resolution techniques*, *commodity/supplier selection process*, *indicators of success*, and *organizational performance*. The results showed that construction managers with 50,001 and more employees rated total *attributes of the alliance* score significantly higher than both managers with 1-500 employees and with 1,001-5,000 employees. Simultaneously, construction managers with 50,001 and more employees rated their least successful alliances as having more commitment than those with 1-500 employees. In addition, construction managers with 50,001 and more employees rated their strategic supplier alliances higher than those with 1-500 employees. A summary of differences in alliance dimensions and success factors according to organizational characteristics for Research Question 3 is presented in Table 5-4.

For the number of U.S. offices, ANOVA comparisons showed that there were no significant effects of either the number of U.S. offices or number of foreign offices on alliance dimensions and success factors. In terms of five U.S. region categories (Northeast, Southeast, Midwest, Southwest, and West), although there was no significant difference in the *communication behavior* score, ANOVA showed that U.S. region had great effects on both the *information quality from the least successful alliance* subscale and the *information participation* subscale of *communication behavior*. The results illustrated that the alliance managers of the Northeast region rated *information quality from the least successful alliance* significantly higher than those of the West region.

Simultaneously, the alliance managers of the Northeast region also rated *information participation* significantly higher than those of the Southwest region. However, there were no significant effects of U.S. region on *attributes of the alliance*, *conflict resolution techniques*, *commodity/supplier selection process indicators of success*, *organizational performance*.

For the type of location area with three response groups (rural, suburban, and urban), there was no significant effect of type of location area on alliance dimensions and success factors. Regarding the total revenue, ANOVA showed that there was a significant effect of total revenue on the *commitment from the least successful alliance* subscale of *attributes of the alliance*, *communication behavior* total score, and *information quality from the least successful alliance* subscale of *communication behavior*. The results indicated that alliance managers whose organizations reported total revenue of $1 billion or more rated their construction supplier alliance higher than those between $100 million and $500 million. Construction managers whose companies reported total revenue of $500 million-less than $1 billion rated total *communication behavior* score significantly higher than those of $1 billion or more. The managers whose firms earned total revenue of $500 million-less than $1 billion rated *information quality from the least successful alliance* significantly higher than both those of $100 million-less than $500 million and those of $1 billion or more. In addition, there were no significant effects of total revenue on success factors in the study.

Table 5-4

Summary of Differences in Alliance Dimensions and Success Factors According to Organizational Characteristics (Question 3)

	Organizational Characteristics							
Variables	**Number of Employees**	**Number of U.S. Offices**	**Number of Foreign Offices**	**U.S. Region**	**Type of Location Area**	**Total Revenue**	**New Contracts**	**Alliance Training Programs**
Modified Attributes of the Alliance								
Trust and Coordination								
Commitment (Least)	√					√		
Commitment (Most)								
Interdependence	√							
Total	√							√
Modified Communication Behavior								
Information Quality (Least)				√		√		
Information Quality (Most)								
Information Sharing						√		
Information Participation				√				
Proprietary Information Sharing								
Total						√		
Modified Conflict Resolution Techniques								
Avoidance and Constructive								
Destructive Conflict Resolution								
Techniques								
Total								
Commodity/Supplier Selection Process								√
Indicators of Success								
Past Success							√	√
Success Difference								
Total								
Organizational Performance								
Customer								
Learning and Growth								
Financial								
Internal-Business-Process								√
Total								

Summary and Interpretations of Hypotheses Testing

Summary Results of Hypotheses Testing

To test the six respective hypotheses and sub-hypotheses in this study, multiple hierarchical linear regression analyses were used to find the best explanatory models for the combined relationships. Eta correlations were conducted on categorical explanatory variables and dependent variables. Categorical variables with significant relationships to respective dependent variables were converted to dummy variables and analyzed with other explanatory continuous variables and dependent variables using Pearson *r*. Based on the order of the Pearson *r* correlations from the strongest or trend to the weakest, the explanatory variables were entered into the hierarchical (enter) linear regression model until the model with the highest explanatory power (R^2) and adjusted R^2 were produced. R^2 was the variance in the outcome for which the predictors account. The adjusted R^2 accounts for the number of explanatory variables in the model, and generally is a better indicator of goodness-of-fit than R^2 to determine the best model of each hypothesis because it increases only if the new variable improves the model more than would be expected by chance. The error (ε) was the percentage of the dependent variable that was not explained by the variables.

The first set of Hypotheses (1a, 1b, 1c, 1d, and 1e) examined the relationship between alliance manager characteristics and the dimensions of alliances (attributes of the alliance, communication behavior, conflict resolution techniques, and commodity/supplier selection process). The second set of Hypotheses (2a, 2b, 2c, 2d, 2e, 2f, and 2g) examined the relationship between alliance manager characteristics and the success of the alliances (satisfaction, adjusted satisfaction, financial perspective,

customer perspective, internal-business-process perspective, and learning and growth perspective). The third set of Hypotheses (3a, 3b, 3c, 3d, and 3e) examined the relationship between organizational characteristics and the dimensions of alliances. The fourth set of Hypotheses (4a, 4b, 4c, 4d, 4e, 4f, and 4g) examined the relationship between organizational characteristics and the success of the alliance. The fifth set of Hypotheses (5a, 5b, 5c, 5d, 5e, 5f, and 5g) asserted that the success of the alliance were associated with dimensions of alliance. The sixth set of Hypotheses (6a, 6b, 6c, 6d, 6e, 6f, and 6g) asserted that the success of the alliance (satisfaction, adjusted satisfaction, financial perspective, customer perspective, internal-business-process perspective, and learning and growth perspective) were associated with alliance manager characteristics, organizational characteristics, and dimensions of alliances (attributes of the alliance, communication behavior, conflict resolution techniques, and commodity/supplier selection process) in the construction industry of USA-based contractor companies. Table 5-5 summarizes the results of testing the research hypotheses and reports whether each hypothesis was supported, partially supported, or not supported by the results presented in Chapter IV. The table also includes the percentage of the variance of the best explanatory model tested to explain the dependent variable and the findings of other scholars.

Table 5-5

Research Hypotheses and Results

	Hypotheses	Variance Explained	Results	Literature
H_{1a}:	Alliance manager characteristics are significant explanatory variables of *attributes of the alliance* in the construction industry.	8.6%-10.5%	Supported: Race–Asian (+) Job Tenure (+)	None
H_{1b}:	Alliance manager characteristics are significant explanatory variables of *communication behavior* in the construction industry.	N/A	Not Supported	None
H_{1c}:	Alliance manager characteristics are significant explanatory variables of *conflict resolution techniques* in the construction industry.	N/A	Not Supported	None
H_{1d}:	Alliance manager characteristics are significant explanatory variables of *commodity/supplier selection process* in the construction industry.	N/A	Not Supported	None
H_{1e}:	Alliance manager characteristics are significant explanatory variables of *dimensions of alliances (total score)* in the construction industry.	3.8%-4.4%	Supported: Race–Asian (+)	None
H_{2a}:	Alliance manager characteristics are significant explanatory variables of *satisfaction with the alliance* in the construction industry.	2.5%-3.2%	Supported: Age (+)	None
H_{2b}:	Alliance manager characteristics are significant explanatory variables of *adjusted satisfaction with the alliance* in the construction industry.	N/A	Not Supported	None
H_{2c}:	Alliance manager characteristics are significant explanatory variables of *financial perspective with the alliance* in the construction industry.	N/A	Not Supported	None
H_{2d}:	Alliance manager characteristics are significant explanatory variables of *customer perspective with the alliance* in the construction industry.	N/A	Not Supported	None
H_{2e}:	Alliance manager characteristics are significant explanatory variables of *internal-business-process perspective with the alliance* in the construction industry.	4.3%-5.6%	Supported: Ethnicity–Hispanic (+) Gender–Male (+)	None
H_{2f}:	Alliance manager characteristics are significant explanatory variables of *learning and growth perspective with the alliance* in the construction industry.	N/A	Not Supported	None
H_{2g}:	Alliance manager characteristics are significant explanatory variables of *success of the alliance (total score)* in the construction industry.	N/A	Not Supported	None

Table 5-5 (Continued)

	Hypotheses	Variance Explained	Results	Literature
H_{3a}:	Organizational characteristics are significant explanatory variables of *attributes of the alliance* in the construction industry.	4.2%-5.5%	Supported: Alliance Training Programs (+) Number of Employees(+)	None
H_{3b}:	Organizational characteristics are significant explanatory variables of *communication behavior* in the construction industry.	N/A	Not Supported	None
H_{3c}:	Organizational characteristics are significant explanatory variables of *conflict resolution techniques* in the construction industry.	N/A	Not Supported	None
H_{3d}:	Organizational characteristics are significant explanatory variables of *commodity/supplier selection process* in the construction industry.	4.3%-4.9%	Supported: Alliance Training Programs (+)	None
H_{3e}:	Organizational characteristics are significant explanatory variables of *dimensions of alliance (total score)* in the construction industry.	2.0%-2.7%	Supported: Alliance Training Programs (+)	None
H_{4a}:	Organizational characteristics are significant explanatory variables of the *satisfaction with the alliance* in the construction industry.	4.9%-6.2%	Supported: New Contracts (+) Alliance Training Programs (+)	None
H_{4b}:	Organizational characteristics are significant explanatory variables of the *adjusted satisfaction with the alliance* in the construction industry.	N/A	Not Supported	None
H_{4c}:	Organizational characteristics are significant explanatory variables of the *financial perspective with the alliance* in the construction industry.	N/A	Not Supported	None
H_{4d}:	Organizational characteristics are significant explanatory variables of the *customer perspective with the alliance* in the construction industry.	N/A	Not Supported	None
H_{4e}:	Organizational characteristics are significant explanatory variables of the *internal-business-process perspective with the alliance* in the construction industry.	4.6%-5.2%	Supported: Alliance Training Programs (+)	None
H_{4f}:	Organizational characteristics are significant explanatory variables of the *learning and growth perspective with the alliance* in the construction industry.	N/A	Not Supported	None
H_{4g}:	Organizational characteristics are significant explanatory variables of *success of the alliance (total score)* in the construction industry.	2.6%-3.3%	Supported: Alliance Training Programs (+)	None

Table 5-5 (Continued)

	Hypotheses	Variance Explained	Results	Literature
H_{5a}:	Dimensions of alliance are significant explanatory variables of *satisfaction with the alliance* in the construction industry.	51%-53.6%	Supported	Proposition Confirmed—Mohr & Spekman (1994) Kauser & Shaw (2004) Monczka et al. (1998)
H_{5b}:	Dimensions of alliance are significant explanatory variables of the *adjusted satisfaction with the alliance* in the construction industry.	6.9%-10.1%	Partially Supported	Proposition Confirmed—Monczka et al. (1998) Mohr & Spekman (1994)
H_{5c}:	Dimensions of alliance are significant explanatory variables of the *financial perspective with the alliance* in the construction industry.	49.3%-53%	Supported	Partly—Kauser & Shaw (2004) Confirmed Independent Dimensions of Balanced Scorecard by Kaplan & Nortion (1996c)
H_{5d}:	Dimensions of alliance are significant explanatory variables of the *customer perspective with the alliance* in the construction industry.	51.3%-53.2%	Partially Supported	Confirmed Independent Dimensions of Balanced Scorecard by Kaplan & Nortion (1996c)
H_{5e}:	Dimensions of alliance are significant explanatory variables of the *internal-business-process perspective with the alliance* in the construction industry.	32.5%-36.6%	Supported	Confirmed Independent Dimensions of Balanced Scorecard by Kaplan & Nortion (1996c)
H_{5f}:	Dimensions of alliance are significant explanatory variables of the *learning and growth perspective with the alliance* in the construction industry.	38.6%-42.7%	Supported	Confirmed Independent Dimensions of Balanced Scorecard by Kaplan & Nortion (1996c)
H_{5g}:	Dimensions of alliance are significant explanatory variables of the *success of the alliance (total score)* in the construction industry.	65.1%-80.7%	Supported	Confirmed Independent Dimensions of Balanced Scorecard by Kaplan & Nortion (1996c)

Table 5-5 (Continued)

	Hypotheses	Variance Explained	Results	Literature
H_{6a}:	Alliance manager characteristics, organizational characteristics, dimensions of alliance are significant explanatory variables of the *satisfaction with the alliance* in the construction industry.	51%-53.6%	Partially Supported	Proposition Confirmed—Mohr & Spekman (1994) Kauser & Shaw (2004) Monczka et al. (1998)
H_{6b}:	Alliance manager characteristics, organizational characteristics, dimensions of alliance are significant explanatory variables of the *adjusted satisfaction with the alliance* in the construction industry.	8.8%-14.9%	Supported	Proposition Confirmed—Monczka et al. (1998) Mohr & Spekman (1994)
H_{6c}:	Alliance manager characteristics, organizational characteristics, dimensions of alliance are significant explanatory variables of the *financial perspective with the alliance* in the construction industry.	50%-54%	Partially Supported	Partly—Kauser & Shaw (2004) Confirmed Independent Dimensions of Balanced Scorecard by Kaplan & Nortion (1996c)
H_{6d}:	Alliance manager characteristics, organizational characteristics, dimensions of alliance are significant explanatory variables of the *customer perspective with the alliance* in the construction industry.	51.4%-54.7%	Partially Supported	Confirmed Independent Dimensions of Balanced Scorecard by Kaplan & Nortion (1996c)
H_{6e}:	Alliance manager characteristics, organizational characteristics, dimensions of alliance are significant explanatory variables of the *internal-business-process perspective with the alliance* in the construction industry.	37.5%-42.5%	Supported	Confirmed Independent Dimensions of Balanced Scorecard by Kaplan & Nortion (1996c)
H_{6f}:	Alliance manager characteristics, organizational characteristics, dimensions of alliance are significant explanatory variables of the *learning and growth perspective with the alliance* in the construction industry.	38.3%-42.8%	Partially Supported	Confirmed Independent Dimensions of Balanced Scorecard by Kaplan & Nortion (1996c)
H_{6g}:	Alliance manager characteristics, organizational characteristics, dimensions of alliance are significant explanatory variables of the *success of the alliance (total score)* in the construction industry.	62.8%-65.8%	Supported	Confirmed Independent Dimensions of Balanced Scorecard by Kaplan & Nortion (1996c)

Table 5-6 presents a summary of the explanatory variables in the best models to explain alliance performance for research hypotheses 5a-5g and research hypotheses 6a-6g. Each explanatory variable of the hypothesis is reported as inverse (-), positive (+), or no relationship (left blank) by the results presented in Chapter IV.

Table 5-6

Summary of Explanatory Variables and Predictor Variables to Explain Alliance Performance for Hypotheses 5 and 6

Explanatory Variables	Alliance Performance						
	Satisfaction	Adjusted Satisfaction	Fin.	Cus.	Int'l Bus. Process	L & G	Total
Alliance Manager Characteristics							
Gender					H6e= +		
Ethnicity					H6e= +		
Age							
Education Level		H6b= (-)	H6c= +				H6g= +
Race							
Job Tenure							
Job Title							
Yearly Income		H6b= +					
Organizational Characteristics							
Number of Employees							
Number of U.S. Offices							
Number of Foreign Offices							
U.S. Region							
Type of Location Area							
Total Revenue		H6b= +					
New Contracts							
Alliance Training Programs					H6e= +		H6g= +
Modified Attributes of the Alliance							
Trust and Coordination	H5a= + H6a= +	H5b= + H6b= +	H5c= (-) H6c= (-)	H5d= + H6d= (-)	H5e= + H6e= +	H5f= + H6f= +	H5g= + H6g= +
Commitment (Least)			H5c= + H6c= +	H6d= +	H5e= + H6e= +	H5f= + H6f= +	H5g= + H6g= +
Commitment (Most)	H5a= + H6a= +	H5b= + H6b= +	H5c= + H6c= +	H5d= + H6d= +	H5e= + H6e= +	H5f= + H6f= +	H5g= + H6g= +
Interdependence		H5b= + H6b= +					
Modified Communication Behavior							
Information Quality (Least)			H5c= (-) H6c= (-)			H6f= +	
Information Quality (Most)	H5a= (-) H6a= (-)	H5b= + H6b= +	H5c= + H6c= +	H5d= + H6d= +	H5e= + H6e= +	H5f= + H6f= +	H5g= + H6g= +
Information Sharing	H5a= (-) H6a= (-)		H5c= + H6c= +	H5d= + H6d= +	H5e= + H6e= +	H5f= (-) H6f= (-)	H5g= + H6g= +
Information Participation	H5a= + H6a= +	H5b= + H6b= +	H5c= + H6c= +	H5d= + H6d= +	H5e= (-) H6e= (-)	H5f= (-) H6f= (-)	H5g= + H6g= +
Proprietary Information Sharing			H5c= + H6c= +	H6d= +	H5e= + H6e= +	H5f= + H6f= +	H5g= + H6g= +
Modified Conflict Resolution Techniques							
Avoidance and Constructive	H5a= + H6a= +		H5c= + H6c= +	H6d= +	H5e= + H6e= +	H5f= + H6f= +	H5g= + H6g= +
Destructive	H5a= (-) H6a= (-)		H5c= (-) H6c= (-)	H6d= (-)		H5f= (-) H6f= (-)	H5g= (-) H6g= (-)
Commodity/Supplier Selection Process	H5a= + H6a= +	H6b= (-)	H5c= + H6c= +	H5d= + H6d= +	H5e= + H6e= +	H5f= + H6f= +	H5g= + H6g= +

H1: Alliance Manager Characteristics and Dimensions of Alliances

According to the hypothesized model in this study, Hypothesis 1 had five sub-hypotheses. Each sub-hypothesis tested a different explanatory relationship between alliance manager characteristics (gender, age, level of education, race, ethnicity, job tenure, job title, and yearly income) and the dimensions of alliances (*attributes of the alliance, communication behavior, conflict resolution techniques, and commodity/supplier selection process*) in the construction industry of USA-based contractor companies. The purposes of *Alliance Manager Characteristics Profile* were to predict how a person from all levels of the organization who were engaged in strategic supplier alliance might behave in their work setting, to understand relationships among the basic manager profile and success factors of alliances and success of the alliance performance, and to assist in career counseling for construction contractor companies' personnel selection in the future.

Hypothesis 1_a *attributes of the alliance* was supported. Characteristics of alliance manager included race (Asian) and job tenure explained a range of 8.6% to 10.5% of the variation in attributes of the alliance. The findings showed that Asian construction managers perceived more attributes of the alliance than other races. Likewise, the positive relationship between job tenure and attributes of the alliance indicated that construction alliance managers with longer job tenure perceived more attributes of the alliance than those with shorter job tenure in the organization. In addition, the results showed no support for H_{1b} and H_{1c} that alliance manager characteristics were not associated with communication behavior and conflict resolution techniques. Based on the small sample size (n = 150) and the lack of significant or trend relationships between

the explanatory and dependent variables, hierarchical regression analysis was not conducted for H_{1d} *commodity/supplier selection process*. For $H1_e$, the total score for dimensions of alliances was supported. The variable of race (Asian) explained a range of 3.8% to 4.4% of the variation in dimensions of alliances (total score). No models or propositions were supported regarding these findings.

H2: Alliance Manager Characteristics and Success of the Alliances

According to the hypothesized model in this study, Hypothesis 2 had seven sub-hypotheses. Each sub-hypothesis tested a different explanatory relationship between alliance manager characteristics (gender, age, level of education, race, ethnicity, job tenure, job title, and yearly income) and the success of the alliances (*satisfaction, adjusted satisfaction, financial perspective, customer perspective, internal-business-process perspective, and learning and growth perspective*) in the construction industry of USA-based contractor companies.

Hypothesis 2_a satisfaction (i.e., past success) was supported. The variable of age explained a range of 2.5% to 3.2% of the variation in satisfaction. The finding indicated that older construction managers who were engaged in strategic alliances may perceive more *satisfaction with the alliance* based on their past success than the younger ones. In addition, the results showed no support for H_{2b}, H_{2c}, and H_{2g} that alliance manager characteristics were not associated with *adjusted satisfaction* (i.e., success difference), *financial perspective performance*, and *success of the alliances (Total Score)*. Based on the small sample size (n = 150) and the lack of significant or trend relationships between the explanatory and dependent variables, hierarchical regression analysis was not

conducted for H_{2d} *customer perspective performance* and H_{2f} *learning and growth perspective performance*.

Hypothesis 2_e *internal-business-process perspective performance* was supported. The sociodemographic characteristics on alliance manager included ethnicity (Hispanic) and gender (male) explained a range of 4.3% to 5.6% of the variation in internal-business-process perspective performance. Hispanic construction alliance managers as it related to *internal-business-process perspective performance* indicated that an increase in participants of Asian construction managers who were engaged in strategic alliances provided more internal-business-process perspective performance. Meanwhile, male construction alliance managers as it related to *internal-business-process perspective performance* subscale indicated that an increase in participants of male construction managers who were engaged in strategic alliances provided more internal-business-process perspective performance. No models or propositions were supported regarding these findings.

H3: Organizational Characteristics and Dimensions of Alliances

The purposes of *Organizational Characteristics Profile* among the respondents' companies were to understand whether a general construction contractor might influence dimension of alliances and success of the alliance. According to the hypothesized model in this study, Hypothesis 3 had five sub-hypotheses. Each sub-hypothesis tested a different explanatory relationship between organizational characteristics (number of employees, number of offices in the United States and other countries, region of United States, type of location area, total revenue, new contract, and alliance training programs) and the dimensions of alliances (*attributes of the alliance, communication behavior,*

conflict resolution techniques, and commodity/supplier selection process) in the construction industry of USA-based contractor companies.

Hypothesis 3_a *attributes of the alliance* was supported. Characteristics of organization profile included alliance training programs (yes) and number of employees explained a range of 4.2% to 5.5% of the variation in attributes of the alliance. The findings showed that the higher the frequency of the respondents with alliance training programs in their firms, the more the *attributes of alliance.* Likewise, the positive relationship between firm size and attributes of the alliance indicated that the more the employees in construction firms, the higher the *attributes of alliance.*

Based on the small sample size (n = 150) and the lack of significant or trend relationships between the explanatory and dependent variables, hierarchical regression analyses was not conducted for H_{3b} *communication behavior* and H_{3c} *conflict resolution techniques.* Hypothesis 3_d *commodity/supplier selection process* and Hypothesis 3_e *dimensions of alliances (total score)* were supported. The variable *organizational characteristics* alliance training programs (yes) explained a range of 4.3% to 4.9% of the variation in *commodity/supplier selection process* and a range of 2.0% to 2.7% of the variation in *dimensions of alliances (total score).* The results indicated that the higher the frequency of the respondents with alliance training programs in their firms, the more comprehensive the *commodity/supplier selection process* and the higher *dimensions of alliances (total score).* This suggested an important goal for further research in the area of training programs that "offering alliance training programs" to buyers and suppliers in the general contractor companies or other industries may have a positive influence on

strategic alliance or partnership. No models or propositions were supported regarding these findings.

H4: Organizational Characteristics and Success of the Alliance

There are many theories of the organization, including resource-based view, resource dependence, agency, game theories, and transaction costs economics. The resource based view (RBV) by Wernerfelt in 1984 with significant empirical validity is used to explain how the unique bundle of resources (resources, competencies, and capabilities) generates sustained competitive advantage and results in superior performance (Dhanaraj & Beamish, 2003; Conner & Prahalad, 1996; Barney, 1991; Fahy, 2000), and even to explore unused resources (Pettus, 2003), and has been viewed as the theory of competitive advantage if the firm deploys internal resources effectively (Fahy, 2000). Some researchers have focused on partner characteristics as the explanatory variables for alliance outcome, such as reputation in the areas of management, product quality, and financial position (Saxton, 1997), and organizational characteristics in structural and control attributes (Kauser & Shaw, 2004). The study had noted the need for examining the relationship between simple organizational characteristics profiles and alliance performance.

According to the hypothesized model in this study, Hypothesis 4 had seven sub-hypotheses. Each sub-hypothesis tested a different explanatory relationship between organizational characteristics (number of employees, number of offices in the United States and other countries, region of United States, type of location area, total revenue, new contract, and alliance training programs) and the success of the alliance (*satisfaction, adjusted satisfaction, financial perspective, customer perspective, internal-business-*

process perspective, and learning and growth perspective) in the construction industry of USA-based contractor companies.

Hypothesis 4_a *satisfaction with the alliance* (i.e., past success) was supported. Characteristics of organization profile included new contracts (yes) and alliance training programs (yes) explained a range of 4.9% to 6.2% of the variation in *satisfaction with the alliance*. The findings showed that the construction managers whose business units recently received new contracts within strategic alliances experienced a higher level of *satisfaction with the alliance* depending on past success than those who received no contracts. Likewise, the positive relationship between alliance training programs and *satisfaction* indicated that the construction managers whose business units offer alliance training programs perceived more *satisfaction with the alliance* based on past success than those with no training.

The results showed no support for H_{4b} that organization characteristics were not associated with *adjusted satisfaction* (i.e., success difference).

Based on the small sample size (n = 150) and the lack of significant or trend relationships between the explanatory and dependent variables, hierarchical regression analyses were not conducted for H_{4c} *financial perspective performance*, H_{4d} *customer perspective performance*, and H_{4f} *learning and growth perspective performance*.

Hypothesis 4_e *internal-business-process perspective performance* was supported. The variable *organizational characteristics* alliance training programs (yes) explained a range of 4.6% to 5.2% of the variation in *internal-business-process perspective performance* and a range of 2.6% to 3.3% of the variation in *success of alliances (total score)*. The results indicated that the construction managers whose business units

provided alliance training programs obtained a higher level of *internal-business-process perspective performance* and a higher level of *success of the alliance (total score)* than those with no alliance training programs. Interestingly, research findings revealed that alliance training programs, according to H3 and H4, capture the utility of the *dimensions of alliances (total score)* and become the catalyst of the *success of alliances (total score)*, so it is deemed to be an important indicant of partnership's vitality. No previous studies had investigated the relationships among organizational characteristics, dimensions of alliance, and success factors. Therefore, this study provided new knowledge in this area.

H5: Dimensions of Alliances and Success of the Alliance

Some scholars suggested forming alliances of construction partners (Cheng et al., 2001; Matthews et al., 2000; Kanji & Wong, 1998). Further, Holt et al. (2000) proposed two kinds of construction alliances. The advantages of establishing strategic alliances (such as achieving competitive advantage, expanding knowledge, developing applications, commercializing new products, obtaining external resources and flexibility, mitigating uncertainty without investments) (Whipple & Frankel, 2000; Cante et al., 2004; Sakaguchi et al., 2004), the high failure rate (Whipple & Frankel, 2000), and successful factors in strategic alliances (Monczka et al., 1998) are well established in the literature. However, there is no study about assessing performance when implementing a strategic alliance in the construction supply chain.

The goal of this hypothesis was to test whether establishing strategic alliances (dimensions of alliances) did in fact reflect the organizational performance (success of the alliance) in the construction companies based on the previous Mohr and Spekman model (1994), the Monczka et al. model (1998), and the Kauser and Shaw model (2004)

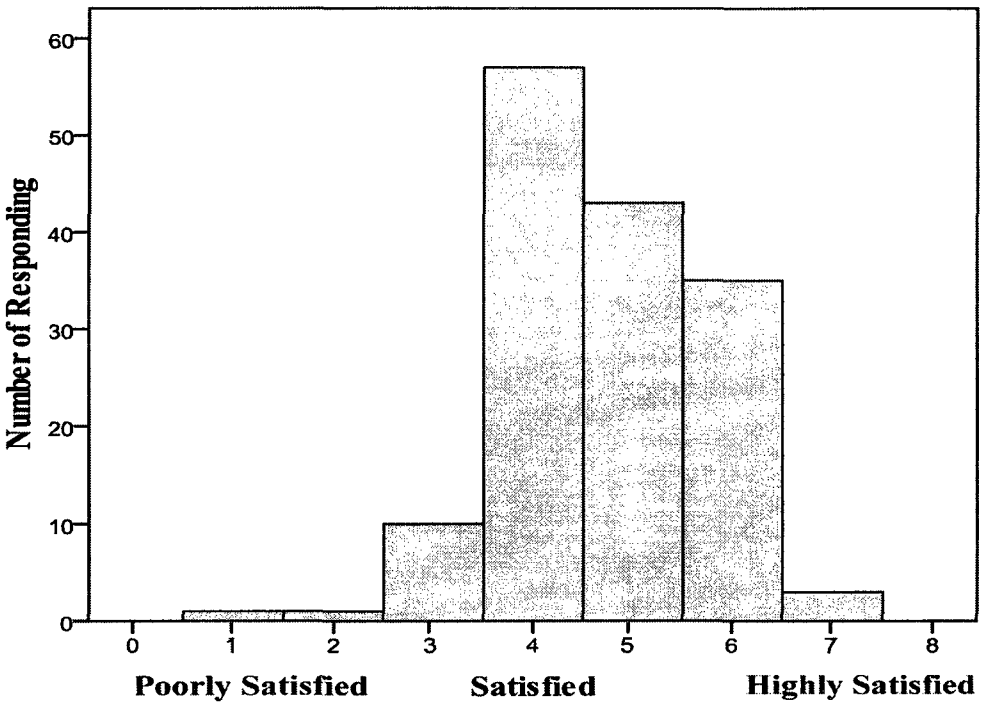
in manufacturing companies. According to the hypothesized model in this study, Hypothesis 5 had seven sub-hypotheses. Each sub-hypothesis tested a different explanatory relationship between dimensions of alliance (*attributes of the alliance, communication behavior, conflict resolution techniques, and commodity/supplier selection process*) and the success of the alliance (*satisfaction, adjusted satisfaction, financial perspective, customer perspective, internal-business-process perspective, and learning and growth perspective*) in the construction industry of USA-based contractor companies.

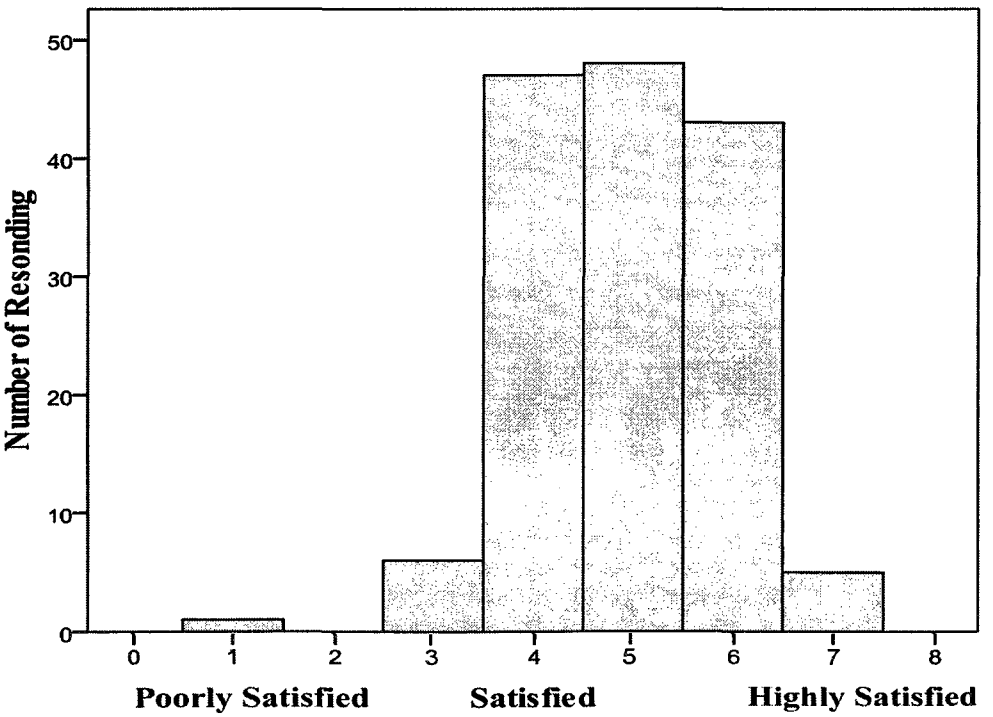
Hypothesis 5_a *satisfaction* was supported. Eight explanatory variables including two variables from *attributes of the alliance* (trust & coordination and commitment from the most successful alliance), four variables from *communication behavior* (information quality from the most successful alliance, information sharing, information participation, and proprietary information sharing), entire *conflict resolution techniques* (avoidance & constructive and destructive), and *commodity/supplier selection process* explained a range of 51% to 53.6% of the variation in perceptual measures of the *satisfaction with the alliance* based on past success.

Hypothesis 5_b *adjusted satisfaction* was partially supported. Five explanatory variables including three variables from *attributes of the alliance* (trust & coordination, commitment from the least successful alliance, and interdependence), two variables from *communication behavior* (information quality from the most successful alliance and information participation) explained a range of 6.9% to 10.1% of the variation in the *adjusted satisfaction with the alliance* based on success difference.

Figure 5-1

Respondents' satisfaction with construction alliance (upper) and overall satisfaction from their business units (lower)





Hypothesis 5_c *financial perspective performance* was supported. Eleven explanatory variables including three variables from *attributes of the alliance* (trust & coordination and commitment from the most/least successful alliance), five variables from *communication behavior* (information quality from the most/least successful alliance, information sharing, information participation, and proprietary information sharing), two from *conflict resolution techniques* (avoidance & constructive and destructive), and *commodity/supplier selection process* explained a range of 49.3% to 53% of the variation in perceptual measures of the *financial perspective performance*.

Hypothesis 5_d *customer perspective performance* was partially supported. Ten explanatory variables including two variables from *attributes of the alliance* (trust & coordination and commitment from the most successful alliance), three variables from *communication behavior* (information quality from the most successful alliance, information sharing, and information participation), and *commodity/supplier selection process* explained a range of 51.3% to 53.2% of the variation in the *customer perspective performance*.

Hypothesis 5_e *internal-business-process perspective performance* was supported. Nine explanatory variables including three variables from *attributes of the alliance* (trust & coordination and commitment from the most/least successful alliance), four variables from *communication behavior* (information quality from the most successful alliance, information sharing, information participation, and proprietary information sharing), one from *conflict resolution techniques* (avoidance & constructive), and *commodity/supplier selection process* explained a range of 32.5% to 36.6% of the variation in the *internal-business-process perspective performance*.

Hypothesis 5_f *learning and growth perspective performance* was supported. Ten explanatory variables including three variables from *attributes of the alliance* (trust & coordination and commitment from the most/least successful alliance), four variables from *communication behavior* (information quality from the most successful alliance, information sharing, information participation, and proprietary information sharing), two from *conflict resolution techniques* (avoidance & constructive and destructive), and *commodity/supplier selection process* explained a range of 38.6% to 42.7% of the variation in the *learning and growth perspective performance*.

Hypothesis 5_g *success of the alliance (total score)* was supported. Ten explanatory variables including three variables from *attributes of the alliance* (trust & coordination and commitment from the most/least successful alliance), four variables from *communication behavior* (information quality from the most successful alliance, information sharing, information participation, and proprietary information sharing), two from *conflict resolution techniques* (avoidance & constructive and destructive), and *commodity/supplier selection process* explained a range of 65.1% to 80.7% of the variation in the *success of the alliance (total score)*.

The results in the study of construction strategic alliance related to satisfaction are consistent with those of Mohr and Spekman's (1994) study about marketing channel partnerships and those of Kauser and Shaw's (2004) study about international strategic alliances. The results are also consistent with those of Monczka, Petersen, Hanfield, and Ragatz's (1998) research on the industrial supplier alliances (or supply chain alliances) with exceptions: commitment, interdependence, information sharing. In addition, the most of the respondents (98.6%) and business units (99.3%) are satisfied with

construction strategic alliances/partnerships according to *adjusted satisfaction with the alliance* subscale based on success difference (see Figure 5-1).

Modified attributes of the alliance. Trust & coordination was found to be positively related to construction alliance performance and managers' satisfaction with the partnership. The findings support those of Mohr and Spekman (1994) who found that believing the relationship between vendors (supplier) and dealers might serve to calm the dealers' fear of opportunistic behavior, resulting in a greater satisfaction with the partnership. A higher level of trust between alliance partners resulting in better alliance performance is consistent with Kauser and Shaw's (2004) proposition that in order to establish and help develop mutual trust in international strategic alliances, executives must try to instill in personnel involved in the relationship by "keeping promises, being sincere when making decisions, showing loyalty and offering support to the other party" and avoiding taking advantage of both partners for achieving a long-term goal (p. 41). Results support Monczka et al.'s (1998) findings that trust & coordination are prominent factors among the multiple dimensions of alliances, since "the suppliers may become closely involved in joint R&D, requiring access to internal design competencies, and technology roadmaps" (p. 566). The findings further found that a higher level of trust & coordination is associated with more successful organizational performance in the *success of the alliance (total score)*, and *customer perspective performance, internal-business-process perspective performance, and learning and growth perspective performance,* but is associated with less *financial perspective performance* (i.e., accelerate revenue growth, increase return on investment, increase profitability, and control total costs). The results are inconsistent with Kauser and Shaw's (2004) findings

that trust & coordination is positively related to international strategic alliance performance in the financial area, such as market share, profitability, and sales growth. However, this result is somewhat consistent with Monczka et al.'s (1998) finding that enhancing coordination is found to be lowering administrative costs (Monczka et al., 1998).

Commitment from the most successful alliance was found to be positively associated to construction alliance performance in the study. The findings are consistent with the proposition of previous empirical studies that more committed partners manage their relationship relying on mutual consent rather than written agreements (Kauser & Shaw, 2004), and will make efforts to balance short-term problems with long-term goal achievement without raising the opportunistic behavior, resulting in successful partnership (Mohr & Spekman, 1994). The findings are not consistent with Monczka et al. (1998), where no significant differences were found between commitment and successful strategic supplier alliances. The findings also found that a higher level of commitment is associated with more successful organizational performance in the four areas (*financial, customer, internal-business-process, and learning and growth*) and *success of the alliance (total score)*. It is a little consistent with Kauser and Shaw's (2004) finding that commitment is positively related to international strategic alliance performance in the financial area.

Interdependence was not significantly related to any of the dependent variables, including satisfaction and four areas of organization performance in the study. The findings are consistent with the previous empirical studies reported by Mohr and Spekman (1994) and Kauser and Shaw (2004). The results, however, did not support

those of Mohr and Spekman (1994) who found that "joint improvements in the areas of cost reduction, quality, and just-in-time delivery require multiple interdependencies between engineers, materials managers, and designers" (p. 566).

Modified communication behavior. Information quality from the least successful alliance showed no relationship with alliance satisfaction and even organizational performance, while information quality from the most successful alliance showed negative relationship with alliance satisfaction but positive relationship with the entire four areas of organizational performance in the study. These findings are inconsistent with the previous empirical studies reported by Mohr and Spekman (1994), Monczka et al. (1998), and Kauser and Shaw (2004) and could not provide strong support. Their researches found that a higher level of information quality is associated with successful strategic alliances.

Information sharing was found to negatively influence managers' satisfaction but positively influence alliance performance (*success of the alliance total score)* in the study. The findings are consistent with Mohr and Spekman (1994), where a greater level of information sharing may cause the buyers the impression that they are entitled to a greater share of the fruit of partnership with the suppliers for higher margins. However, the findings did not support those of Monczka et al. (1998) and Kauser and Shaw (2004) where sharing of information was positively associated with satisfaction of successful strategic alliance in managers' satisfaction and financial performance. It is interesting to notice that information sharing has a negative relationship with *learning and growth performance* in the general contractor companies.

Information participation was found positively related to alliance performance in managers' satisfaction and *success of the alliance (total score)* in the study. The findings are consistent with the previous empirical studies reported by Mohr and Spekman (1994), Monczka et al. (1998), and Kauser and Shaw (2004), where information participation are higher, manager's satisfaction is higher and alliance performance in financial area is higher as well. It is interesting to notice that information participation has a negative relationship with *internal-business-process* and *learning and growth performance* in the general contractor companies.

Proprietary information sharing was the new construct extracted from information sharing in the study and was found to have no relationship with construction alliance managers' satisfaction but positively related to *success of the alliance (total score)*. Thus, no models or propositions were supported regarding these findings.

Modified conflict resolution techniques. The results in this study indicated that the new construct—avoidance & constructive conflict resolution techniques (smoothing over problems, joint problem solving and persuasion)—is positively associated with more alliance performance in managers' satisfaction and *success of the alliance (total score)*, while the use of destructive conflict resolution techniques (harsh words and outside arbitration) is negatively associated with managers' satisfaction and more *success of the alliance (total score)*. The findings support those of Monczka et al. (1998) and Kauser and Shaw (2004), where low use of destructive conflict resolution techniques was associated with successful strategic alliance in managers' satisfaction. In addition, the results are also consistent with some previous studies where joint problem solving of constructive techniques was found to be positively significant in the expected direction to

achieve success alliance in managers' satisfaction (Mohr & Spekman, 1994; Monczka et al., 1998). However, the findings did not support their study about the negative relationship between avoidance conflict resolution techniques and success alliance in managers' satisfaction.

Commodity/supplier selection process. Commodity/supplier selection process was found to be positively related to alliance performance in the study. These findings supported prior studies that the *commodity selection process* takes precedence over the supplier selection process to increase the likelihood of alliance success because organizations must ensure that strategic alliances are established in proper situations and that the right candidates for alliance are chosen (Monczka et al., 1998).

H6: Alliance Manager Characteristics, Organizational Characteristics, Dimensions of Alliances, and Success of the Alliance

According to the hypothesized model in this study, Hypothesis 6 had seven sub-hypotheses. Each sub-hypothesis tested a different explanatory relationship among alliance manager characteristics (gender, age, level of education, race, ethnicity, job tenure, job title, and yearly income), organizational characteristics (organization name, the most and least successful alliance, number of employees, number of offices in the United States and other countries, region of United States, type of location area, total revenue, new contract, and alliance training programs), dimensions of alliances (attributes of the alliance, communication behavior, conflict resolution techniques, and commodity/supplier selection process), and the success of the alliance (satisfaction, adjusted satisfaction, financial perspective, customer perspective, internal-business-process perspective, and learning and growth perspective) in the construction industry of

USA-based contractor companies. This study was the first to investigate those relationships.

Hypothesis 6_a *satisfaction* was partially supported. Eight explanatory variables including two variables from *attributes of the alliance* (trust & coordination and commitment from the most successful alliance), four variables from *communication behavior* (information quality from the most successful alliance, information sharing, information participation, and proprietary information sharing), entire *conflict resolution techniques* (avoidance & constructive and destructive), and *commodity/supplier selection process* explained a range of 51% to 53.6% of the variation in the *satisfaction with the alliance* based on past success.

Hypothesis 6_b *adjusted satisfaction* was partially supported. Ten explanatory variables including two variables from alliance manager characteristics categorical variables (education level and yearly income), one variable from organizational characteristics categorical variables (total revenue), three variables from *attributes of the alliance* (trust & coordination, commitment from the least successful alliance, and interdependence), two variables from *communication behavior* (information quality from the most successful alliance and information participation), one variable from *conflict resolution techniques* (avoidance & constructive), and *commodity/supplier selection process* explained a range of 8.8% to 14.9% of the variation in the *adjusted satisfaction with the alliance* based on success difference.

Hypothesis 6_c *financial perspective performance* was partially supported. Twelve explanatory variables including one variable from alliance manager characteristics categorical variables (education level), no variable from organizational characteristics

categorical variables, three variables from *attributes of the alliance* (trust & coordination and commitment from the least/most successful alliance), five variables from *communication behavior* (information quality from the least/most successful alliance, information sharing, information participation, and proprietary information sharing), entire *conflict resolution techniques* (avoidance & constructive and destructive), and *commodity/supplier selection process* explained a range of 50% to 54% of the variation in the *financial perspective performance*.

Hypothesis 6_d *customer perspective performance* was partially supported. Ten explanatory variables including no variables from both alliance manager characteristics categorical variables and organizational characteristics categorical variables, three variables from *attributes of the alliance* (trust & coordination and commitment from the least/most successful alliance), four variables from *communication behavior* (information quality from the most successful alliance, information sharing, information participation, and proprietary information sharing), entire *conflict resolution techniques* (avoidance & constructive and destructive), and *commodity/supplier selection process* explained a range of 51.4% to 54.7% of the variation in the *customer perspective performance*.

Hypothesis 6_e *internal-business-process perspective performance* was supported. Twelve explanatory variables including two variables from alliance manager characteristics categorical variables (gender and ethnicity), one variable from organizational characteristics categorical variables (alliance training programs), three variables from *attributes of the alliance* (trust & coordination and commitment from the least/most successful alliance), four variables from *communication behavior* (information quality from the most successful alliance, information sharing, information participation,

and proprietary information sharing), one variable from *conflict resolution techniques* (avoidance & constructive), and *commodity/supplier selection process* explained a range of 37.5% to 42.5% of the variation in the *internal-business-process perspective performance*.

Hypothesis 6_f *learning and growth perspective performance* was partially supported. Eleven explanatory variables including no variables from both alliance manager characteristics categorical variables and organizational characteristics categorical variables, three variables from *attributes of the alliance* (trust & coordination, commitment from the least/most successful alliance), five variables from *communication behavior* (information quality from the least/most successful alliance, information sharing, information participation, and proprietary information sharing), entire *conflict resolution techniques* (avoidance & constructive and destructive), and *commodity/supplier selection process* explained a range of 38.3% to 42.8% of the variation in the *learning and growth perspective performance*.

Hypothesis 6_g *success of the alliance (total score)* was supported. Twelve explanatory variables including one variable from alliance manager characteristics categorical variables (education level), one variable from organizational characteristics categorical variables (alliance training programs), three variables from *attributes of the alliance* (trust & coordination, commitment from the least/most successful alliance), four variables from *communication behavior* (information quality from the most successful alliance, information sharing, information participation, and proprietary information sharing), entire *conflict resolution techniques* (avoidance & constructive and destructive),

and *commodity/supplier selection process* explained a range of 62.8% to 65.8% of the variation in the *success of the alliance (total score)*.

Practical Implications

SCM has been shown to be associated with cost savings and service improvement and it is well established that supply chain management capabilities or logistics capabilities affects organizational performance (Tracey et al., 2005; Lunch et al., 2000). Several studies have demonstrated a relationship between strategic alliance and SCM (Monczka et al., 1998) and partner characteristics (Sakar et al., 2001) to influence organizational performance. Ngowi (2001) noticed the private benefits in construction alliances in Botswana, and Hendricks and Singhal (2005) found a negative relationship between supply chain glitches and operating performance in the stock market.

The critical problem of applying supply chain management (SCM) in the construction industry causing poor performance (Vrijhoef & Koskela, 1999; Matthews et al., 2000; Kanji &Wong, 1998; Cheng et al., 2001), the strengths (e.g., cost saving, service improvement, asset utilization to achieve differentiation; integrating business functions and processes with key members for competitive advantage; communication), weaknesses in the application of SCM in industries (CSCMP, 2007; Lambert et al., 1998; Chan et al., 2003; Stephens, 2001; Huan et al., 2004), and factors affecting the effectiveness of SCM (Croxton et al., 2001; Huan et al., 2004) are well established in the literature.

Some scholars such as Krippaehen et al. in 1992, Flanagan et al. in 1998, Barlow et al. (1997), Gunasekaran (1999), and Holt et al. (2000) suggested forming alliances of construction partners (Cheng et al., 2001; Matthews et al., 2000; Kanji & Wong, 1998).

Further, Holt et al. (2000) proposed two kinds of construction alliances. The advantages of establishing strategic alliances (such as achieving competitive advantage, expanding knowledge, developing applications, commercializing new products, obtaining external resources and flexibility, mitigating uncertainty without investments) (Whipple & Frankel, 2000; Cante et al., 2004; Sakaguchi et al., 2004), the high failure rate (Whipple & Frankel, 2000), and successful factors in strategic alliances (Monczka et al., 1998) are well established in the literature. Thus, the key objectives of this study were to verify the relationship between SCM and strategic alliance in the construction industry, and to examine the successful factors of supply chain alliance in construction industry in the US-based contractor companies based on alliance dimensions, alliance manager characteristics, and organizational characteristics, and to assess organizational performance when implementing a strategic alliance in the construction supply chain. Practical implications from this study include:

1. In order to build a successful strategic alliance, the important action for managers is to foster the alliance relationship (i.e., dimensions of alliances) through the development of higher levels of trust & coordination, commitment, communication behavior (Mohr & Spekman, 1994; Monczka et al., 1998; Kauser & Shaw, 2004). In addition, Mohr and Spekman (1994) and Monczka et al. (1998) also suggested the use of joint problem solving of constructive techniques in strategic alliances (Mohr & Spekman, 1994; Monczka et al., 1998).
2. A higher level of trust between alliance partners results in better alliance performance. In order to establish and help develop mutual trust in

international strategic alliances, executives must try to instill in personnel involved in the relationship by "keeping promises, being sincere when making decisions, showing loyalty and offering support to the other party" and avoiding taking advantage of both partners for achieving a long-term goal (Kauser & Shaw, 2004, p. 41). Believing the relationship between vendors (supplier) and dealers might serve to calm the dealers' fear of opportunistic behavior, resulting in a greater satisfaction with the partnership (Mohr & Spekman, 1994). Trust & coordination are prominent factors among the multiple dimensions of alliances, since "the suppliers may become closely involved in joint R&D, requiring access to internal design competencies, and technology roadmaps" (Monczka et al., 1998, p. 566).

3. More committed partners manage their relationship relying on mutual consent rather than written agreements (Kauser & Shaw, 2004), and will make efforts to balance short-term problems with long-term goal achievement without raising the opportunistic behavior, resulting in successful partnership (Mohr & Spekman, 1994). In addition, commitment is positively related to international strategic organization performance in financial area (Kauser & Shaw, 2004).
4. A greater level of information sharing may cause the buyers the impression that they are entitled to a greater share of the fruit of partnership with the suppliers for higher margins (Mohr & Spekman, 1994).

5. With higher levels of information participation, the higher the level of managers' satisfaction and alliance performance in the financial area (Mohr & Spekman (1994); Monczka et al. (1998); Kauser and Shaw (2004).
6. The use of destructive conflict resolution techniques (harsh words and outside arbitration) may have negative influence on managers' satisfaction (Monczka et al., 1998; Kauser & Shaw, 2004).
7. The *commodity selection process* takes precedence over the supplier selection process to increase the likelihood of alliance success because organizations must ensure that strategic alliances are established in proper situations and that the right candidates for alliances are chosen (Monczka et al., 1998).
8. Since education level was a significant positive explanatory variable of attributes of the alliance and organizational performance, managers of general contractor companies can obtain more effective and more successful strategic alliances if they focus their attentions on how to improve employees' education level, such as offering alliance training programs in an organization.
9. Alliance training programs capture the utility of the *dimensions of alliances (total score)* and become the catalyst of the alliance performance (*success of alliances total score)*, so it is deemed to be an important indicant of a partnership's vitality.

Conclusions

1. The majority of respondents in this study were male (86%), and white (92%), the largest age group was between 35 and 44 years old (31.3%). Those who had one to three years of college, who had a four-year college degree or who

earned professional degrees accounted for approximately 95.3% of the respondents. The non-Hispanic (ethnicity) group accounted for a total of 97.3%. The majority (42%) of participants had yearly income in US dollars between 75,000 and 124,999. These results in terms of gender, race, and ethnicity were consistent with the employment by detailed occupation and minority groups (Bureau of Labor Statistics, 2009).

2. Among the respondents' companies, the average number of employees was 23,538 with the highest percentage (34.7%) of firms having 1,001-5,000 employees. The average number of foreign offices was 23 but one half of the total respondents identified that their companies had "zero" offices outside the U.S. (50%). Most respondents (91.3%) reported receiving new construction contracts in their companies recently and over half of the total sampled companies were "not" offering alliance training programs (64%).

3. The Organizational Performance measurement based on Norton and Kaplan's work was developed for this study as a subjective assessment. It was shown to be reliable and valid. Content validity, construct validity, and convergent validity were established for the other scales. Internal consistency reliability was estimated, with satisfactory results.

4. For the characteristics of alliance managers (gender, age, level of education, race, ethnicity, job tenure, job title, and yearly income), this study compared the dimension of alliances (*attributes of the alliance, communication behavior, conflict resolution techniques, and commodity/supplier selection process*), and alliance performance in both managers' satisfaction and the four

perspectives of organizational performance (*financial perspective, customer perspective, internal-business-process perspective, and learning and growth perspective*) in the construction industry of USA-based contractor companies.

a. Gender: According to the *internal-business-process perspective performance* subscale, male construction alliance managers who were engaged in strategic alliances provided more internal-business-process perspective performance.

b. Age: Older construction managers who were engaged in strategic alliances may perceive more *satisfaction with the alliance* based on their past success than the younger ones.

c. Race: Asian construction managers perceived more attributes of the alliance than other races and more dimension of alliance (total score).

d. Ethnicity: Hispanic construction managers who were engaged in strategic alliances provided higher internal-business-process perspective performance.

e. Job tenure: The construction alliance managers with longer job tenure perceived more attributes of the alliance than those with shorter job tenure in the organization.

5. For the organizational characteristics (number of employees, number of offices in the United States and other countries, region of United States, type of location area, total revenue, new contract, and alliance training programs), this study compared dimension of alliance (*attributes of the alliance, communication behavior, conflict resolution techniques, and*

commodity/supplier selection process), and alliance performance in both managers' satisfaction and the four perspectives of organizational performance (*financial perspective, customer perspective, internal-business-process perspective, and learning and growth perspective*) in the construction industry of USA-based contractor companies.

a. Number of employees: The more employees in construction firms, the higher the *attributes of alliance*.

b. New contracts: The construction managers whose business units recently received new contracts within strategic alliances experienced a higher level of *satisfaction with the alliance* depending on past success than those who received no contracts

c. Alliance training programs: Respondents with a higher frequency of alliance training programs in their firms had more *attributes of alliance*, more comprehensive *commodity/supplier selection process*, and higher *dimensions of alliances (total score)* and the greater *satisfaction with the alliance* based on past success, the higher level of *internal-business-process perspective performance*, and a higher level of *success of the alliance (total score)*.

6. For the dimension of alliances (*attributes of the alliance, communication behavior, conflict resolution techniques, and commodity/supplier selection process*), this study compared alliance performance in both managers' satisfaction and the four perspectives of organizational performance (*financial perspective, customer perspective, internal-business-process perspective, and*

learning and growth perspective) in the construction industry of USA-based contractor companies.

a. Trust & coordination: Trust & coordination was found to be positively related to construction alliance performance and managers' satisfaction with the partnership (positive relationship), except for the *financial perspective performance* (negative relationship).

b. Commitment: A higher level of commitment is associated with more successful organizational performance in the four areas (*financial, customer, internal-business-process, and learning and growth*) and *success of the alliance (total score)*.

c. Information sharing: Information sharing has a negative influence on managers' satisfaction and *learning and growth performance*, but a positive influence on alliance performance (*success of the alliance total score)*.

d. Information participation: Information participation has a positive influence on alliance performance in managers' satisfaction and *success of the alliance (total score)*, but a negative relationship with *internal-business-process* and *learning and growth performance*.

e. Avoidance & constructive conflict resolution techniques: Avoidance & constructive conflict resolution techniques are positively associated with higher alliance performance in managers' satisfaction and *success of the alliance (total score)*.

f. Destructive conflict resolution techniques: The use of destructive conflict resolution techniques (harsh words and outside arbitration) is negatively associated with managers' satisfaction and greater *success of the alliance (total score)*.

g. Commodity/supplier selection process: Commodity/supplier selection process positively related to alliance performance in managers' satisfaction and the four perspectives of organizational performance.

Limitations

This study was one of the more comprehensive studies about the relationships among supply chain management, strategic alliance, and organizational performance with implications for the construction industry. The limitations of this study are as follows:

1. This non-experimental study was weaker than an experimental design.
2. The sample size of only 150 construction alliance mangers that are in charge of strategic alliances or partnership in the general contractor companies does not represent all companies in the construction industry.
3. The sample size was small for the data analysis.
4. The results were generated only from the 2008 Top Lists of *Engineering News Record (ENR)* and the *Blue Book of Building and Construction* online directory.
5. The *Attributes of the Alliance* scale, the *Communication Behavior* scale, and the *Conflict Resolution Techniques* scale were modified.
6. This study was limited to the United States. Thus, the results of this study cannot be generalized beyond this sample.

Recommendations for Future Study

Based on the interpretations and conclusions from this study, future studies are recommended to further explore relationships among dimensions of strategic alliances, and organizational performance in the construction industry.

1. There are a large number of unexplained items in an organization which need to be explored and developed in hypotheses testing, such as negotiation methods and cultural sensitivity. It is recommended to examine the multidimensional nature of the scale for future studies.
2. Additional construct validation studies should be conducted with the *Organizational Performance* scale in difference industries.
3. This study did not include the variables associated with leadership style. A future study can measure the concept of leadership with other leadership behaviors to examine the relationship with dimensions of alliances.
4. A future study focusing on conflict management and strategic alliances in uncovering the ways to prevent conflicts for effective and efficient strategic alliances is recommended.
5. Future studies can use interviews and observations as well as face to face surveys to general contractor companies or any other industries rather than the online survey format to increase response rates.

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Appendixes

Appendix A

IRB Approval for Research

Lynn University

Principal Investigator: Hai-Ping Chang
Project Title: Relationships among Supply Chain Management, Strategic Alliances, and Organizational Performance with Implications for the Construction Industry

IRB Project Number: 2009-010 Request for Expedited Review of Application and Research Protocol for a New Project

IRB Action by the IRB Chair or Another Member or Members Designed by the Chair:

Expedited Review of Application and Research Protocol and Request for Expedited Review (FORM 3): Approved X Approved; w/provision(s) ___

COMMENTS:

Consent Required: No ____ Yes __X__ Not Applicable ____ Written __X__ Signed____.

Consent forms must bear the research protocol expiration date of 03/11/2010__.

Application to Continue/Renew is due:

1) For an Expedited IRB Review, one month prior to the due date for renewal __X__.
2) Other:

Name of IRB Chair: Farideh Farazmand

Signature of IRB Chair _____ Date: 03/11/09

Cc. Dr. Norcio

Institutional Review Board for the Protection of Human Subjects
Lynn University
3601 N. Military Trail Boca Raton, Florida 33431

Appendix B

Authorization for Informed Consent

Informed Consent Form

Lynn University
THIS DOCUMENT SHALL ONLY BE USED TO PROVIDE AUTHORIZATION FOR VOLUNTARY CONSENT

PROJECT TITLE: Relationships Among Supply Chain Management, Strategic Alliances, and Organizational Performance with Implications for the Construction Industry
Project IRB Number: 2009-010 Lynn University 3601 N. Military Trail Boca Raton, Florida 33431

I, Hai-Ping Chang, am a doctoral student at Lynn University. I am studying Global Leadership, with a specialization in Corporate and Organizational Management. One of my degree requirements is to conduct a research study.

DIRECTIONS FOR THE PARTICIPANT:

You are being asked to participate in my research study. Please read this carefully. This form provides you with information about the study. The Principal Investigator (Hai-Ping Chang) will answer all of your questions. Ask questions about anything you don't understand before deciding whether or not to participate. You are free to ask questions at any time before, during, or after your participation in this study. Your participation is entirely voluntary and you can refuse to participate without penalty or loss of benefits to which you are otherwise entitled. You acknowledge that you are at least 18 years of age, and that you do not have medical problems or language or educational barriers that precludes understanding of explanations contained in this authorization for voluntary consent.

PURPOSE OF THIS RESEARCH STUDY: The study is about supply chain management, strategic alliances, and organizational performance in the USA-based contractor companies. There will be approximately 3,434 or more executives and contract/procurement professionals who are in charge of strategic alliances or partnership in the general contractor companies invited to participate in this study. All participants must be at least 18 years old. Participants must be fluent in English. Participants must have been employed at their present companies for the past six months.

PROCEDURES: The invitation e-mail is sent by using the Blind Carbon Copy (Bcc) feature. When an e-mail is sent by Bcc, the recipients are unable to know who else has received the message. The survey is completed electronically and begins by clicking on the "Yes, I agree to participate in this survey" button under the consent letter. You are prompted to answer questions based on your beliefs about construction alliances in your firm. These surveys should take about 25 minutes to complete.

POSSIBLE RISKS OR DISCOMFORT: This study involves minimal risk. You may find that some of the questions are sensitive in nature. In addition, participation in this study requires a minimal amount of your time and effort.

POSSIBLE BENEFITS: There may be no direct benefit to participants in this research. However, in addition to the value of the theory development for future scholarly inquiry, the results of this study would contribute to actual practice of strategic alliances and supply chain management in the construction industry. Managers/Executives might use the research instruments to find gaps in the use of strategic supplier alliances.

ANONYMITY: This online survey will be anonymous. Anonymity will be maintained to the degree permitted by the technology used. Specifically, no guarantees can be made regarding the interception of data sent via the Internet by any third parties. The researcher will not identify you and data will be reported as "group" responses. Participation in this survey is voluntary and submit of the completed survey will constitute your informed consent to participate. All information will be held in strict confidence and will not be disclosed unless required by law or regulation.

RIGHT TO WITHDRAW: You are free to choose whether or not to participate in this study. There will be no penalty or loss of benefits to which you are otherwise entitled if you choose not to participate.

CONTACTS FOR QUESTIONS/ACCESS TO CONSENT FORM: Any further questions you have about this study or your participation in it, either now or any time in the future, will be answered by Hai-Ping Chang who may be reached at: (425) 279-3482 or at hchang2@email.lynn.edu and Dr. Ralph Norcio, faculty advisor who may be reached at: (561) 237-7010 or at rnorcio@lynn.edu. For any questions regarding your rights as a research subject, you may call Dr. Farideh Farazmand, Chair of the Lynn University Institutional Review Board for the Protection of Human Subjects, at (561) 237-7847. If any problems arise as a result of your participation in this study, please call the Principal Investigator (Hai-Ping Chang) and the faculty advisor (Dr. Norcio) immediately. You are free to print a copy of this consent form.

INVESTIGATOR'S AFFIDAVIT: I hereby certify that a written explanation of the nature of the above project has been provided to the person participating in this project. A copy of the written documentation provided is attached hereto. By the person's consent to voluntary participate in this study, the person has represented that he/she is at least 18 years of age, and that he/she does not have a medical problem or language or educational barrier that precludes his/her understanding of my explanation. Therefore, I hereby certify that to the best of my knowledge the person participating in this project understands clearly the nature, demands, benefits, and risks involved in his/her participation.

Hai Ping Chang
Signature of Investigator

LYNN UNIVERSITY Valid one year from date of approval

Date of IRB Approval: 3/11/09
Date of IRB Expiration: 3/11/2010

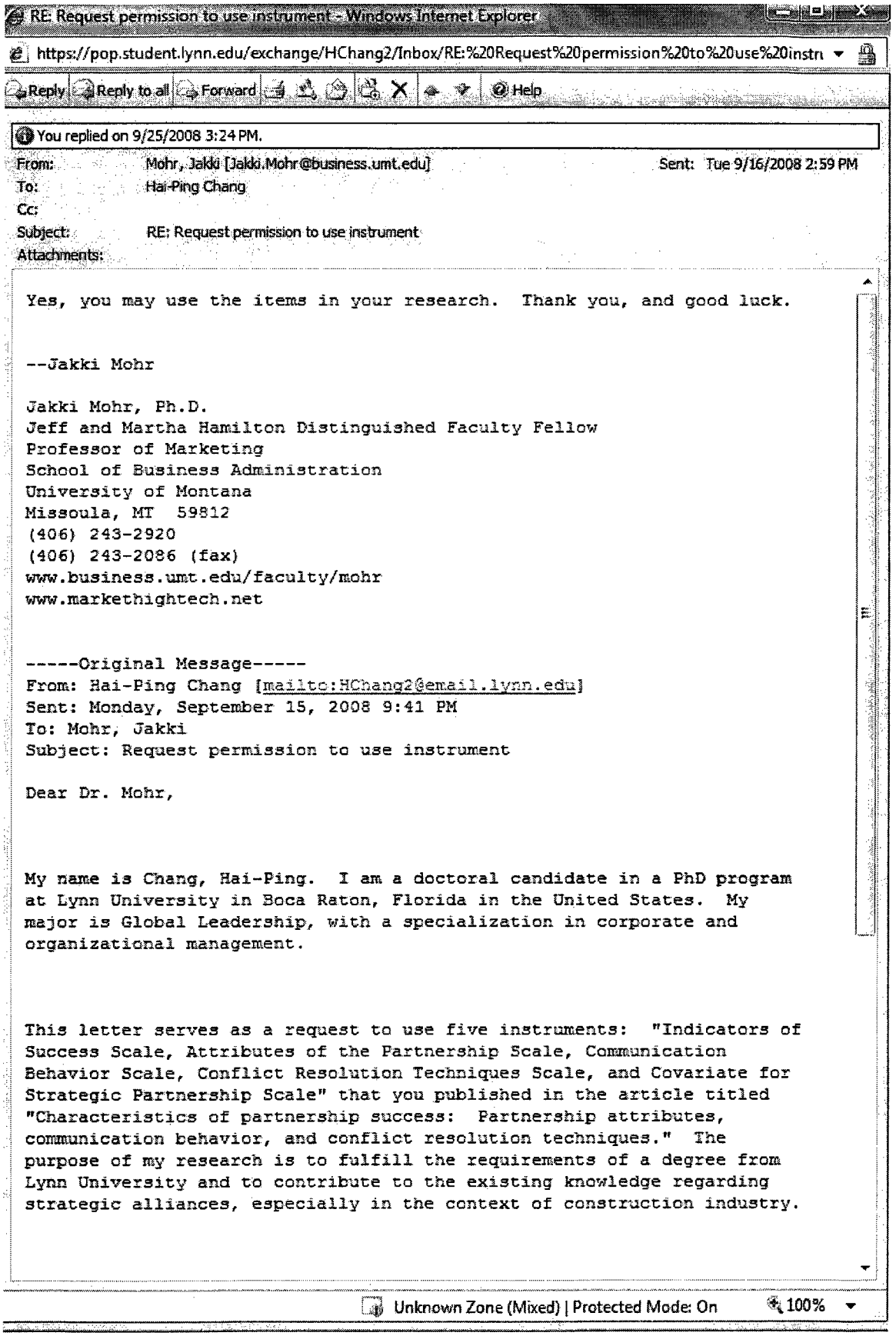
1. Would you like to participate in this study

- Yes, I agree to participate in this study
- No, I do not agree to participate in this study

Next

Appendix C

Permission to Use Dimension of Alliances Scale to Measure Success Factors in Strategic Alliances



RE: Request permission to use instrument - Windows Internet Explorer

https://pop.student.lynn.edu/exchange/HChang2/Inbox/RE:%20Request%20permission%20to%20use%20instrn

Reply | Reply to all | Forward | Help

You replied on 9/25/2008 3:24 PM.

From: Mohr, Jakki [Jakki.Mohr@business.umt.edu] Sent: Tue 9/16/2008 2:59 PM
To: Hai-Ping Chang
Cc:
Subject: RE: Request permission to use instrument
Attachments:

Yes, you may use the items in your research. Thank you, and good luck.

--Jakki Mohr

Jakki Mohr, Ph.D.
Jeff and Martha Hamilton Distinguished Faculty Fellow
Professor of Marketing
School of Business Administration
University of Montana
Missoula, MT 59812
(406) 243-2920
(406) 243-2086 (fax)
www.business.umt.edu/faculty/mohr
www.markethightech.net

-----Original Message-----
From: Hai-Ping Chang [mailto:HChang2@email.lynn.edu]
Sent: Monday, September 15, 2008 9:41 PM
To: Mohr, Jakki
Subject: Request permission to use instrument

Dear Dr. Mohr,

My name is Chang, Hai-Ping. I am a doctoral candidate in a PhD program at Lynn University in Boca Raton, Florida in the United States. My major is Global Leadership, with a specialization in corporate and organizational management.

This letter serves as a request to use five instruments: "Indicators of Success Scale, Attributes of the Partnership Scale, Communication Behavior Scale, Conflict Resolution Techniques Scale, and Covariate for Strategic Partnership Scale" that you published in the article titled "Characteristics of partnership success: Partnership attributes, communication behavior, and conflict resolution techniques." The purpose of my research is to fulfill the requirements of a degree from Lynn University and to contribute to the existing knowledge regarding strategic alliances, especially in the context of construction industry.

Unknown Zone (Mixed) | Protected Mode: On 100%

Dear Dr. Mohr,

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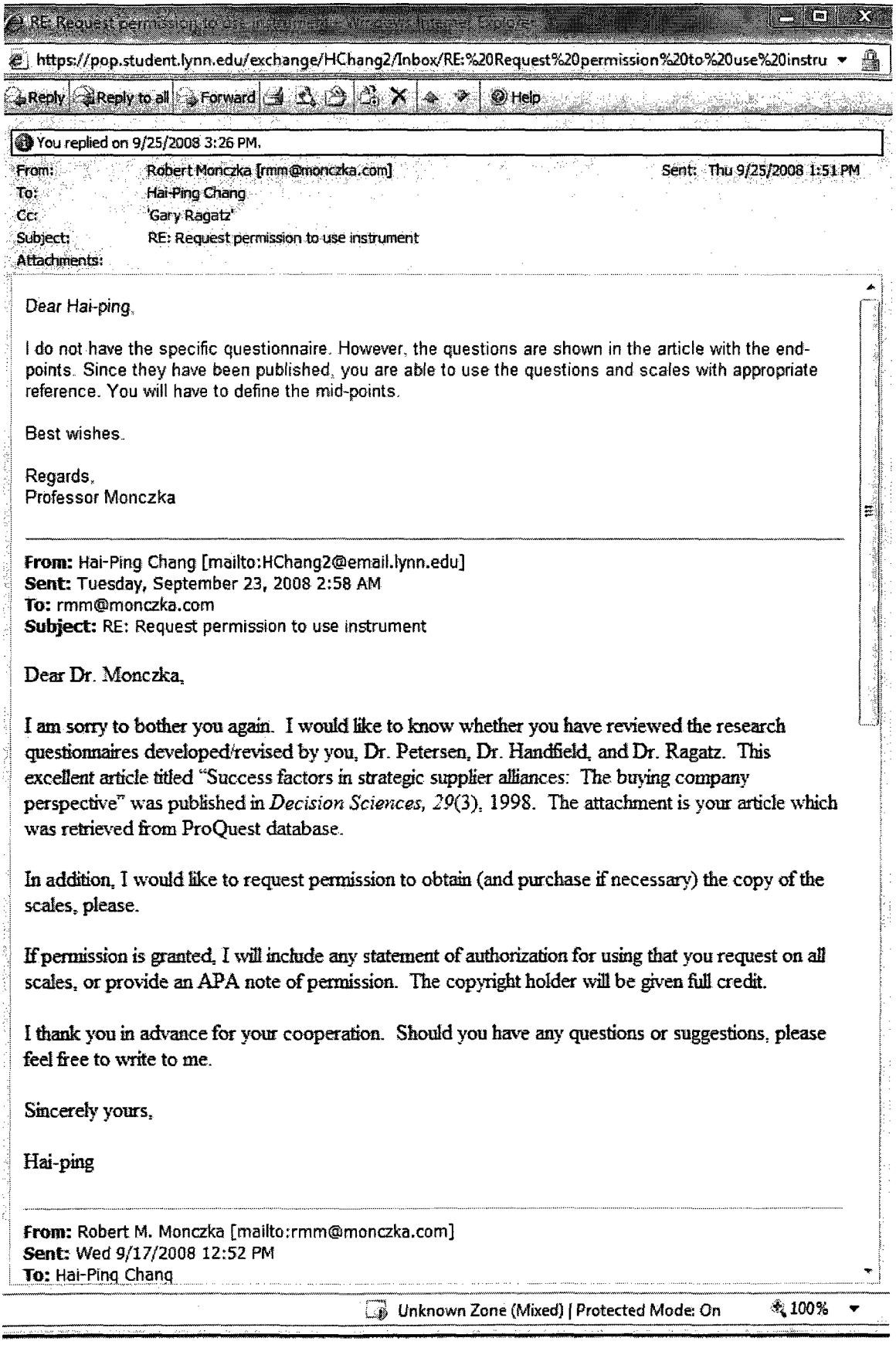
I would greatly appreciate your consent to my request. If you require any additional information, please do not hesitate to contact me. I can be reached via e-mail at hchang2@lynn.edu <mailto: hchang@lynn.edu> or (425)279-3482. My postal mailing address is 4201 W. Atlantic Blvd, Apt. # 617, Coconut Creek, Florida. My dissertation committee's chairperson is Dr. Ralph Norcio, who may be reached at: RNorcio@lynn.edu <mailto: rnorcio@lynn.edu > and (561)237-7010.

Best Regards,

Hai-Ping Chang



RE: Request permission to use instrument - Windows Internet Explorer

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Reply | Reply to all | Forward | Help

You replied on 9/25/2008 3:26 PM.

From: Robert Monczka [rmm@monczka.com] Sent: Thu 9/25/2008 1:51 PM
To: Hai-Ping Chang
Cc: 'Gary Ragatz'
Subject: RE: Request permission to use instrument
Attachments:

Dear Hai-ping,

I do not have the specific questionnaire. However, the questions are shown in the article with the end-points. Since they have been published, you are able to use the questions and scales with appropriate reference. You will have to define the mid-points.

Best wishes.

Regards,
Professor Monczka

From: Hai-Ping Chang [mailto:HChang2@email.lynn.edu]
Sent: Tuesday, September 23, 2008 2:58 AM
To: rmm@monczka.com
Subject: RE: Request permission to use instrument

Dear Dr. Monczka,

I am sorry to bother you again. I would like to know whether you have reviewed the research questionnaires developed/revised by you, Dr. Petersen, Dr. Handfield, and Dr. Ragatz. This excellent article titled "Success factors in strategic supplier alliances: The buying company perspective" was published in *Decision Sciences, 29*(3), 1998. The attachment is your article which was retrieved from ProQuest database.

In addition, I would like to request permission to obtain (and purchase if necessary) the copy of the scales, please.

If permission is granted, I will include any statement of authorization for using that you request on all scales, or provide an APA note of permission. The copyright holder will be given full credit.

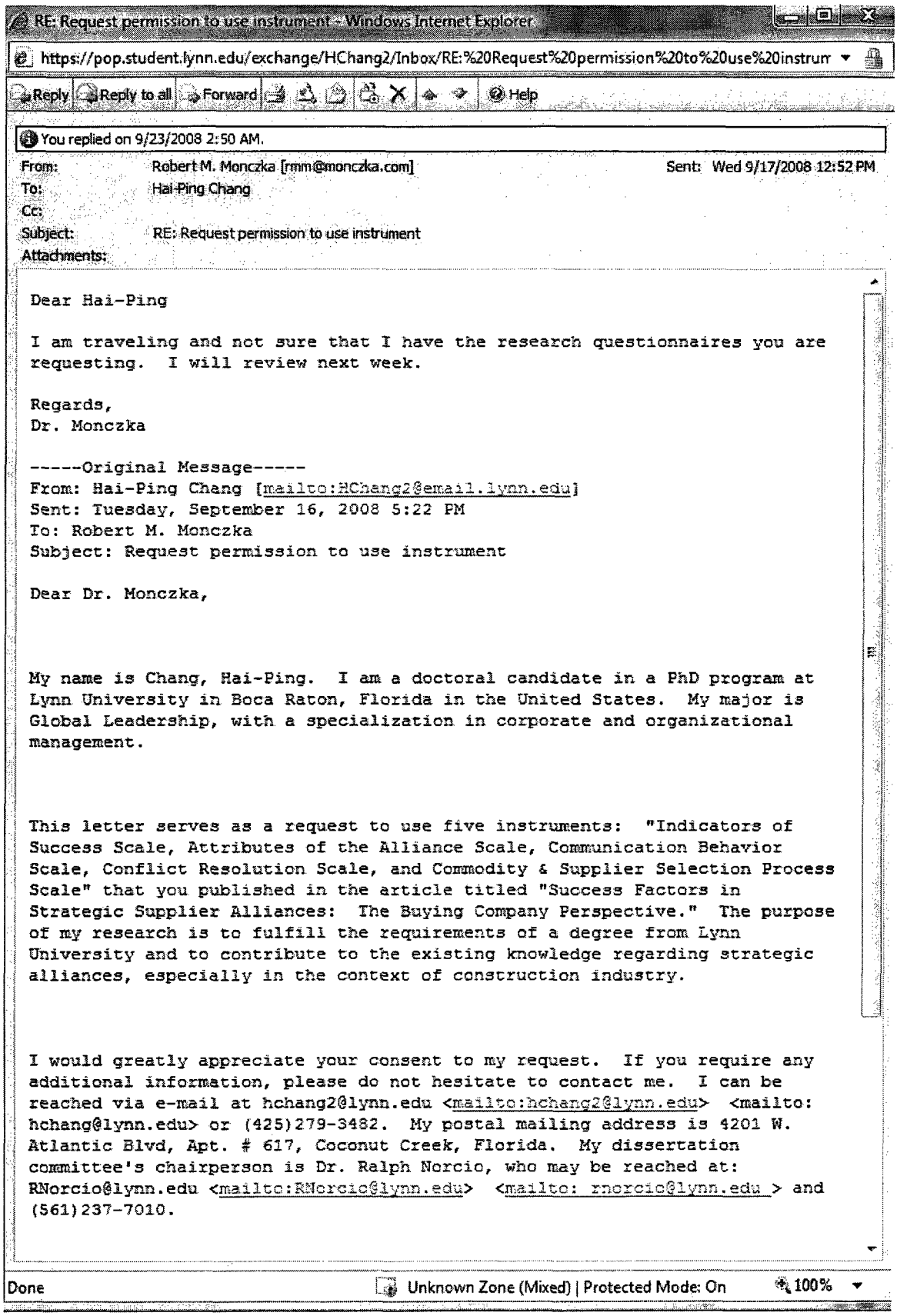
I thank you in advance for your cooperation. Should you have any questions or suggestions, please feel free to write to me.

Sincerely yours,

Hai-ping

From: Robert M. Monczka [mailto:rmm@monczka.com]
Sent: Wed 9/17/2008 12:52 PM
To: Hai-Ping Chang

Unknown Zone (Mixed) | Protected Mode: On 100%



RE: Request permission to use instrument - Windows Internet Explorer

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Reply | Reply to all | Forward | Help

You replied on 9/23/2008 2:50 AM.

From: Robert M. Monczka [rmm@monczka.com] Sent: Wed 9/17/2008 12:52 PM
To: Hai-Ping Chang
Cc:
Subject: RE: Request permission to use instrument
Attachments:

Dear Hai-Ping

I am traveling and not sure that I have the research questionnaires you are requesting. I will review next week.

Regards,
Dr. Monczka

-----Original Message-----
From: Hai-Ping Chang [mailto:HChang2@email.lynn.edu]
Sent: Tuesday, September 16, 2008 5:22 PM
To: Robert M. Monczka
Subject: Request permission to use instrument

Dear Dr. Monczka,

My name is Chang, Hai-Ping. I am a doctoral candidate in a PhD program at Lynn University in Boca Raton, Florida in the United States. My major is Global Leadership, with a specialization in corporate and organizational management.

This letter serves as a request to use five instruments: "Indicators of Success Scale, Attributes of the Alliance Scale, Communication Behavior Scale, Conflict Resolution Scale, and Commodity & Supplier Selection Process Scale" that you published in the article titled "Success Factors in Strategic Supplier Alliances: The Buying Company Perspective." The purpose of my research is to fulfill the requirements of a degree from Lynn University and to contribute to the existing knowledge regarding strategic alliances, especially in the context of construction industry.

I would greatly appreciate your consent to my request. If you require any additional information, please do not hesitate to contact me. I can be reached via e-mail at hchang2@lynn.edu <mailto:hchang2@lynn.edu> <mailto: hchang@lynn.edu> or (425)279-3482. My postal mailing address is 4201 W. Atlantic Blvd, Apt. # 617, Coconut Creek, Florida. My dissertation committee's chairperson is Dr. Ralph Norcio, who may be reached at: RNorcio@lynn.edu <mailto:RNorcio@lynn.edu> <mailto: rnorcio@lynn.edu > and (561)237-7010.

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Dear Dr. Monczka,

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This letter serves as a request to use five instruments: "Indicators of Success Scale, Attributes of the Alliance Scale, Communication Behavior Scale, Conflict Resolution Scale, and Commodity & Supplier Selection Process Scale" that you published in the article titled "Success Factors in Strategic Supplier Alliances: The Buying Company Perspective." The purpose of my research is to fulfill the requirements of a degree from Lynn University and to contribute to the existing knowledge regarding strategic alliances, especially in the context of construction industry.

I would greatly appreciate your consent to my request. If you require any additional information, please do not hesitate to contact me. I can be reached via e-mail at hchang2@lynn.edu <mailto: hchang@lynn.edu> or (425)279-3482. My postal mailing address is 4201 W. Atlantic Blvd, Apt. # 617, Coconut Creek, Florida. My dissertation committee's chairperson is Dr. Ralph Norcio, who may be reached at: RNorcio@lynn.edu <mailto: rnorcio@lynn.edu > and (561)237-7010.

Best Regards,

Hai-Ping Chang

Following-up Letter

Dear Dr. Monczka,

I am sorry to bother you again. I would like to know whether you have reviewed the research questionnaires developed/revised by you, Dr. Petersen, Dr. Handfield, and Dr. Ragatz. This excellent article titled "Success factors in strategic supplier alliances: The buying company perspective" was published in *Decision Sciences, 29*(3), 1998. The attachment is your article which was retrieved from ProQuest database.

In addition, I would like to request permission to obtain (and purchase if necessary) the copy of the scales, please.

If permission is granted, I will include any statement of authorization for using that you request on all scales, or provide an APA note of permission. The copyright holder will be given full credit.

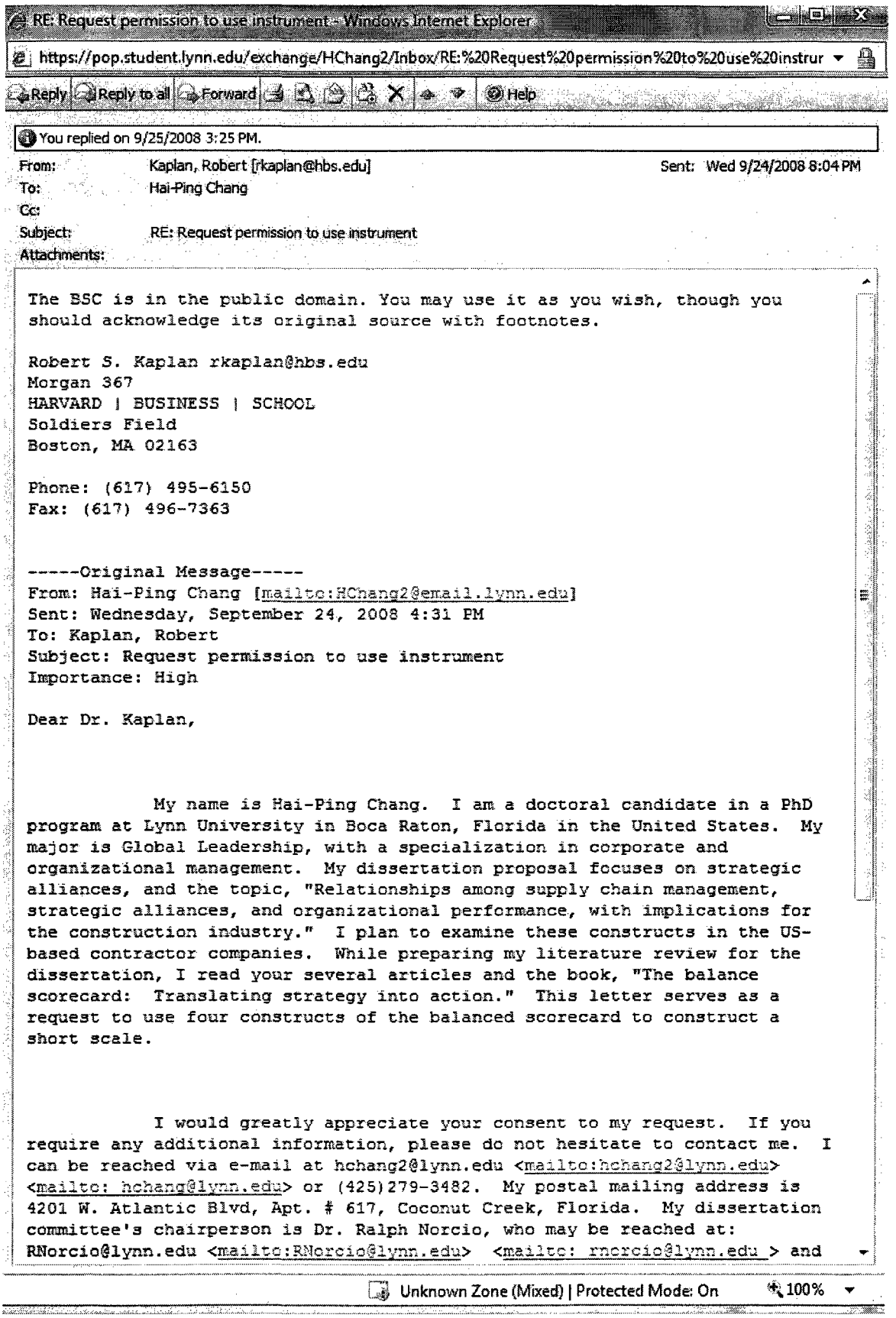
I thank you in advance for your cooperation. Should you have any questions or suggestions, please feel free to write to me.

Sincerely yours,

Hai-ping

Appendix D

Permission to Use Organizational Performance Instrument



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Reply | Reply to all | Forward | Help

You replied on 9/25/2008 3:25 PM.

From: Kaplan, Robert [rkaplan@hbs.edu] Sent: Wed 9/24/2008 8:04 PM
To: Hai-Ping Chang
Cc:
Subject: RE: Request permission to use instrument
Attachments:

The BSC is in the public domain. You may use it as you wish, though you should acknowledge its original source with footnotes.

Robert S. Kaplan rkaplan@hbs.edu
Morgan 367
HARVARD | BUSINESS | SCHOOL
Soldiers Field
Boston, MA 02163

Phone: (617) 495-6150
Fax: (617) 496-7363

-----Original Message-----
From: Hai-Ping Chang [mailto:HChang2@email.lynn.edu]
Sent: Wednesday, September 24, 2008 4:31 PM
To: Kaplan, Robert
Subject: Request permission to use instrument
Importance: High

Dear Dr. Kaplan,

My name is Hai-Ping Chang. I am a doctoral candidate in a PhD program at Lynn University in Boca Raton, Florida in the United States. My major is Global Leadership, with a specialization in corporate and organizational management. My dissertation proposal focuses on strategic alliances, and the topic, "Relationships among supply chain management, strategic alliances, and organizational performance, with implications for the construction industry." I plan to examine these constructs in the US-based contractor companies. While preparing my literature review for the dissertation, I read your several articles and the book, "The balance scorecard: Translating strategy into action." This letter serves as a request to use four constructs of the balanced scorecard to construct a short scale.

I would greatly appreciate your consent to my request. If you require any additional information, please do not hesitate to contact me. I can be reached via e-mail at hchang2@lynn.edu <mailto:hchang2@lynn.edu> <mailto: hchang@lynn.edu> or (425)279-3482. My postal mailing address is 4201 W. Atlantic Blvd, Apt. # 617, Coconut Creek, Florida. My dissertation committee's chairperson is Dr. Ralph Norcio, who may be reached at: RNorcio@lynn.edu <mailto:RNorcio@lynn.edu> <mailto: rnorcio@lynn.edu > and

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Dear Dr. Kaplan,

My name is Hai-Ping Chang. I am a doctoral candidate in a PhD program at Lynn University in Boca Raton, Florida in the United States. My major is Global Leadership, with a specialization in corporate and organizational management. My dissertation proposal focuses on strategic alliances, and the topic, "Relationships among supply chain management, strategic alliances, and organizational performance, with implications for the construction industry." I plan to examine these constructs in the US-based contractor companies. While preparing my literature review for the dissertation, I read your several articles and the book, "The balance scorecard: Translating strategy into action." This letter serves as a request to use four constructs of the balanced scorecard to construct a short scale.

I would greatly appreciate your consent to my request. If you require any additional information, please do not hesitate to contact me. I can be reached via e-mail at hchang2@lynn.edu <mailto: hchang@lynn.edu> or (425)279-3482. My postal mailing address is 4201 W. Atlantic Blvd, Apt. # 617, Coconut Creek, Florida. My dissertation committee's chairperson is Dr. Ralph Norcio, who may be reached at: RNorcio@lynn.edu <mailto: rnorcio@lynn.edu > and (561)237-7010.

Best Regards,

Hai-Ping Chang

Reference

Kaplan, R., & Norton, D. (1996c). *Balanced scorecard: Translating strategy into action.* Boston, MA: Harvard Business School Press.

Appendix E

Survey Instrument

Part 1 : Filter Questions

Instructions: Please fill in the blank or check one response.

1. Is your company a building construction contractor who builds residential, industrial, commercial, or other buildings?
   ☐ Yes ☐ No

2. Are you 18 years or older?
   ☐ Yes ☐ No

3. Have you been employed at your company for the past six months?
   ☐ Yes ☐ No

If you answer "Yes" to all of the above questions, please proceed. If you answered "No" to any of the above questions, there is no need to complete the survey.

Part 2 : Alliance Manager Characteristics Profile

Instructions: Please fill in the blank or check the most appropriate response.

1. What is your gender? (Check one) ☐ 1 = Male ☐ 2 = Female

2. What is your age?
   - ☐ 1 = 18-24
   - ☐ 2 = 25-34
   - ☐ 3 = 35-44
   - ☐ 4 = 45-54
   - ☐ 5 = 55 or more

3. What is the highest level of education you have reached? (Check one)
   - ☐ 1 = Professional *(MA, MS, ME, MD, PhD, and the like)*
   - ☐ 2 = Four-year college graduate *(BA, BS, BM, and the like)*
   - ☐ 3 = One to three years college *(also business schools)*
   - ☐ 4 = High school graduate
   - ☐ 5 = Ten to eleven years of school *(part high school)*
   - ☐ 6 = Seven to nine years of school
   - ☐ 7 = Less than seven years of school

4. Please indicate your race (Check one):
   - ☐ 1 = White
   - ☐ 2 = Black or African American
   - ☐ 3 = Asian
   - ☐ 4 = Native Hawaiian or Other Pacific Islander
   - ☐ 5 = American Indian or Alaska Native

5. Please indicate your ethnicity (Check one):
   - ☐ 1 = Hispanic
   - ☐ 2 = Non-Hispanic

6. Please indicate your job tenure with the organization (Check one):
   - ☐ 1 = Less than 1 year
   - ☐ 2 = 1 to less than 5 years
   - ☐ 3 = 5 to less than 10 years
   - ☐ 4 = 10 or more years

7. What is your primary job title within your firm?
   - ☐ 1 = Chief Executive Officer (CEO)
   - ☐ 2 = Chief Operating Officer (COO)
   - ☐ 3 = Strategy Director
   - ☐ 4 = Purchasing/Procurement Director
   - ☐ 5 = Purchasing/Procurement Profession
   - ☐ 6 = Other (Please Specify) _____

8. Do you have a job title for the alliance relationship?
   - ☐ 1 = Alliance Manager
   - ☐ 2 = Alliance Team Member
   - ☐ 3 = Other Title _____
   - ☐ 4 = No Job Title

9. In which range is your yearly income (Check one)?
   - ☐ 1 = Under $12,299
   - ☐ 2 = $12,299 - $19,999
   - ☐ 3 = $20,000 - $27,499
   - ☐ 4 = $27,500 - $34,999
   - ☐ 5 = $35,000 - $44,999
   - ☐ 6 = $45,000 - $74,999
   - ☐ 7 = $75,000 - $124,999
   - ☐ 8 = $125,000 +

Part 3 : Organizational Characteristics Profile

Instructions: Please select (or fill in where required) the most appropriate answer to describe your current company by providing a check mark in one of the boxes for each question or by filling-in-the-blank.

1. Please tell us your organization's name.

   Organization Name: _____

2. Please provide us with the organization's name of your partner on the most and least successful strategic alliance respectively.

   The most successful alliance partner: _____

   The least successful alliance partner: _____

3. Number of employees in your organization: _____

4. Number of offices in the United States: _____

5. Number of offices in other countries: _____

6. In what region of the United States is your office located? (Check one)
   - ☐ 1 = Northeast
   - ☐ 2 = Southeast
   - ☐ 3 = Midwest
   - ☐ 4 = Southwest
   - ☐ 5 = West

7. In what type of area is your company or local office located?
   - ☐ 1 = Rural
   - ☐ 2 = Suburban
   - ☐ 3 = Urban

8. Total Revenue including Domestic and International in U.S. Dollars:

   _____

9. Did your organization recently receive (or recently complete) a new construction contract(s)?
   ☐ 1 = Yes ☐ 2 = No

10. Does your organization offer or develop an alliance training program(s)?

☐ 1 = Yes ☐ 2 = No

Part 4 : Indicators of Success

Instructions: Respond to each statement pertaining to your company's strategic alliance relationship with your construction supplier by checking one of the boxes associated with seven ratings (1, 2, 3, 4, 5, 6, or 7), where first dimension (from SU1 to SU4) are ranged with anchor of 1 = Strongly Disagree, and 7 = Strongly Agree; SU5 is ranged with anchor of 1 = Poorly Satisfied, and 7 = Extremely Satisfied; the second dimension (SU6 and SU6a) is ranged with anchor of 1 = Poorly Satisfied, and 7 = Highly Satisfied.

	Past Success	Strongly Disagree 1	2	3	Neutral 4	5	6	Strongly Agree 7
SU1:	In this strategic supplier alliance/partnership relationship, the parties work together to solve problems.	☐	☐	☐	☐	☐	☐	☐
SU2:	This strategic supplier is flexible in response to requests we make.	☐	☐	☐	☐	☐	☐	☐
SU3:	This strategic supplier makes an effort to help us during emergencies.	☐	☐	☐	☐	☐	☐	☐
SU4:	When an agreement is made, we can always rely on the strategic supplier to fulfill the requirements.	☐	☐	☐	☐	☐	☐	☐

		Poorly Satisfied			Neutral			Extremely Satisfied
		1	2	3	4	5	6	7
SU5a:	Please indicate the overall degree of results satisfaction with your most successful strategic supplier alliance/partnership.	☐	☐	☐	☐	☐	☐	☐
SU5b:	Please indicate the overall degree of results satisfaction with your least successful strategic supplier alliance/partnership.	☐	☐	☐	☐	☐	☐	☐

	Success Difference	Poorly Satisfied			Neutral			Highly Satisfied
		1	2	3	4	5	6	7
SU6:	Please indicate your degree of satisfaction with this strategic supplier alliance/partnership.	☐	☐	☐	☐	☐	☐	☐
SU6a:	What is your business unit's overall degree of satisfaction with strategic supplier alliances/partnerships?	☐	☐	☐	☐	☐	☐	☐

Note. From "Success factors in strategic supplier alliances: The buying company perspective," by R. M. Monczka, K. J. Petersen, R. B. Handfield, and G. L. Ragatz, 1998, *Decision Sciences, 29(3)*, p. 553-577. Adapted with permission of Monczka.

Part 5 : Attributes of the Alliance

Instructions: Respond to each statement pertaining to your beliefs about the attributes of the construction alliance in your firm. Please show the extent to which you think your business unit's construction alliance has the feature described by the statement, where the first and the last dimensions are ranged with anchors of "1 = Strongly Disagree and 7 = Strongly Agree", the second dimension on the next page is ranged with anchors of "1 = Very Poorly Coordinated and 7 = Extremely Well Coordinated", and the third dimension is ranged with "1 = Significantly Less and 7 = Significantly More." Choose the number between 1 and 7 to show how strong your belief is.

	Trust	Strongly Disagree 1	2	3	Neutral 4	5	6	Strongly Agree 7
TC1:	We trust that our strategic supplier alliance/partnership will be beneficial to our business unit.	☐	☐	☐	☐	☐	☐	☐
TC2:	We do not get an equitable deal from our strategic supplier in this alliance. (Reverse scored)	☐	☐	☐	☐	☐	☐	☐
TC3:	This strategic supplier alliance/partnership relationship is marked by a high degree of harmony.	☐	☐	☐	☐	☐	☐	☐

R = Reverse scored

	Coordination	Very Poorly Coordinated 1	2	3	Neutral 4	5	6	Extremely Well Coordinated 7
TC4a:	Please rate the business unit's most successful strategic supplier alliance/partnership in terms of coordination with your strategic supplier.	☐	☐	☐	☐	☐	☐	☐
TC4b:	Please rate the business unit's least successful strategic supplier alliance/partnership in terms of coordination with your strategic supplier.	☐	☐	☐	☐	☐	☐	☐

	Commitment (from the Most Successful Alliance)	Significantly Less 1	2	3	Neutral 4	5	6	Significantly More 7
CM1:	Time commitment of your business unit's key personnel	☐	☐	☐	☐	☐	☐	☐
CM2:	Supplier training	☐	☐	☐	☐	☐	☐	☐
CM3:	Capital investment in the supplier	☐	☐	☐	☐	☐	☐	☐
CM4:	Direct dollar investment in the supplier	☐	☐	☐	☐	☐	☐	☐

	Commitment (from the Least Successful Alliance)	Significantly Less 1	2	3	Neutral 4	5	6	Significantly More 7
CM1:	Time commitment of your business unit's key personnel	☐	☐	☐	☐	☐	☐	☐
CM2:	Supplier training	☐	☐	☐	☐	☐	☐	☐
CM3:	Capital investment in the supplier	☐	☐	☐	☐	☐	☐	☐
CM4:	Direct dollar investment in the supplier	☐	☐	☐	☐	☐	☐	☐

	Interdependence	Strongly Disagree 1	2	3	Neutral 4	5	6	Strongly Agree 7
ID1:	It would be very easy to terminate the most or least successful strategic supplier alliance/partnerships and establish another strategic supplier.	☐	☐	☐	☐	☐	☐	☐
ID2:	The time to establish another strategic supplier alliance/partnership for this commodity/purchase family would be extremely long.	☐	☐	☐	☐	☐	☐	☐
ID3:	The cost to establish another strategic supplier alliance/partnership for this commodity/purchase family would be extremely high.	☐	☐	☐	☐	☐	☐	☐

Note. From "Success factors in strategic supplier alliances: The buying company perspective," by R. M. Monczka, K. J. Petersen, R. B. Handfield, and G. L. Ragatz, 1998, *Decision Sciences, 29(3)*, p. 553-577. Adapted with permission of Monczka.

Part 6 : Communication Behavior

Instructions: Please show the extent to which you believe your business unit's communication with the supplier in these most and least successful strategic supplier alliance/partnership, where the first dimension is ranged with anchors of "1 = Poor, and 7 = Excellent," and the rest of the dimensions are ranged with anchors of "1 = Strongly Disagree, and 7 = Strongly Agree."

Information Quality (from the Most Successful Alliance)	**Poor** 1	2	3	**Average** 4	5	6	**Excellent** 7
The information quality was:							
QL 1: Timely	☐	☐	☐	☐	☐	☐	☐
QL 2: Accurate	☐	☐	☐	☐	☐	☐	☐
QL 3: Adequate	☐	☐	☐	☐	☐	☐	☐
QL 4: Complete	☐	☐	☐	☐	☐	☐	☐
QL 5: Credible	☐	☐	☐	☐	☐	☐	☐

Information Quality (from the Least Successful Alliance)	**Poor** 1	2	3	**Average** 4	5	6	**Excellent** 7
The information quality was:							
QL 1: Timely	☐	☐	☐	☐	☐	☐	☐
QL 2: Accurate	☐	☐	☐	☐	☐	☐	☐
QL 3: Adequate	☐	☐	☐	☐	☐	☐	☐
QL 4: Complete	☐	☐	☐	☐	☐	☐	☐
QL 5: Credible	☐	☐	☐	☐	☐	☐	☐

	Information Participation	Strongly Disagree 1	2	3	Neutral 4	5	6	Strongly Agree 7
PT1:	We actively seek advice, counsel, and information from our strategic supplier in this strategic supplier alliance/partnership.	☐	☐	☐	☐	☐	☐	☐
PT2:	The strategic supplier participates in our planning and goal-setting activities.	☐	☐	☐	☐	☐	☐	☐
PT3:	We participate in our strategic supplier's planning and goal-setting activities that are relevant to this strategic supplier alliance/partnership.	☐	☐	☐	☐	☐	☐	☐
PT4:	We actively encourage improvement suggestions from this strategic supplier.	☐	☐	☐	☐	☐	☐	☐
PT5:	We take timely action on this strategic supplier's suggestion(s) for this alliance/partnership.	☐	☐	☐	☐	☐	☐	☐

	Information Sharing	Strongly Disagree 1	2	3	Neutral 4	5	6	Strongly Agree 7
IS1:	We share our business unit's proprietary information with this strategic supplier for this strategic alliance/partnership.	☐	☐	☐	☐	☐	☐	☐
IS2:	Our strategic supplier shares proprietary information with us.	☐	☐	☐	☐	☐	☐	☐
IS3:	We inform this strategic supplier in advance of changing needs.	☐	☐	☐	☐	☐	☐	☐
IS4:	In this relationship, it is expected that any information which might help the other party will be provided.	☐	☐	☐	☐	☐	☐	☐
IS5:	The parties are expected to keep each other informed about events or changes that may affect the other party.	☐	☐	☐	☐	☐	☐	☐
IS6:	It is expected that the parties will only provide information according to pre-specified agreements. R	☐	☐	☐	☐	☐	☐	☐
IS7:	This strategic supplier keeps us fully informed about issues that affect our business.	☐	☐	☐	☐	☐	☐	☐

R = Reverse scored

Note. From "Success factors in strategic supplier alliances: The buying company perspective," by R. M. Monczka, K. J. Petersen, R. B. Handfield, and G. L. Ragatz, 1998, *Decision Sciences, 29(3)*, p. 553-577. Adapted with permission of Monczka.

Part 7 : Conflict Resolution Techniques

Instructions: Assuming that some conflict exists over various program and policy issues and how the strategic supplier alliance/partnership is executed, how frequently are the following methods used to resolve such conflict? Respond to each conflict resolution technique by checking one of the boxes associated with seven ratings (1, 2, 3, 4, 5, 6, or 7), where 1 = Never, and 7 = Occasionally.

		Never						Occasionally
	Conflict Resoultion Techniques	1	2	3	4	5	6	7
CR1:	Smooth over the problem	☐	☐	☐	☐	☐	☐	☐
CR2:	Persuasive attempts by either party	☐	☐	☐	☐	☐	☐	☐
CR3:	Joint problem solving	☐	☐	☐	☐	☐	☐	☐
CR4:	Harsh words	☐	☐	☐	☐	☐	☐	☐
CR5:	Outside arbitration	☐	☐	☐	☐	☐	☐	☐

Note. From "Success factors in strategic supplier alliances: The buying company perspective," by R. M. Monczka, K. J. Petersen, R. B. Handfield, and G. L. Ragatz, 1998, *Decision Sciences, 29(3)*, p. 553-577. Adapted with permission of Monczka.

Part 8 : Commodity/Supplier Selection Process

Instructions: The following two questions relate to your beliefs about linking the alliance objectives to your business unit strategy and the procurement strategy. Respond to each statement by checking one of the boxes associated with seven ratings (1, 2, 3, 4, 5, 6, or 7), where the first question is ranged with anchors of "= Poorly Satisfied, and 7 = Highly Satisfied," and the other is ranged with anchors of "1 = Very Limited, and 7 = Very Comprehensive."

		Poorly Satisfied						**Highly Satisfied**
		1	**2**	**3**	**4**	**5**	**6**	**7**
NA1:	How comprehensive is your business unit's process to select commodities/purchase items as candidates for strategic supplier alliances/partnerships—compared to what you may consider best practice?	☐	☐	☐	☐	☐	☐	☐
		Very Limited						**Very Comprehensive**
		1	**2**	**3**	**4**	**5**	**6**	**7**
NA2:	How comprehensive is your business unit's strategic supplier assessment and selection process—compared to what you consider best practice?	☐	☐	☐	☐	☐	☐	☐

Note. From "Success factors in strategic supplier alliances: The buying company perspective," by R. M. Monczka, K. J. Petersen, R. B. Handfield, and G. L. Ragatz, 1998, *Decision Sciences, 29(3)*, p. 553-577. Adapted with permission of Monczka.

Part 9 : Organizational Performance

Instructions: The following questions relate to your perception of how successful you consider your business unit's strategic supplier alliances as a whole. Respond to each statement by checking one of the boxes associated with seven ratings (1, 2, 3, 4, 5, 6, or 7), where 1 = Strongly Disagree, and 7 = Strongly Agree.

		Strongly Disagree						Strongly Agree
	Financial Perspective	**1**	**2**	**3**	**4**	**5**	**6**	**7**
F1:	Accelerate revenue growth	☐	☐	☐	☐	☐	☐	☐
F2:	Increase return on investment	☐	☐	☐	☐	☐	☐	☐
F3:	Increase profitability	☐	☐	☐	☐	☐	☐	☐
F4:	Control total costs	☐	☐	☐	☐	☐	☐	☐
	Customer Perspective							
C1:	Increase market share	☐	☐	☐	☐	☐	☐	☐
C2:	Increase customer acquisition/Attract new customers	☐	☐	☐	☐	☐	☐	☐
C3:	Increase customer satisfaction/Meet customers' needs	☐	☐	☐	☐	☐	☐	☐
C4:	Increase customer retention/Loyalty/Repeat Business	☐	☐	☐	☐	☐	☐	☐
	Internal-Business-Process Perspective							
BP1:	Reduce order cycle time	☐	☐	☐	☐	☐	☐	☐
BP2:	Meet contract schedule/Meet time standards	☐	☐	☐	☐	☐	☐	☐
BP3:	Improve quality standards	☐	☐	☐	☐	☐	☐	☐
BP4:	Lower costs of existing processes	☐	☐	☐	☐	☐	☐	☐
BP5:	Speed up new product introduction in comparison to competitors/Technology	☐	☐	☐	☐	☐	☐	☐

	Learning and Growth Perspective							
LG1:	High employee satisfaction	☐	☐	☐	☐	☐	☐	☐
LG2:	High employee retention	☐	☐	☐	☐	☐	☐	☐
LG3:	High employee productivity	☐	☐	☐	☐	☐	☐	☐

Note. From *The balanced scorecard: Translating strategy into action*, by R. S. Kaplan and D. P. Norton, 1996c, Boston, MA: Harvard Business School Press. Developed with permission of Kaplan.

Thank you for participating.

If you would like a summary of results, please e-mail the researcher at:

hchang2@email.lynn.edu

Appendix F

Printout of Online Nine-Part Survey Scales Adopted for Study

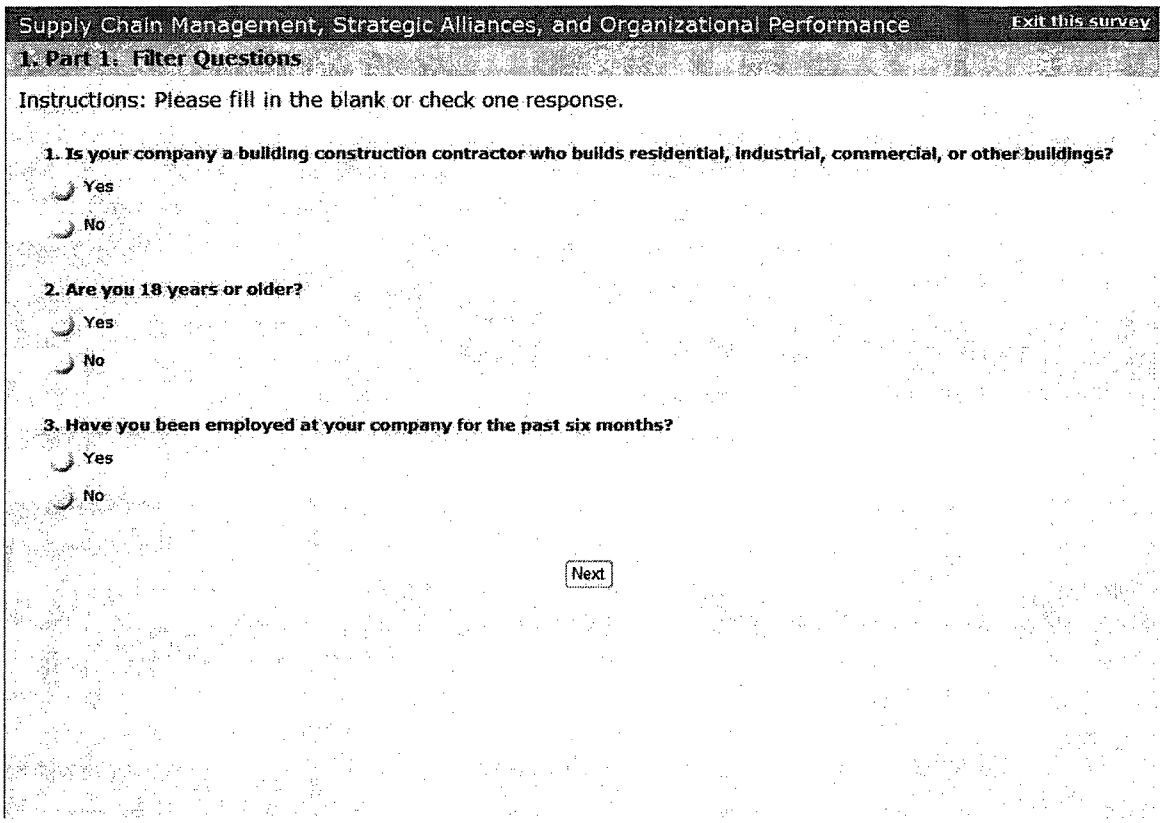
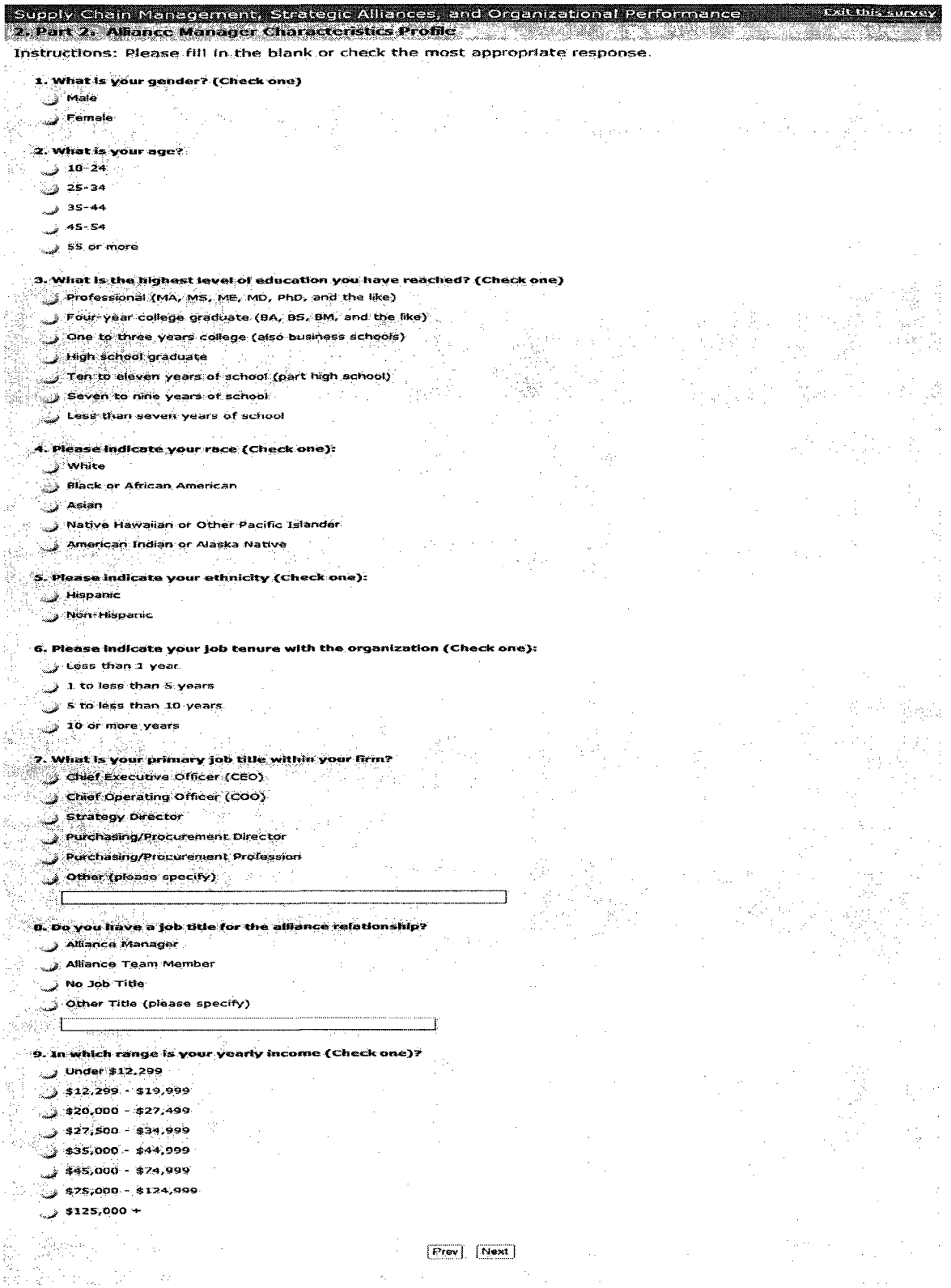


Figure E1. Printout of the filter questions of online survey from SurveyMonkey


Supply Chain Management, Strategic Alliances, and Organizational Performance — Exit this survey

2. Part 2. Alliance Manager Characteristics Profile

Instructions: Please fill in the blank or check the most appropriate response.

1. What is your gender? (Check one)
- Male
- Female

2. What is your age?
- 18-24
- 25-34
- 35-44
- 45-54
- 55 or more

3. What is the highest level of education you have reached? (Check one)
- Professional (MA, MS, ME, MD, PhD, and the like)
- Four-year college graduate (BA, BS, BM, and the like)
- One to three years college (also business schools)
- High school graduate
- Ten to eleven years of school (part high school)
- Seven to nine years of school
- Less than seven years of school

4. Please indicate your race (Check one):
- White
- Black or African American
- Asian
- Native Hawaiian or Other Pacific Islander
- American Indian or Alaska Native

5. Please indicate your ethnicity (Check one):
- Hispanic
- Non-Hispanic

6. Please indicate your job tenure with the organization (Check one):
- Less than 1 year
- 1 to less than 5 years
- 5 to less than 10 years
- 10 or more years

7. What is your primary job title within your firm?
- Chief Executive Officer (CEO)
- Chief Operating Officer (COO)
- Strategy Director
- Purchasing/Procurement Director
- Purchasing/Procurement Profession
- Other (please specify)

8. Do you have a job title for the alliance relationship?
- Alliance Manager
- Alliance Team Member
- No Job Title
- Other Title (please specify)

9. In which range is your yearly income (Check one)?
- Under $12,299
- $12,299 - $19,999
- $20,000 - $27,499
- $27,500 - $34,999
- $35,000 - $44,999
- $45,000 - $74,999
- $75,000 - $124,999
- $125,000 +

Prev Next

Figure E2. Printout of the *Alliance Manager Characteristics Profile* of online survey from SurveyMonkey

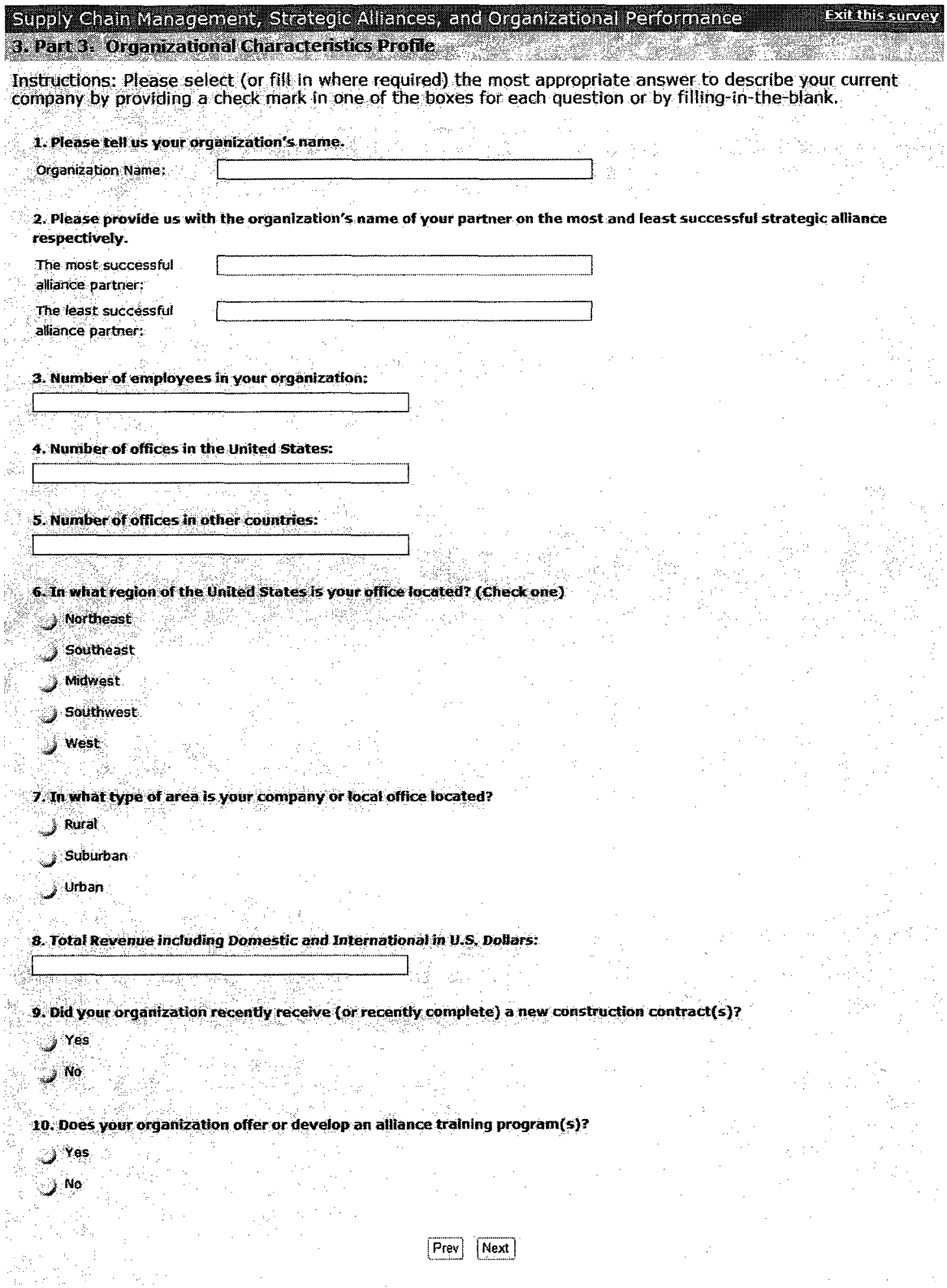


Figure E3. Printout of the *Organizational Characteristics Profile* of online survey from SurveyMonkey

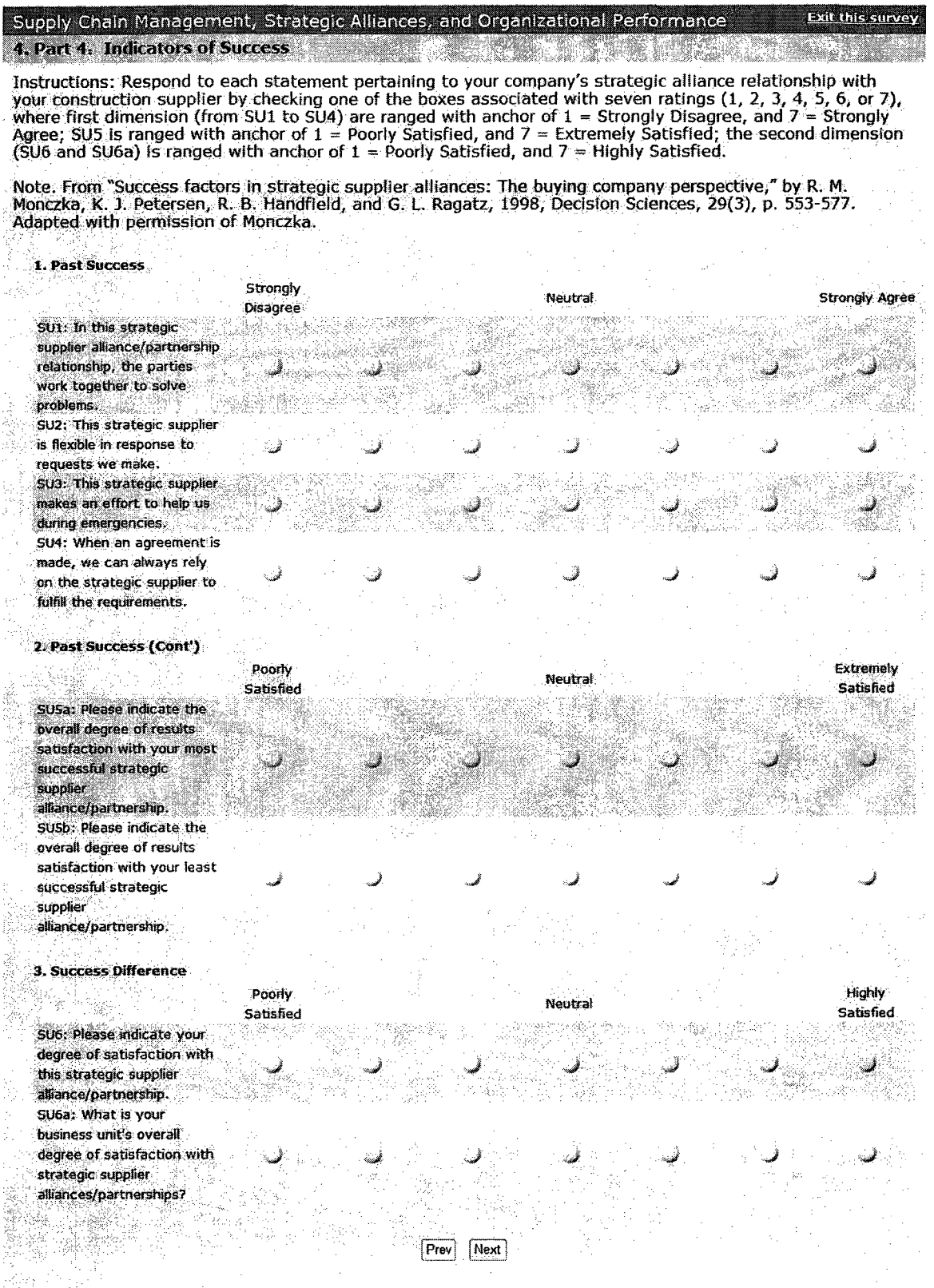


Figure E4. Printout of the *Indicators of Success* of online survey from SurveyMonkey

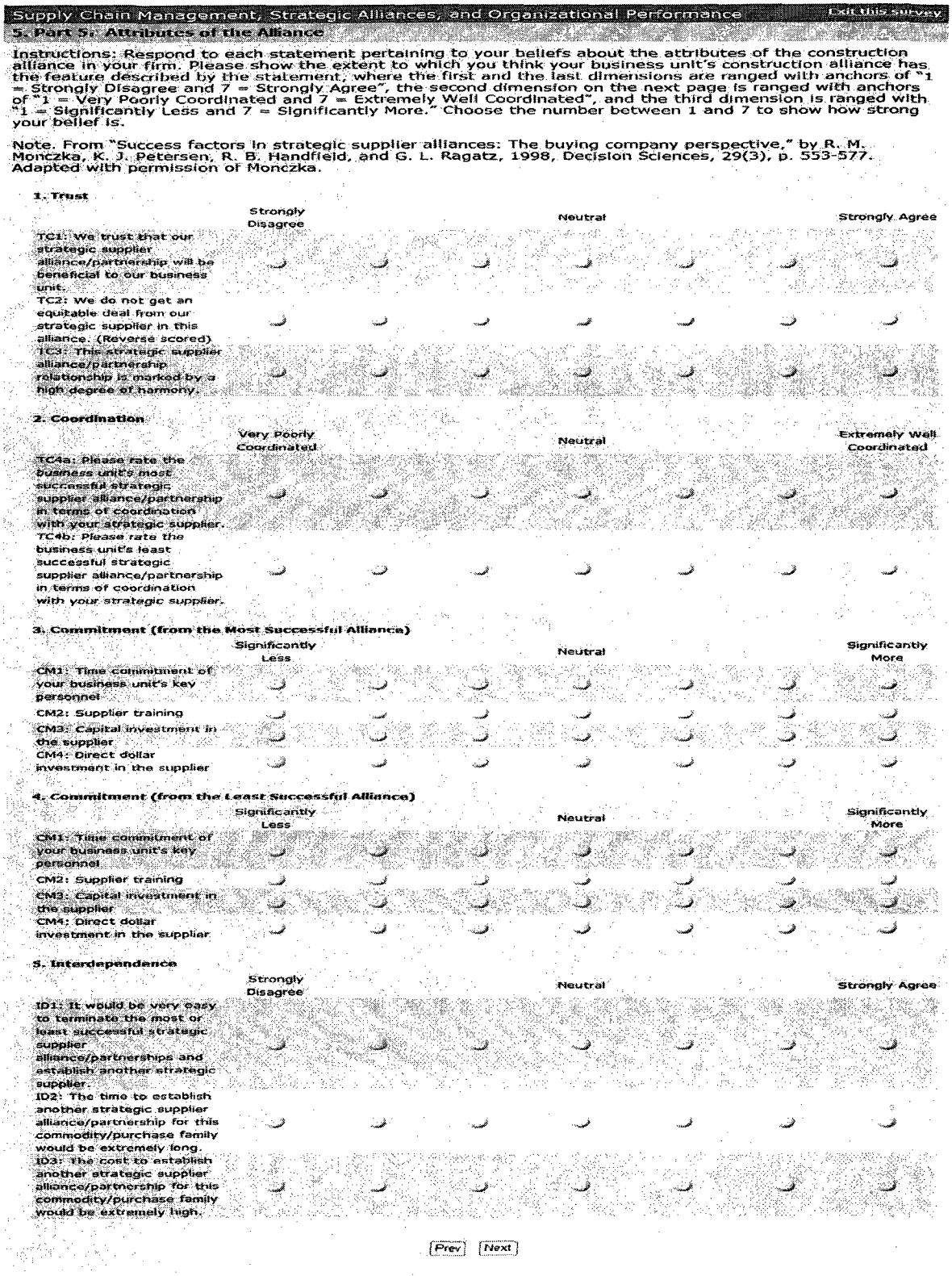
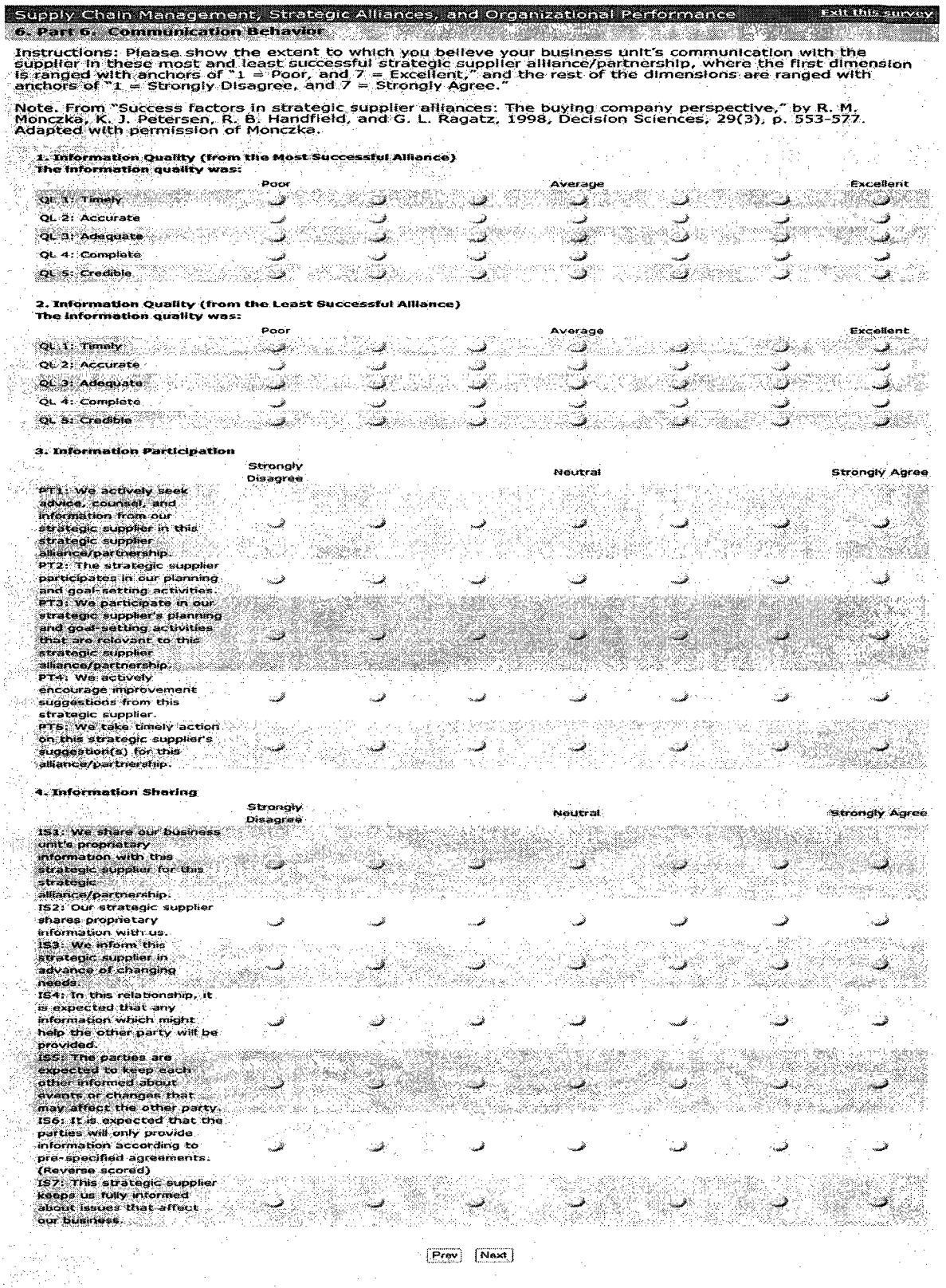


Figure E5. Printout of the *Attributes of the Alliance* of online survey from SurveyMonkey



Supply Chain Management, Strategic Alliances, and Organizational Performance — Exit this survey

6. Part 6. Communication Behavior

Instructions: Please show the extent to which you believe your business unit's communication with the supplier in these most and least successful strategic supplier alliance/partnership, where the first dimension is ranged with anchors of "1 = Poor, and 7 = Excellent," and the rest of the dimensions are ranged with anchors of "1 = Strongly Disagree, and 7 = Strongly Agree."

Note. From "Success factors in strategic supplier alliances: The buying company perspective," by R. M. Monczka, K. J. Petersen, R. B. Handfield, and G. L. Ragatz, 1998, Decision Sciences, 29(3), p. 553-577. Adapted with permission of Monczka.

1. Information Quality (from the Most Successful Alliance)
The information quality was:

	Poor			Average			Excellent
QL 1: Timely							
QL 2: Accurate							
QL 3: Adequate							
QL 4: Complete							
QL 5: Credible							

2. Information Quality (from the Least Successful Alliance)
The information quality was:

	Poor			Average			Excellent
QL 1: Timely							
QL 2: Accurate							
QL 3: Adequate							
QL 4: Complete							
QL 5: Credible							

3. Information Participation

	Strongly Disagree			Neutral			Strongly Agree
PT1: We actively seek advice, counsel, and information from our strategic supplier in this strategic supplier alliance/partnership.							
PT2: The strategic supplier participates in our planning and goal-setting activities.							
PT3: We participate in our strategic supplier's planning and goal-setting activities that are relevant to this strategic supplier alliance/partnership.							
PT4: We actively encourage improvement suggestions from this strategic supplier.							
PT5: We take timely action on this strategic supplier's suggestion(s) for this alliance/partnership.							

4. Information Sharing

	Strongly Disagree			Neutral			Strongly Agree
IS1: We share our business unit's proprietary information with this strategic supplier for this strategic alliance/partnership.							
IS2: Our strategic supplier shares proprietary information with us.							
IS3: We inform this strategic supplier in advance of changing needs.							
IS4: In this relationship, it is expected that any information which might help the other party will be provided.							
IS5: The parties are expected to keep each other informed about events or changes that may affect the other party.							
IS6: It is expected that the parties will only provide information according to pre-specified agreements. (Reverse scored)							
IS7: This strategic supplier keeps us fully informed about issues that affect our business.							

Prev Next

Figure E6. Printout of the *Communication Behavior* of online survey from SurveyMonkey

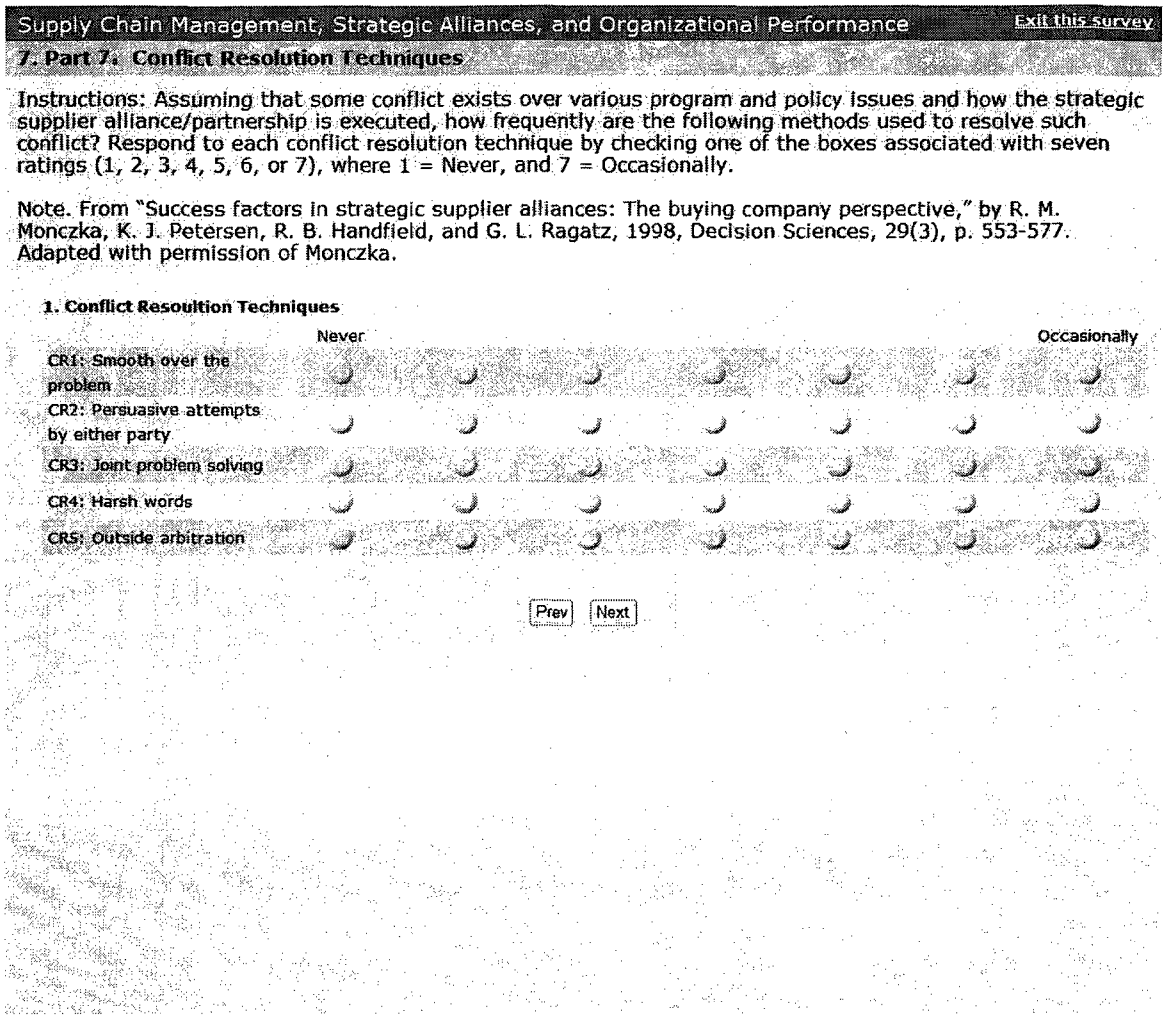


Figure E7. Printout of the *Conflict Resolution Techniques* of online survey from SurveyMonkey

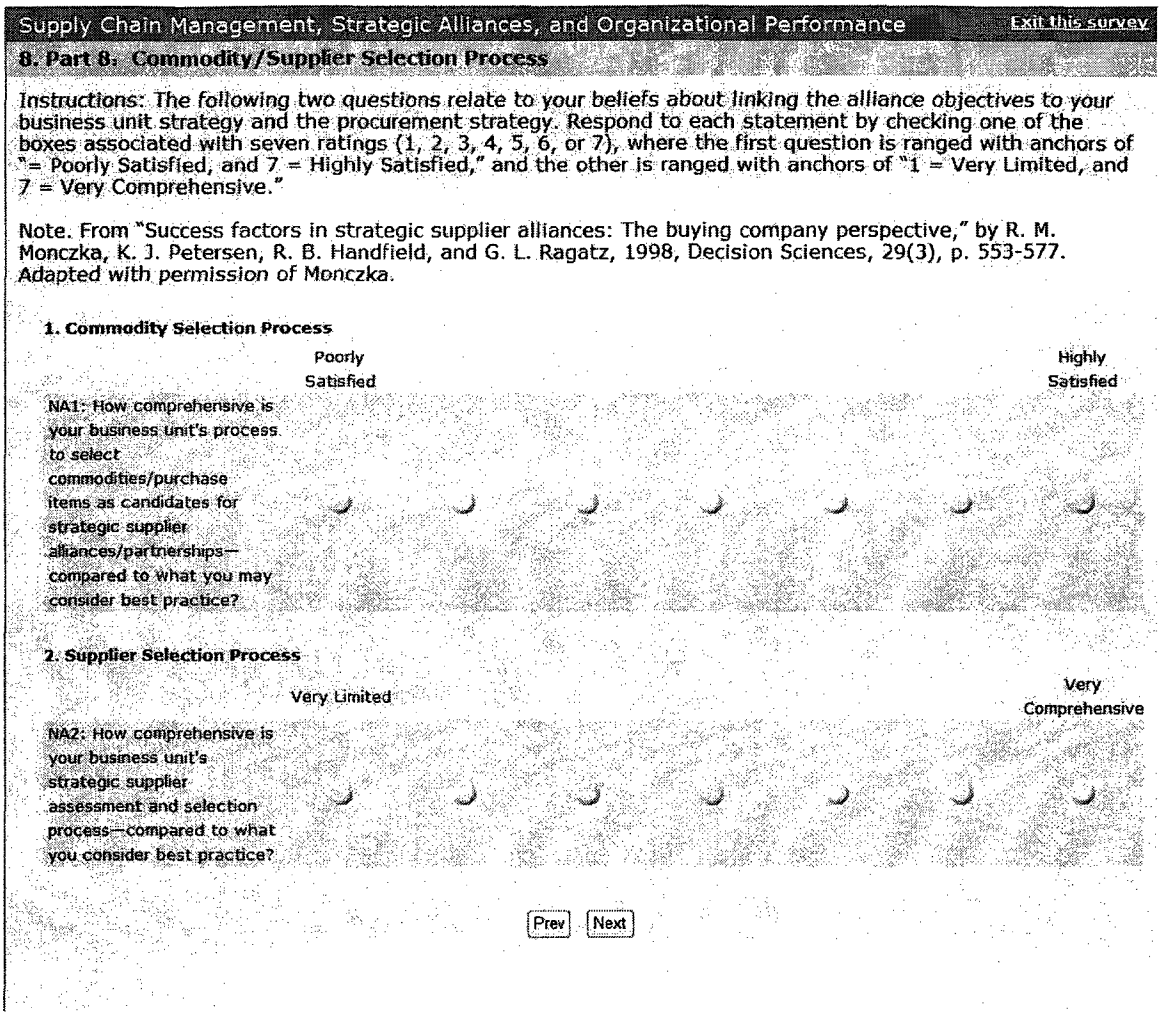


Figure E8. Printout of the *Commodity/Supplier Selection Process* of online survey from SurveyMonkey

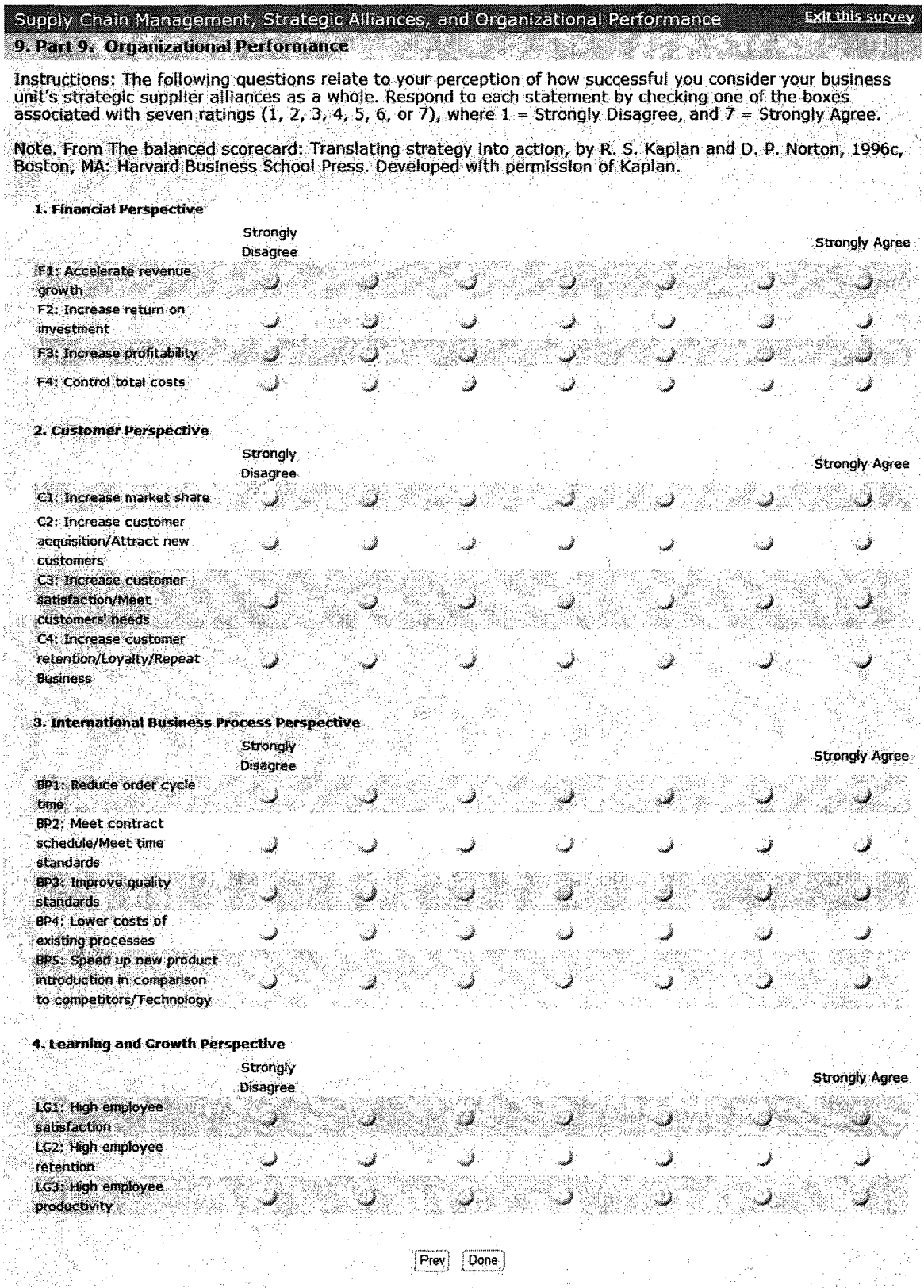


Figure E9. Printout of the *Organizational Performance* of online survey from SurveyMonkey

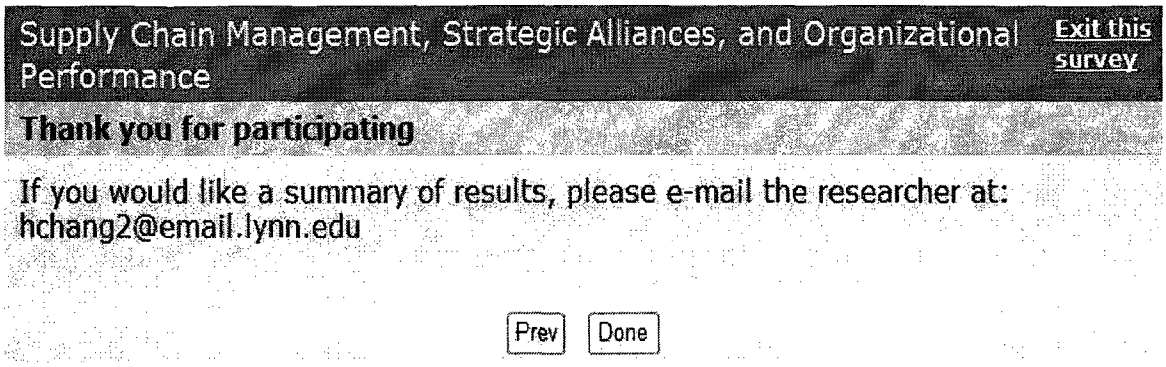
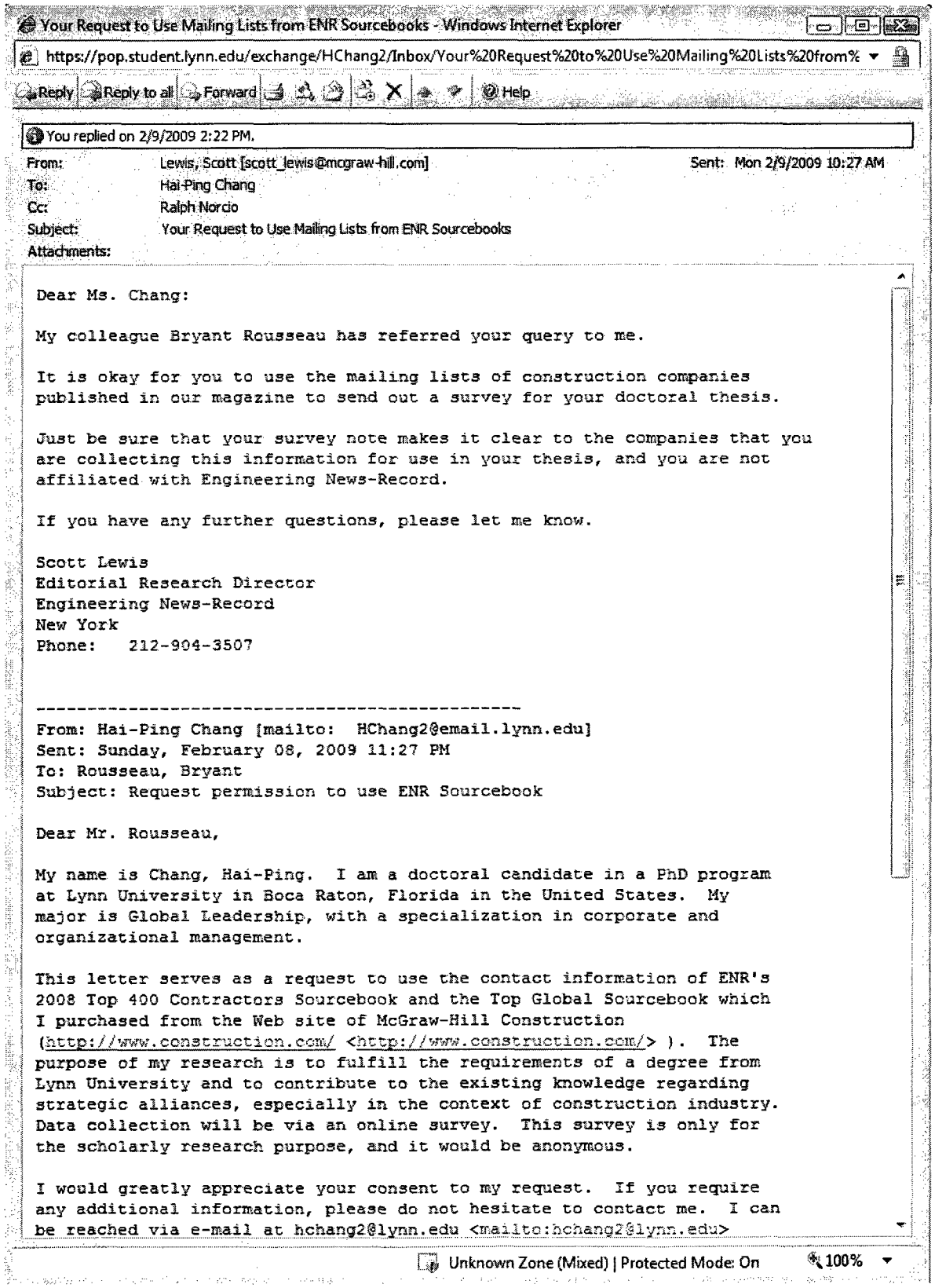


Figure E10. Printout of the *Thank you for participating* from SurveyMonkey

Appendix G

Permission Letter from ENR and the Blue Book

Permission to Use the Contact Information of ENR's Contractors Sourcebook



Your Request to Use Mailing Lists from ENR Sourcebooks - Windows Internet Explorer

https://pop.student.lynn.edu/exchange/HChang2/Inbox/Your%20Request%20to%20Use%20Mailing%20Lists%20from%

Reply | Reply to all | Forward | Help

You replied on 2/9/2009 2:22 PM.

From: Lewis, Scott [scott_lewis@mcgraw-hill.com] Sent: Mon 2/9/2009 10:27 AM
To: Hai-Ping Chang
Cc: Ralph Norcio
Subject: Your Request to Use Mailing Lists from ENR Sourcebooks
Attachments:

Dear Ms. Chang:

My colleague Bryant Rousseau has referred your query to me.

It is okay for you to use the mailing lists of construction companies published in our magazine to send out a survey for your doctoral thesis.

Just be sure that your survey note makes it clear to the companies that you are collecting this information for use in your thesis, and you are not affiliated with Engineering News-Record.

If you have any further questions, please let me know.

Scott Lewis
Editorial Research Director
Engineering News-Record
New York
Phone: 212-904-3507

From: Hai-Ping Chang [mailto: HChang2@email.lynn.edu]
Sent: Sunday, February 08, 2009 11:27 PM
To: Rousseau, Bryant
Subject: Request permission to use ENR Sourcebook

Dear Mr. Rousseau,

My name is Chang, Hai-Ping. I am a doctoral candidate in a PhD program at Lynn University in Boca Raton, Florida in the United States. My major is Global Leadership, with a specialization in corporate and organizational management.

This letter serves as a request to use the contact information of ENR's 2008 Top 400 Contractors Sourcebook and the Top Global Sourcebook which I purchased from the Web site of McGraw-Hill Construction (http://www.construction.com/ <http://www.construction.com/>). The purpose of my research is to fulfill the requirements of a degree from Lynn University and to contribute to the existing knowledge regarding strategic alliances, especially in the context of construction industry. Data collection will be via an online survey. This survey is only for the scholarly research purpose, and it would be anonymous.

I would greatly appreciate your consent to my request. If you require any additional information, please do not hesitate to contact me. I can be reached via e-mail at hchang2@lynn.edu <mailto:hchang2@lynn.edu>

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877-876-8208 Tel
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11-Feb-2009
Invoice # 2009-0088-6654

Invoice #: 2009-0088-6654
Purchase Date: 13-JAN-2009
Name: Hai-Ping Chang
User ID: EN677066
Company: Lynn University
Address: 4201 W. Atlantic Blvd
Coconut Creek, FL 33066

Item(s) Purchased	Project Code/PO	US$ Price
The 2008 Top 400 Contractors Sourcebook		
Article ID: Top400Cont08		
Publication: ENR		
Publication Date: Sep 2008		
The 2008 Top 400 Contractors Sourcebook		**$ 85.00**
TAX		**$ .00**
	CART TOTAL:	**$ 85.00**
	TOTAL:	**$ 85.00**
	Payment Method:	**Credit Card**
	CC#:	**xxxx-xxxx-xxxx-010**

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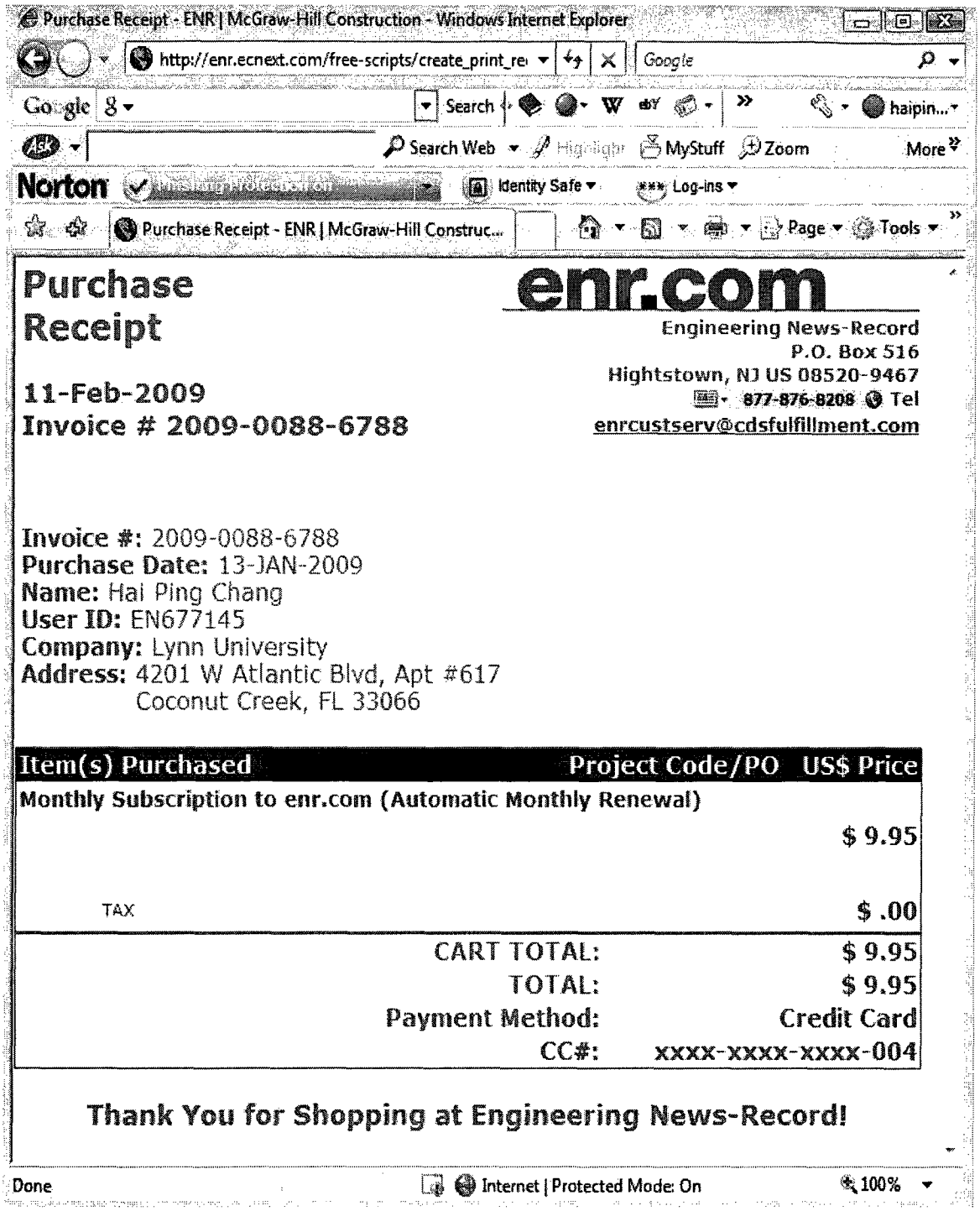
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11-Feb-2009
Invoice # 2009-0088-6788
Invoice #: 2009-0088-6788
Purchase Date: 13-JAN-2009
Name: Hai Ping Chang
User ID: EN677145
Company: Lynn University
Address: 4201 W Atlantic Blvd, Apt #617
Coconut Creek, FL 33066
Item(s) Purchased
Project Code/PO
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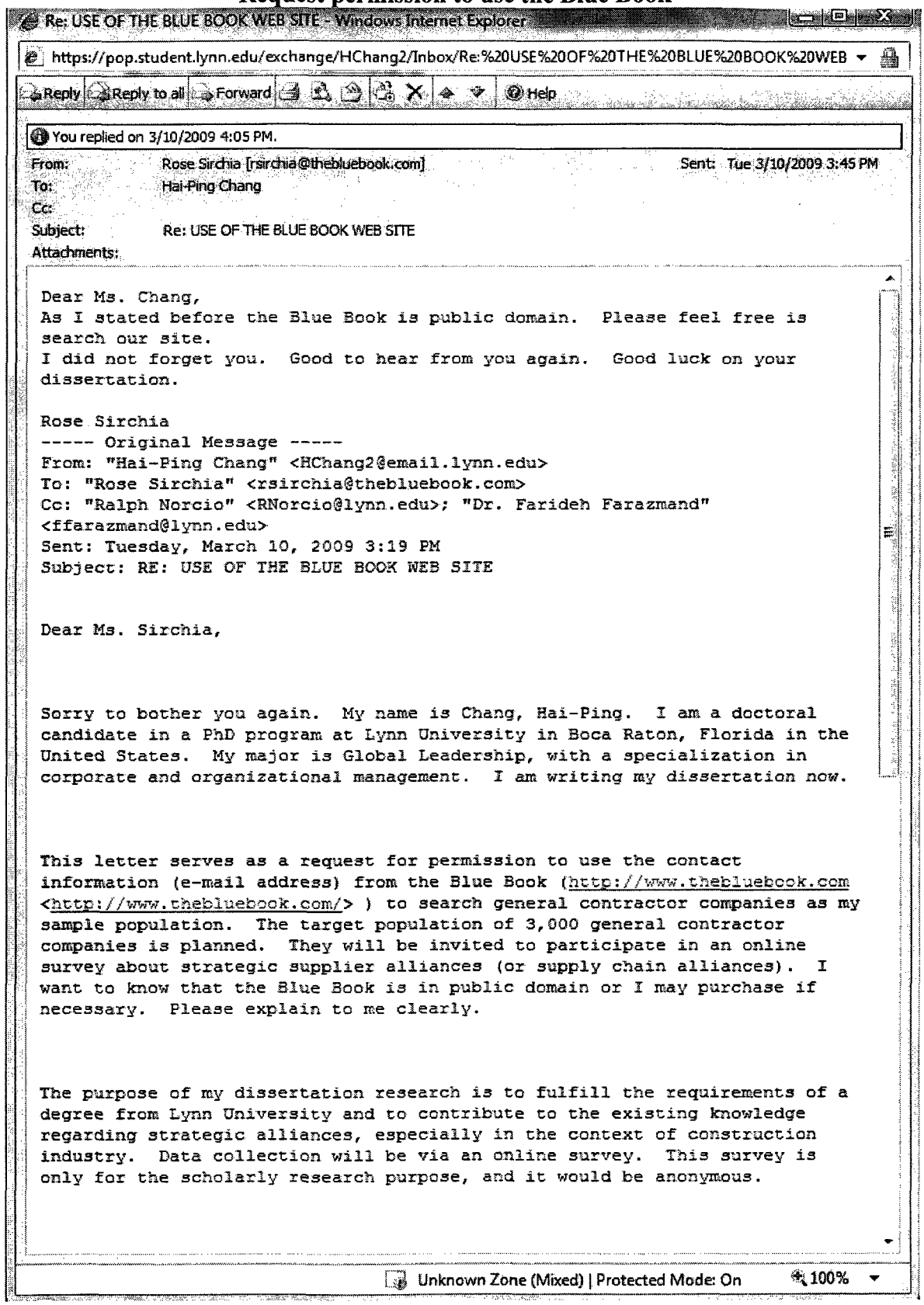
Request permission to use the Blue Book



Re: USE OF THE BLUE BOOK WEB SITE - Windows Internet Explorer

https://pop.student.lynn.edu/exchange/HChang2/Inbox/Re:%20USE%20OF%20THE%20BLUE%20BOOK%20WEB

Reply | Reply to all | Forward | Help

You replied on 3/10/2009 4:05 PM.

From: Rose Sirchia [rsirchia@thebluebook.com] Sent: Tue 3/10/2009 3:45 PM
To: Hai-Ping Chang
Cc:
Subject: Re: USE OF THE BLUE BOOK WEB SITE
Attachments:

Dear Ms. Chang,
As I stated before the Blue Book is public domain. Please feel free is search our site.
I did not forget you. Good to hear from you again. Good luck on your dissertation.

Rose Sirchia
----- Original Message -----
From: "Hai-Ping Chang" <HChang2@email.lynn.edu>
To: "Rose Sirchia" <rsirchia@thebluebook.com>
Cc: "Ralph Norcio" <RNorcio@lynn.edu>; "Dr. Farideh Farazmand" <ffarazmand@lynn.edu>
Sent: Tuesday, March 10, 2009 3:19 PM
Subject: RE: USE OF THE BLUE BOOK WEB SITE

Dear Ms. Sirchia,

Sorry to bother you again. My name is Chang, Hai-Ping. I am a doctoral candidate in a PhD program at Lynn University in Boca Raton, Florida in the United States. My major is Global Leadership, with a specialization in corporate and organizational management. I am writing my dissertation now.

This letter serves as a request for permission to use the contact information (e-mail address) from the Blue Book (http://www.thebluebook.com <http://www.thebluebook.com/>) to search general contractor companies as my sample population. The target population of 3,000 general contractor companies is planned. They will be invited to participate in an online survey about strategic supplier alliances (or supply chain alliances). I want to know that the Blue Book is in public domain or I may purchase if necessary. Please explain to me clearly.

The purpose of my dissertation research is to fulfill the requirements of a degree from Lynn University and to contribute to the existing knowledge regarding strategic alliances, especially in the context of construction industry. Data collection will be via an online survey. This survey is only for the scholarly research purpose, and it would be anonymous.

Unknown Zone (Mixed) | Protected Mode: On 100%

Dear Ms. Chang,
As I stated before the Blue Book is public domain. Please feel free is search our site. I did not forget you. Good to hear from you again. Good luck on your dissertation.

Rose Sirchia
----- Original Message -----
From: "Hai-Ping Chang" <HChang2@email.lynn.edu>
To: "Rose Sirchia" <rsirchia@thebluebook.com>
Cc: "Ralph Norcio" <RNorcio@lynn.edu>; "Dr. Farideh Farazmand" <ffarazmand@lynn.edu>
Sent: Tuesday, March 10, 2009 3:19 PM
Subject: RE: USE OF THE BLUE BOOK WEB SITE

Dear Ms. Sirchia,

Sorry to bother you again. My name is Chang, Hai-Ping. I am a doctoral candidate in a PhD program at Lynn University in Boca Raton, Florida in the United States. My major is Global Leadership, with a specialization in corporate and organizational management. I am writing my dissertation now.

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I would greatly appreciate your consent to my request. If you require any additional information, please do not hesitate to contact me. I can be reached via e-mail at HChang2@email.lynn.edu <mailto:HChang2@email.lynn.edu> <mailto: HChang2@email.lynn.edu> or (425)279-3482. My postal mailing address is 4201 W. Atlantic Blvd, Apt. # 617, Coconut Creek, Florida. My dissertation committee's chairperson is Dr. Ralph Norcio, who may be reached at: RNorcio@lynn.edu <mailto:RNorcio@lynn.edu> <mailto: rnorcio@lynn.edu > and (561)237-7010.

Sincerely yours,

Hai-Ping Chang

From: Rose Sirchia [mailto:rsirchia@thebluebook.com]
Sent: Wed 2/11/2009 2:50 PM
To: Hai-Ping Chang
Subject: USE OF THE BLUE BOOK WEB SITE

Please advise as to what your needs are. The Blue Book web site is free access.
Please contact me if you have any questions at 800-431-2584 extension 3394

Thank you,
Rose Sirchia

Appendix H

Sample of E-Mail Invitation

Dear Executive and Professional,

I am a doctoral student at Lynn University in Boca Raton, Florida. My major is Global Leadership, with a specialization in corporate and organizational management. I am in the process of researching my dissertation, which explores the relationships among supply chain management, strategic alliances, and organizational performance in USA-based contractor companies.

Your e-mail address was provided by the *Engineering News Record (ENR)* and the *Blue Book of Building and Construction* online directory listing in the United States. The researcher is not affiliated with both the ENR and the Blue Book. This e-mail invites you to participate in an online survey about strategic supplier alliances (or supply chain alliances). You must be at least 18 years of age to participate.

Please click the following link to enter a web page, which describes the survey and provides information about your consent to participate. This is followed by a link to the online survey. Please do not leave any identifier. It should take approximately 25 minutes to complete the online survey.

Click here to go to the survey website
http://www.surveymonkey.com/s.aspx?sm=z68pQaBnaphi7c3M7uSvCA_3d_3d

Whether or not you participate, I would appreciate if you would forward this e-mail to those who are in charge of strategic alliances in your company or other subsidiary companies, and ask if they would participate. When you forward this e-mail, please use the blind carbon copy (Bcc) technique so that the e-mail addresses of other participants will remain undisclosed.

Thank you for your assistance with my dissertation.

Hai-Ping Chang
4201 W. Atlantic Blvd, Apt # 617
Coconut Creek, FL 33066
U.S.A
Phone: (425) 279-3482 (U.S.A)
E-mail: hchang2@email.lynn.edu

Appendix I

VITA

Hai-Ping Chang
3101 Port Royale Blvd, Apt # 1126
Fort Lauderdale, FL. 33308
Tel: (425)279-3482
E-mail: haipingchang@gmail.com

Education

Lynn University, Boca Raton, Florida
Doctor of Philosophy (Candidate) in Global Leadership
Specialization in Corporate and Organizational Management — **Expected Grad. May 2010**

University of Central Oklahoma, Edmond, Oklahoma
Master of Business Management in Marketing — **Dec. 2002**

Feng-Chia University, Taiwan, R.O.C.
B.S. in Public Finance and Taxation — **Jun. 2000**

Honors

Second Prize and Scholarship in Accounting of the Business Administration Department — **1996**
Dean's Honor Roll (University of Central Oklahoma) — **2001**
Merit Award (Argosy University, Seattle) — **2005-2006**
Sigma Beta Delta, international honor society for business, management, and administration — **2010**

Work Experience

Joy English School
Full-time English teacher — **1996-2003**

Advanced Semiconductor Engineering, Inc. (ASE Inc.)
Procurement Engineer of Material & Machine Division — **2003**

Leader University
Lecturer (Part-time) in the Department of Hotel Management & Finance — **2003-2006**

Nan Jeon Institute of Technology
Lecturer (Part-time) in the Department of Business Management — **2003-2006**

Hsing Kuo University
Lecturer (Part-time) in the Department of Finance — **2004**

Tung Fang Institute of Technology
Lecturer (Part-time) in the Department of Hotel Management — **2004-2006**

Computer Skills

Proficiency in Excel Spreadsheet, Microsoft Word, Access, PowerPoint, Project Management

Art

Piano, Electronic organ, Ballet dance, Vocal music, Theoretical composition

Language

Mandarin Chinese, English