Thesis for the Degree of Doctor of Philosophy

Partnering in Construction: The Views and Experiences of Foreign and Local Participants in Vietnamese Market

by

Le Hoai Long

Interdisciplinary Program of Construction Engineering

and Management

The Graduate School

Pukyong National University

February 2010

Partnering in Construction: The Views and Experiences of Foreign and Local Participants in Vietnamese Market

Advisor : Prof. Lee Young Dai

by

Le Hoai Long

A thesis submitted in partial fulfillment of the requirements for the degree of

Doctor of Philosophy

in Interdisciplinary Program of Construction Engineering and Management

The Graduate School

Pukyong National University

February 2010

Le Hoai Long의 공학박사 학위논문을

인준함

2010년 2월

주 심 공학박사 김수용 (인)

위 원 공학박사 이수용 (인)

위 원 공학박사 권혁무 (인)

위 원 공학박사 문성우 (인)

위 원 농학박사 이영대 (인)

Partnering in Construction: The Views and Experiences of Foreign and Local Participants in Vietnamese Market

A dissertation

by

Le Hoai Long

Approved by:

_____

Chairman Prof. Kim, Soo Yong

_____ _____

Member Prof. Lee, Soo Yong Member Prof. Kwon, Hyuck Moo

_____ _____

Member Prof. Moon, Sung Woo Member Prof. Lee, Young Dai

February, 2010

Partnering in Construction: The Views and Experiences of Foreign and Local Participants in Vietnamese Market

Le Hoai Long

Interdisciplinary Program of Construction Engineering & Management
The Graduate School
Pukyong National University

Abstract

Traditional procurement methods have revealed many disadvantages especially the adversarial relationship between parties. After several decades of application, partnering has shown that it is an innovative arrangement that help to reduce many problems having existed in traditional arrangement. It can provide a win-win working attitude in a construction project. This mechanism can help both local and foreign construction participants to mutually offset their differences when implementing projects.

Partnering in construction has been applied in several ways in recent years in Vietnam. Complying with the global integration, the Vietnamese construction industry has faced many new challenges such as increased competition from foreign sector, more exacting quality standards, rapid development of new technologies and increased risks of globalization. The adversarial relationships between project parties from the traditional contract arrangement have caused many difficulties. The construction firms are trying to improve the competency and competitive advantages. They are searching for a new arrangement sufficient with their current context.

There are three major distinct objectives which are the three aspects of

partnering implementation in this study. The first objective is to identify and investigate the incentives of partnering application. The second is to identify and examine the problems in implementing partnering approach. Exploring the critical success factors for construction partnering in Vietnam is the last objective in this study. Foreign and local sectors are the two concerned subjects in the study.

The study has investigated and introduced the incentives of partnering from Vietnam perspective. It has been shown that to learn mutually among participants and to increase bidding advantages are the most important incentives according to foreign and local practitioners respectively. In addition, the four perspectives of incentives are examined. Brand and competition perspective is considered as most important while performance improvement perspective is considered as least essential with respect to two sectors. Learning and growth perspective and financial perspective are the two perspectives having divergent opinions between foreign and local participants. Foreign participants pay more attention to learning and growth than to financial side.

The study has identified some prominent problematic issues of partnering in Vietnam construction projects. Partners' attitudes governed by commercial pressure and dealing with large bureaucratic organization(s) are the most concerned problems with foreign organizations and local practitioners respectively. Factor analysis has pointed out seven underlying dimensions of problems existing in partnering process. These are: unsuitability of partnering application; lack of commitment to partnering; unfamiliarity with partnering concept; poor communication between partners; lack of key stakeholders' involvement; external constraint issues; and disagree to compromise.

Twenty eight success factors are identified in Vietnamese context. The top five success factors in Vietnamese context are: financial security, commitment from top management, mutual trust between parties, adequate resources, and effective communication. Furthermore, factor analysis shows that there are eight underlying dimensions that must be adequately considered to improve the partnering performance in Vietnam. The eight dimensions are: dedication, readiness, coordination, teamwork, sufficiency, leading, balance, and clearness. The dimensions cover all aspects of the partnering working environment.

The subjective answers of respondents on the ten-point scale about partnering success level show a positive trend of performance. The present positive outcomes encourage the practitioners to widely take advantage of this innovative arrangement.

Four components, dedication, teamwork, sufficiency, and balance, are observed to have significant influence on the success level of construction partnering using multinomial logistic regression analysis. It is shown that the extent of contribution varies with success level. A cross-validation technique, namely discriminant analysis, also shows the four similar components significantly influence on the partnering success level. Moreover a logistic regression model is developed to convert qualitative performance of related success factors into quantitative value of chance of partnering success in a specific context. The model can also be used to measure the performance of partnering and to enhance the performance through identifying the impact of significant factors.

Keywords: partnering, construction industry, foreign sector, Vietnam.

건설에서의 파트너링: 베트남시장에서의 내외참여자들의 전망과 경험

Le Hoai Long

요약

최근 베트남에서 여러 가지 방법으로 파트너링이 적용되어 오고 있다. 건설산업의 세계화에 따라 베트남의 건설산업은 여러 가지 어려움에 직면해 있다. 건설업실무자들은 현재의 상황에 충분히 대응할 수 있는 새로운 제도를 찾고 있다. 이번 연구는 파트너링을 적용하는 세 가지 수단(도구)인 세 가지의 주된 목적에 대한 것이다. 첫째 목표는 파트너링 적용의 인센티브를 규명하고 조사하는 것이고, 둘째 목표는 파트너링 적용시 문제점을 규명하고 검토하는 것이다. 마지막으로 베트남에서의 건설파트너링의 성공요인을 알아보는 것이다. 이 이번 연구에서는 외국부문과 과 국내부문에 관심을 두고서 , 다중이항대수회귀식(multi-nomial logistic regression model) 을 사용하여 주어진(특수한) 상황에서의 정성적인 파트너링관련 성공요인을 이용하여 파트너링의 성공수준을 정량적인 값으로 나타낼 수 있는 모형을 제안(개발)하고자 하였다. 이 모형을 이용하여 중요한 요인의 영향을 규명함으로써 파트너링의 수행도를 측정할 수 있고 수행도향상을 시키는데 적용할 수 있다. 이 번 연구의 결과는 파트너링을 적용함으로써 건설참여자들이 혁신적인 계약관계 이점을 얻을 수 있다는 것을 알 수 있게 용기를 북돋을 수 있으며, 또한 파트너링을 적용하는데 필요한 광범한 지식을 제공하는데 기여할 것이다.

ACKNOWLEDGEMENTS

Passing all courses and finishing this Ph.D. thesis is such a long and tough journey. I am indebted to so many people who have given their hands during the study. Without their helps, this thesis wouldn't have been possible.

My deep, sincere appreciation is first extended to Prof. Lee, Young Dai. Professor Lee is my advisor but he also treats me like his son. I am eternally grateful for your continuing support throughout my study. You have challenged me to develop a great understanding of construction management. Further, you have taught me many valuable lessons on the importance of patience. I will never forget your passion for education, work, and life that you shared with me and other students. You gave me sufficient freedom to explore new knowledge and ideas.

I wish to express my sincere gratitude to Prof. Kim, Soo Yong, who is the chairman of Interdisciplinary Program of Construction Engineering and Management, for his constant encouragement and guidance.

I am grateful to Prof. Lee, Soo Yong, Ph.D. Yang, Jin Kook, Ph.D. Park, Young Min, Ph.D. Lee, Kang Min, Ph.D. Hur, Yurl for their kind guidance and valuable suggestions about the courses they lectured.

Specially thanks to Pukyong National University and Division of Civil Engineering for sponsoring my study by a studentship. I wish to thank the help by those professor staff, e.g. Prof. Lee, Jong-Chool, Prof. Jang, Heu-Suk, Prof. Shon, In- Shik, Prof. Lee, Jong-Sup, Prof. Lee, Dong-Uk, Prof. Kim, Myung-Sik, Prof. Jeong, Jin-Ho, Prof. Lee, Hwan-Woo, Prof. Jung, Du-Hwoe, Prof. Kook, Seung-Kyu, and Prof. Lee, Sang-Ho.

I also wish to thank my fellows, e.g. Ph.D. Luu, Truong Van, Mr. Kim, Chang Soo, Mr. Chang, Byung Hoon, Mr. Park, Ki Ho, Mr. Song, Kee Ju, Mr. Lim, Jong Kyu, Mr. Cho, Yong Keun, Mr. Mizanur and other students who provided generous help to my study at Pukyong University.

I would like to extend my appreciation to my close Vietnamese friends, both in Korea and in Vietnam, for their continuous supports and helps throughout my path.

Thanks to all construction professionals who gave their time and energy, out of their tight working schedule, in discussing the research issues, completing the survey form, and providing any other help for my research.

Last, but not the least, I owned a lot to my beloved ones – my parents and my wife. My father is most likely one of the most intelligent men that I have ever met. I set a goal to complete my Ph.D. in dedication to you. Thank you Dad for always instilling a love and passion for education! Next, Mom you have been a wonderful source of emotional support throughout this entire journey. I always keep in my mind all those wonderful meals you have cooked for me. And my wife, without your love, my journey would have been rough and tough. I hope that, one day, our dreams become true.

Many thanks send to my sister's family for their supports and encouragement.

Pukyong National University, Busan, Korea

February, 2010

Le Hoai Long

TABLE OF CONTENTS

APPENDIX

LIST OF TABLES

LIST OF FIGURES

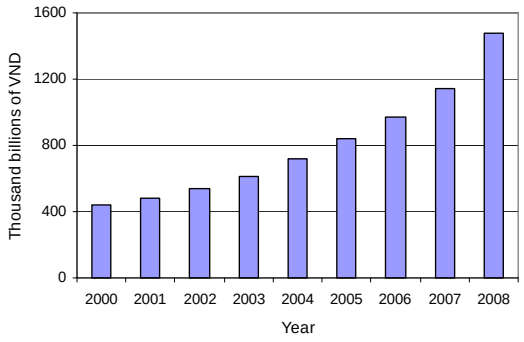
CHAPTER 1

INTRODUCTION

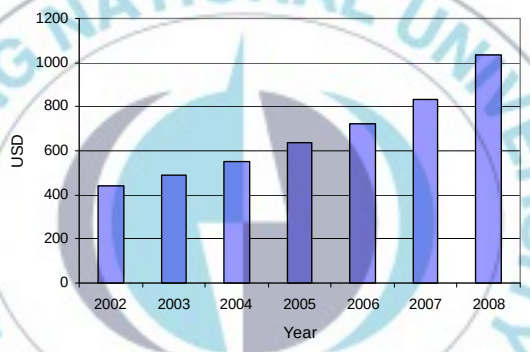
1.1 Introduction

In past decades, Vietnamese economy was controlled by the central government administration and allocation system. The Central government used to make plans and allocate norm to industries and local governments. Construction industry was not an exception in this endeavour. The participation of private and foreign sectors was scarce and limited (Le-Hoai et al, 2009).

Over the last twenty years from applying innovation and "open door" policy, Vietnam's economy has been growing as one of the fastest countries. Vietnamese market has been an attractive and potential market. The Asian Development Bank (ADB, 2007) reported that Vietnam's economy has been transformed significantly with an average gross domestic product (GDP) growth of 7.5% over the last decade. The net values of GDP in the 2000-2008 periods are presented in Figure 1.1 (1 USD = 16,500 VNDs, approximately for the period). And GDP per capita increased from $440 in 2002 to $1,034 in 2008 (see Figure 1.2). (*Data used in this section extracted from Vietnamese General Statistics Office*)



< **Figure 1.1** > Vietnamese GDP



< **Figure 1.2** > Vietnamese GDP per capita

The development of economy stimulates the development of the construction industry. Output value of construction sector increased from 23,642 billion VNDs in 2000 to 95,696 billion VNDs in 2008. These numbers are corresponding to the contribution into gross domestic product of 5.35%, and 6.48% in 2000 and 2008 respectively. Investment capital poured into construction industry gained 20,136 billion VNDs in 2007 from mere 3,563 billion VNDs in 2000 (See Table 1.1).

< **Table 1.1** > Construction sector in Vietnam

Year	Output (billion VNDs)	Contribution to GDP (%)	Investment capital (billion VNDs)
2000	23,642	5.35	3,563
2001	27,931	5.80	9,046
2002	31,558	5.89	10,490
2003	37,100	6.05	11,508
2004	44,558	6.23	11,197
2005	53,276	6.35	13,202
2006	64,503	6.62	16,043
2007	79,712	6.97	20,136
2008	95,696	6.48	N/A

N/A: Not Available

The ratio of foreign investment has arisen year by year. Foreign investment in Vietnam has increased since the 'open door' policy was introduced. In 2007, Foreign Direct Investment (FDI) reached about $21,347 millions (registered capital). South Korea is the biggest investor of Vietnamese economic market (See Table 1.2). Of the FDI amount, about $993.3 millions were for the construction industry or 5.5% in 2007.

< **Table 1.2** > Top FDI countries in Vietnam (2007)

Country	FDI (million USDs)	Number of project
South Korea	5,395.4	423
Virgin Island (UK)	4,410.5	60
Singapore	2,572.3	89
Taiwan	2,489.7	230
Japan	1,385.9	159
Malaysia	1,172.6	46
Hong Kong	607.4	73
China	572.5	130

Vietnam is a rather new market. It is risky and unfamiliar with many foreign investors. Developing partnership with local practitioner(s) has been a strategy of most foreign companies. Table 1.3 presents the top countries invested in Vietnam in the period of 1988-2007 according to the amount of registered capital. The foreign sector's shares and Vietnamese sector's shares in the charter capital are also tabulated in the Table 1.3. South Korea is the biggest investor both on registered and charter capital in this period. South Korea is also the biggest counterpart of Vietnamese partners.

< **Table 1.3** > Top FDI invested countries in Vietnam (Period: 1988-2007)

Country	Number of project	Registered capital	Charter capital		
			Amount	Foreigner's share	Vietnamese's share
South Korea	1,861	14,647.3	5,334	4,311.3	1,022.7
Singapore	632	12,575.2	4,300.8	3,398.6	902.2
Taiwan	2,003	12,100.2	5,077.3	4,661	416.3
Japan	997	9,783.5	4,215.8	3,703.9	511.9
Virgin Island (UK)	389	9,771.5	3,315.4	2,998.2	317.2
Hong Kong	621	7,007.7	2,729.8	2,273.1	456.7
USA	440	3,509.6	1,846.6	1,605	241.6
France	258	3,128.7	1,703.6	1,469.1	234.5

Note: unit of capital amount is million USDs

It is similar to other developing countries, foreign investment plays key role in the socio-economic development. Many government-related problems have been reduced. Vietnamese government has invited the investment from foreigner and tried to put down 'red carpet' to all investors (Le-Hoai et al, 2008).

One of the advantages of Vietnamese practitioners doing business in Vietnam is the familiarity with market and culture while foreign partners

have the advantages of strong financial and technological capabilities. This is encouraging to form alliance between them. It is due to the diverse nature, professional knowledge, organizational culture and distinctive interests in the project; different stakeholders have different perceptions (Toor and Ogunlana, 2008). As such, the perceptions about partnering by foreigners and Vietnamese people are likely to be different.

Given that potential incentives are the drivers to encourage participants to develop a partnership, a thorough understanding about them would help to widely propagate the innovative concept of partnering. Moreover, given that performance is a core aspect in partnering research and practice, a better understanding of the elements related to performance such as problematic factors and success factors would definitely contribute to the current knowledge on construction partnering. The results could also be used by construction professionals for the guidance of partnering operation and management in practice, since partnering becomes popular and seems suitable in current construction market in Vietnam. Therefore, this research is conducted to fill in the gap to explore the incentives, problems, and success factors in partnering implementation in Vietnam.

1.2 Characteristics of the construction industry in Vietnam

The construction industry plays an important role in the socio-economic development of the country with the fast speed development to meet the infrastructure demands and the urbanization. However, it has been criticized for its inefficiency and weakness. Even though there is a quite long development history, the construction industry is still weaker than

neighbouring countries (Ho et al. 2007). A number of works have been analyzed the context of Vietnamese construction industry. These works' results presented several distinct characteristics of the construction sector in Vietnam.

It is similar to other developing countries that human-related problems received many criticisms. One of the prominent features of the industry is labour redundancy (Ho et al. 2007) but low-productivity (See Table 1.4). The lack of competency and skill of the labour force was blamed in some researches (Long et al, 2004; Le-Hoai et al, 2008). There is little or no training activity for personnel from construction companies. The Ministry of Construction has developed a strategy of human resource development. According to this plan, till 2020 human resource of the industry will meet its demands.

< **Table 1.4** > Number of construction workers and productivity

Year	Number of workers (thousand workers)	Output productivity (million VNDs/worker)
2004	1,923	23.2
2005	1,999	26.7
2006	2,137	30.2
2007	2,268	35.1
2008	2,394	40.0

Finance and technology are the inherent barriers of the Vietnamese firms. Competition in Vietnamese market greatly depends on the capability of capital supply. The important or large scale projects, which need high technology, mostly depend on foreign sector due to domestic sectors' lack of supply capability (Luu et al, 2008). There is little expenditure on research

and development in construction industry. Vietnamese entrepreneurs' demands for technological innovation are relatively low with average expenditure accounted for only 0.2% - 0.3% of total revenue (Nguyen et al, 2008).

The number of construction entrepreneurs is very large. There is no official definition of construction firms by size in Vietnam. They can be subjectively grouped into very small, small, medium, big, and very big groups according to their capital. The five group sizes and grouping criteria are presented in Table 1.5. Although the number of operating firms is large, the domestic market is mainly controlled by medium and bigger firms (Luu et al, 2008) and they tend to operate independently. A major part of the industry originated from State-owned enterprises that are eligible to the State's policies. They receive strong supports from their governing body and get easy to access to resources (Nguyen et al, 2008).

< **Table 1.5** > Structure of construction entrepreneurs in Vietnamese market

Year	Very small	Small	Medium	Big	Very Big
	< 1 billion VNDs	1 - 10 billion VNDs	10 - 50 billion VNDs	50 - 500 billion VNDs	> 500 billion VNDs
2000	1,343	1,735	637	274	10
2001	2,019	2,602	713	343	16
2002	2,503	3,997	854	471	20
2003	2,831	5,898	1,019	540	29

Note: 2004 – 2008 period, data from government are not available; firms were grouped according to firms' capital

Bureaucracy significantly influences the Vietnamese organizations and the Vietnamese thinking. The bureaucratic organizations tend to focus on

regulations and formality (Nguyen et al, 2009). Bureaucracy is identified as one of the critical problems in the construction industry in Vietnam (Long et al, 2004). Inertia forces are still strong in the Vietnamese culture. The directive style is the common style of the Vietnamese thinking. The supportive and the achievement-oriented styles are not emphasized. Change of think is not willing to be accepted in the near future.

The legal and institutional framework causes many problems for the industry. According to JETO (2007) uncertain and unclear policy management of local government, and arbitrary legal management and application appear in the top five problems of investment environment in Vietnam. The complexity of the framework is a challenge with practitioners.

Complying with the global integration, the Vietnamese construction industry has faced many new challenges such as increased competition from foreign sector, more exacting quality standards, rapid development of new technologies and increased risks of globalization. The necessary infrastructure system has developed very fast. Construction projects' scope has been growing larger and more complicated. The adversarial relationships between project parties from the traditional contract arrangement have caused many difficulties. The construction firms are trying to improve the competency and competitive advantages. They are searching for a new arrangement sufficient with their current context.

1.3 Partnering definition

Literature review yielded numerous definitions of partnering. The fundamental principles of partnering, namely trust, respect, communication and equality, are designed to include proper consideration of the interests of

all parties (Chan et al, 2003a; Chen and Chen, 2007). The most widely cited definition is developed by the Construction Industry Institute (CII) in Austin, Texas (USA). The CII (1991) define partnering as (cited in Chan et al, 2003a):

…a long-term commitment between two or more organizations for the purposes of achieving specific business objectives by maximizing the effectiveness of each participant's resources. This requires changing traditional relationships to a shared culture without regard to organisational boundaries. The relationship is based on trust, dedication to common goals, and an understanding of each other's individual expectations and values.

Partnering is a concept which provides a framework for the establishment of mutual objectives among the building team (Naoum, 2003). The traditional procurement methods have many limitations, especially the adversarial relationship between parties. On the other hand, partnering in construction can benefit all stakeholders involved in a project mainly due to its ability to change adversarial attitude (Lu and Yan, 2007a). Applying properly partnering approach will encourage participants to maximize contributions to achieving the completion of a successful project to benefit all (Tang et al, 2006).

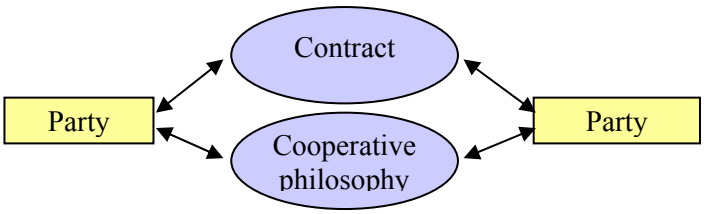
1.4 Partnering in construction

Construction projects have a complicated environment in which the relationships between parties often cause adversaries. Many problems have to be dealt with during the projects' life. Sanvido et al. (1992) commented some bases of project success in their work. The contract, obligations, and changes cover all the written or verbal agreements and change to them that are used

among different parties. Experience such as management, planning, design, construction experience is the information and knowledge that is not included as formally communicated documents but is resident in other media. Resources include all resources provided by all participants. Product information, performance information, constraints impact the participants in their ability to provide a facility.

Partnering helps to advance the collaboration and enhance the competence of construction parties. It is an innovative concept to the construction organizations, which traditionally rely heavily on contracting to bind the parties together (Cheng and Li, 2004). Due to multidisciplinary skills and knowledge of parties involved in a construction project, partnering evolves as a cooperative strategy that modifies and supplements the traditional boundaries between independent companies in a competitive market (Crowley and Karim, 1995) (See Figure 1.3 and 1.4). In recent years, there has been an explosion of research interests in partnering application. The previous studies mainly have been put on the search for applicable tools and techniques. Some of them tried to provide general principles with a highly desirable aim (Bresnen, 2007).

< **Figure 1.3** > Traditional relationship (adapted from Tang et al, 2006)



< **Figure 1.4** > Partnering relationship (adapted from Tang et al, 2006)

Wilson et al (1995) stated that for most construction entities partnering represents a significant divergence from past and current practice. Cultural change of this magnitude requires comprehensive strategic planning. Project partnering agreements are single events and do not provide the cultural change mechanisms required to internalise the partnering process. Moving beyond a discrete project occurrence requires a long-term, strategic vision and cultural change intervention plan.

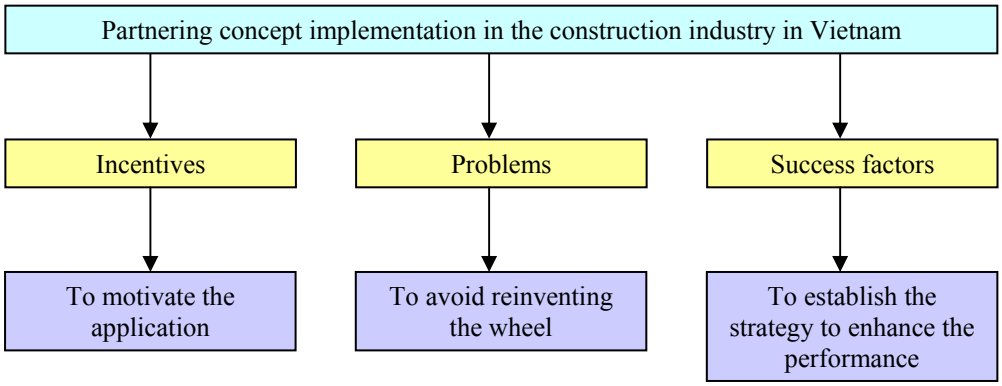
The adoption of different partnering arrangements in construction has become more common in recent years (Lu and Yan, 2007a) such as USA (Wilson et al, 1995; Crane et al, 1997…), UK (Kaluarachchi and Jones, 2007), Australia (Rowlinson et al, 2006), Hong Kong (Chan et al, 2003; Lu and Yan, 2007a-b), China (Tang et al, 2006), Taiwan (Chen and Chen, 2007; Chen et al, 2008)… However, partnering is only a management technique, and its success is totally dependent on the people who drive it (Slater, 1998). Furthermore, the partnering concept remains in an evolutionary phase (Naoum, 2003). There is a need to identify the issues emerging during implementation.

1.5 Research objectives

Many previous researches have shown that partnering arrangement can reduce many of the disadvantages of the traditional arrangement. However, this concept is quite new, not only to Vietnamese but even to practitioners in other countries. Literature review shows that there has no academic research about this concept for Vietnamese context. The application of the new arrangement has spread thanks to anecdotal proofs. It is necessary to conduct a study as a lesson-learn of the industry to encourage the partnering implementation.

There are three major distinct objectives in this study as shown in Figure 1.5. They are the three aspects of partnering implementation. Figure 1.6 presents the framework of the three aspects in partnering implementation. Problems and success factors are the two parallel aspects of a project in which they mutually exist and impact on partnering performance. While incentives play as the motivators of the partnering application. In this research, all the analyses are based on the perceptions of foreign and Vietnamese sectors. The three research's objectives of this study are:

1. To identify and investigate the incentives of partnering application
2. To identify and examine the problems in implementing partnering approach,
3. And to explore the critical success factors for construction partnering in Vietnam.



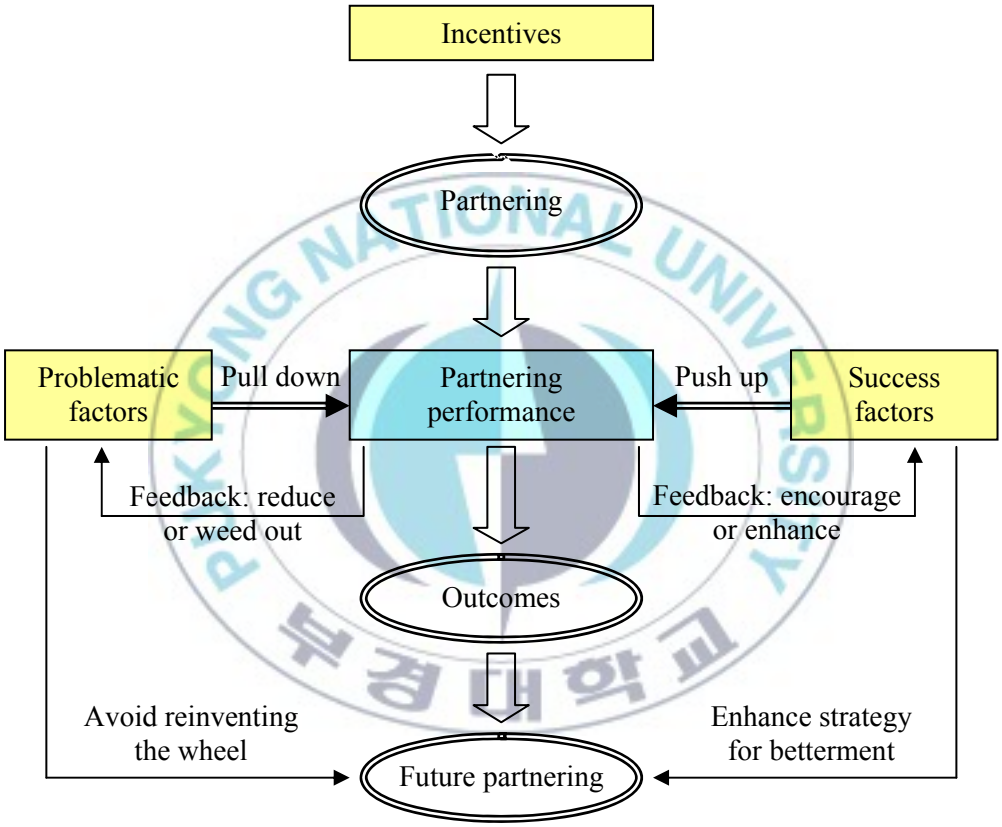
< **Figure 1.5** > Research objectives

Understanding the incentives of the partnering concept can motivate practitioners to adapt it. The first objective of this study is to investigate and introduce what incentives the practitioners are likely to be obtained when applying partnering approach in the Vietnamese construction market.

Problem exists in all processes. Partnering is not an exception. Many problems have arisen during the application of the partnering concept. Understanding the potential problems can help participants to avoid reinventing the wheel. The second objective of this study is to investigate the problematic factors emerging during the implementation process of partnering in Vietnam construction projects.

Toor and Ogunlana (2008) referred previous researches and concluded that most works on critical success factors for construction projects are context specific and the implications are limited to the countries where such studies have been conducted. They cited the reasons are: due to distinctive interest in project, due to variable nature and discrete objectives of every other construction project and, furthermore, due to the different perception

about success of participants at micro and macro level. Through critical success factors we can establish the strategy to enhance project performance. The third objective is to explore the critical success factors for partnering in Vietnamese construction projects.



< **Figure 1.6** > Framework of the three aspects in partnering implementation

Following are the major methods employed in this research:

1. Previous research papers, case analysis published in newspaper, and discussions of practitioners in professional fora in

construction partnering and construction projects are reviewed to seek the potential issues for this research.

2. Empirical data are collected through a questionnaire survey from construction professionals in Vietnam. Statistical and data analysis techniques are employed to process collected data and extract conclusions and recommendations.

1.6 Structure of this thesis

The structure of this thesis has been designed to suit the three distinct major research's objectives. The structure will be organized into seven chapters. Figure 1.6 presents the structure of the thesis.

Chapter 1 is for introduction about the development of Vietnamese economy and the construction industry. Some characteristics of the Vietnamese construction industry are introduced. Then partnering definition and partnering in construction are shortly skimmed. The objectives of this research are stated in this chapter as well.

Chapter 2 contains literature review. A literature review is done to scan and summarize the previous studies about incentives of partnering application. Previous works studied about problematic factors and success factors for construction partnering are also reviewed in this chapter.

Chapter 3 presents the methodology employed in the research. Short discussion about research methodology, the difficulties when conducting the study, and the reason for applying the methodology are introduced. The four steps of questionnaire survey process, namely questionnaire design,

questionnaire distribution, questionnaire collection, and data analysis and discussion, are presented. The sample size and characteristics of respondents are stated. Moreover, some introductions about statistical and data analysis methods are put in this chapter. Statistical tools and techniques employed in the thesis are summarized in the last section of this chapter.

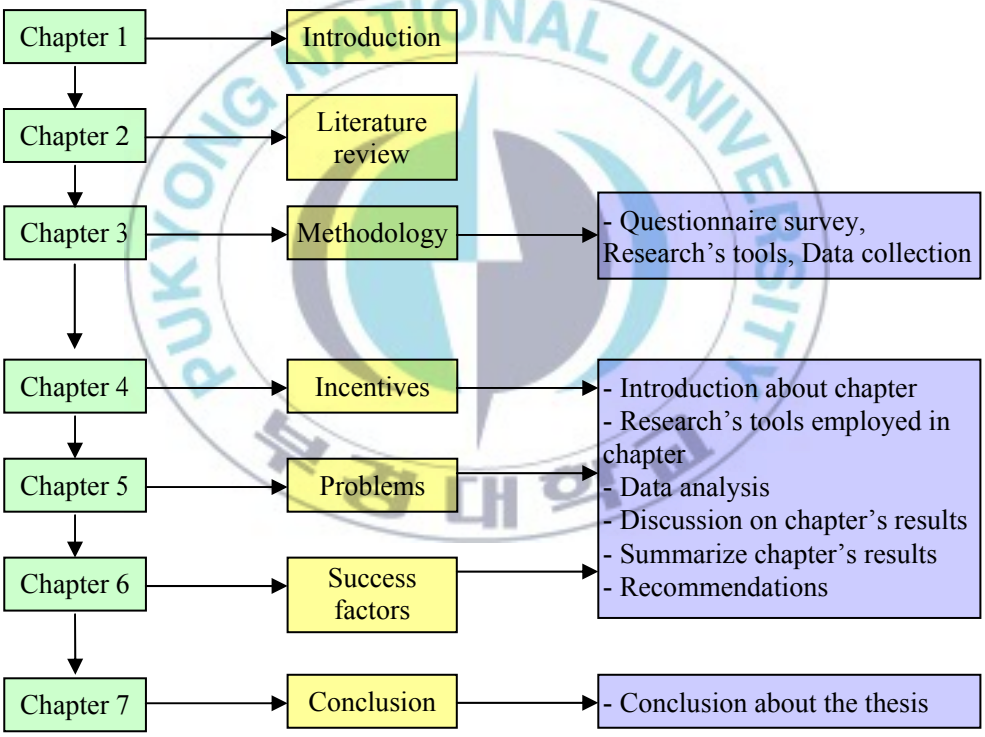
Chapter 4 begins with the introduction about incentives of partnering approach, chapter objectives and chapter structure. The incentives are then analyzed in terms of two sectors' perceptions concerned. The recommendations and conclusions are given at the end of chapter.

Chapter 5 presents the findings of this study about problems in implementing partnering concept in Vietnam. The chapter include six parts. The first two parts are for chapter introduction. Descriptive analysis, including mean score, ranking, Spearman and Kendall tests, and t-test, is presented in part 4.2. Part 4.3 contains the examination results of underlying dimensions of problems. The examination is done using factor analysis technique. The last two parts are devoted to recommendations and conclusions as well.

Chapter 6 presents the findings about success factors. The introduction of previous publications is presented first in this chapter. To process data in this chapter, various tools and techniques are employed. At first, descriptive analysis of success factors is done to investigate the perceptions of two concerned sectors. Because the differences of opinion between two sectors are not large, factor analysis is then employed to find the underlying dimensions of success factors using whole data. The affection of success factors on the level of partnering success is modelled using logistic

regression technique. Discriminant analysis is applied as the classification cross-validation method. At the end, the recommendations and conclusion are provided.

Chapter 7, the last chapter contains the conclusion of the thesis. A general conclusion about the study achievements and the conclusions for each research's objective are presented in this chapter. Limitations and future research proposal are pointed out at the end of the chapter.



< **Figure 1.7** > Structure of the thesis

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Project partnering is a set of actions that helps project teams improve their performance. It provides substantial benefits and incentives for practitioners. It is not a fixed way of working; it develops as project teams cooperate in finding the most effective route to achieve agreed objectives.

Projects and construction works should be exciting and rewarding for participants involved. But there remain many cases where adversarial relationships leave practitioners in the industry disappointed. It is necessary to set up a set of practical actions that make construction projects are successful and the people involved enjoy their work. Achieving the good outcomes is far from easy because modern buildings and infrastructure are more and more complex and construction works are inherently more difficult. Despite the intrinsic difficulty of the task, clients have right to expect projects to meet all their functional requirements, and other needs.

Many things and thinks have changed over recent years that make great strides in producing world-class buildings and infrastructure quickly and efficiently. This has been achieved by moving away from traditional practice, recently by using partnering. Understanding these changes will help practitioners make best use of the construction industry. It will also help the industry itself to improve further.

Research into partnering provides a distinctive picture of the construction industry. Research shows beyond reasonable doubt that, properly applied, partnering reduces the price clients pay for a given building. At the same time consultants, contractors and specialists earn better than normal profits and the industry's workforce find their work more rewarding in every sense (Bennett and Peace, 2006). On the other hand, like other innovative ideas, partnering provokes criticism from both practitioners and academics. The criticism possibly comes from divergent problems arising during implementation process. Teams undertaking construction projects face a task of remarkable complexity and difficulty.

In this chapter, literature review is carried out to review related previous works. Literature review is to convey what knowledge has been established on the topic. The literature review allows bringing out up-to-date researches in the field. It can also present any contrasting perspectives and viewpoints on the topic. There are good reasons for beginning a literature review before starting a research. Literature reviews about researches of incentives of partnering, researches of problems in implementing partnering and studies of success factors for partnering are carried out respectively.

2.2 Incentives of partnering approach

Beach et al (2005) has stated that the use of partnering is now commonplace in a variety of industry sectors. The authors were concerned with evaluating the progress the UK construction industry has made in its adoption of partnering. A questionnaire survey was conducted to identify aspects of main subcontractors' performance through main contractors' perceptions. 97% of the 35 completed questionnaires being returned

indicated that they believed that partnered subcontractors would provide them with a better service. Successful outcomes of individual projects involving the use of partnering are likely to generate mutual rewards and benefits and create an opportunity for the organizations to develop and build trust, culture change and achieve mutual learning from the experiences.

In one overview paper, Naoum (2003) has concluded that there are identifiable ingredients of good partnering practice, but that partnering remains in an evolutionary phase. Methods that motivate good practice are emerging. Koraltan and Dikbas (2002) have presented findings from research that was aimed at investigating the applicability of partnering in the Turkish construction sector. They have suggested that the partnering approach could help reduce some of problems associated with the Turkish construction sector, mainly in terms of cultural change requirements and the bureaucracies. Since partnering is not a known approach in the Turkish construction sector, public offices are not likely to decide to partner on their own initiative.

Paying attention to applicability of partnering in construction as well, Lu and Yan (2007a) have conducted a thorough literature review of factors influencing the partnering use and then have presented a model that supports a systematic process to evaluate the applicability of partnering use in China for contractor and consultant. The top three most important goals of partnering are ‘to increase bidding advantages’, ‘to improve long-term competitive advantages’, and ‘to penetrate new market’. Contractors and consultants have some differences about the ranking of achieved goals. Contractors are more conscious about increase bidding advantages while consultants put more concern on improve long-term competitive advantages.

Tang et al (2006) have presented a finding that was conducted to develop and test a partnering model. It was concluded that project success is the outcome of the interaction between a variety of techniques, and that partnering, associated with incentives, is a basic management method through which risk management and total quality management can be strongly improved. Quality product and service, schedule meets milestone and earlier completion were three highest rating incentives applied in the study. Larson (1995) studied 280 construction projects and indicated that partnered projects achieved superior results in controlling costs, the technical performance, and satisfying customers compared with non-partnered projects or even informal partnering projects.

While there is a general agreement that partnering is beneficial on a number of dimensions, there appears to be anecdotal surrounding the magnitude and nature of incentives that can be realized. One of interesting research fields is to investigate the benefits or incentives of partnering approach. Black et al (2000) have expanded the literature by evaluating empirically the views of contractors, consultants and clients. Respondents believed that partnering could bring significant benefits, including fewer adversarial relationships and increase end-customer satisfaction, to the construction industry if all parties involved in a project strive for its success. The study showed that UK contractors and clients were more positive about partnering than consultants.

Chan et al (2003b) have reported upon the findings of a questionnaire to indicate the relative importance of partnering benefits in Hong Kong. The results have revealed that ‘Improved relationship amongst project participants’, ‘Improved communication amongst project participants’ and

'More responsive to the short-term emergency, changing project or business needs' are the most significant benefits derived from the use of partnering. The results also demonstrated that the position and role of project participants may influence their perceptions of partnering benefits. A benefit to one group may be burden to the others.

< **Table 2.1** > Summary of some previous studies about benefits of partnering

Benefits	Larson (1995)	Black et al (2000)	Bresnen and Marshall (2000a)	Chan et al (2003b)	Cheng et al (2004)	Beach et al (2005)	Tang et al (2006)	Lu and Yan (2007b)
Improved relationship		*		*	*	*		*
Satisfy customers	*	*	*					*
Mutual learning/ understanding		*				*		*
Increased bidding advantages					*			*
Increased market share		*			*			
Improved communication				*		*		
Reduced risks		*			*			
Fairly shared risks		*	*	*			*	*
Increased profits			*		*	*		
Improved design related issues		*		*		*		
Assured financing			*					*
Improved quality		*	*	*	*			*
Saved cost		*	*	*	*	*	*	*
Increased productivity				*	*			
Reduced rework				*	*			*
Improved safety				*		*	*	
Earlier or timely completion	*			*	*		*	
Better project performance	*						*	*
Increased opportunity for innovation				*	*			*

Bresnen and Marshall (2000) have demonstrated how a number of important cognitive and social dimensions affect the use and impact of incentives. They have concluded that there were important limitations to the use of incentives as means of reinforcing collaboration and developing commitment and trust. An empirical study on incentives of strategic partnering in China was conducted by Lu and Yan (2007b). The analysis has revealed that both the contractors and the consultants considered 'competitive position enhancement' and 'new market entry' as the most significant incentives. Through strategic partnering, companies are more likely to access technology, share risks, and improve project-based performance and competitive position.

A summary of literature review is presented in Table 2.1.

2.3 Problems in implementing partnering arrangement

Partnering in construction has been an interesting field of study in recent decades. According to Wilson et al. (1995), the partnering philosophy must become a strategic part of everyday life in every construction firm if it is to assist in changing the industry's adversarial nature; however, planning alone is not enough and setting plans into motion requires diligence, resilience, and an extreme amount of patience. Gardiner and Simmons (1998) provided a finding that partnering can also be applied to small and medium sized projects to reduce conflicts. With the suggestion that partnering measures allow participants to assess the current status of partnering arrangement, Crane et al. (1999) discussed the use of measures at various levels of the partnering relationship. In a conceptual paper, Naoum (2003) provided an overview of the concepts, philosophies and definitions of partnering. It was

concluded that there were identifiable ingredients of good partnering practice. Lu and Yan (2007a) reviewed factors influencing the use of partnering through literature and presented a model that supported a systematic process to evaluate the applicability of partnering use in China.

The experience in practicing partnering process was also shared in the construction management community. Bayliss et al. (2004) reported a case study on the MTRC TKE contract 604 in Hong Kong. Through interviews with the key contract participants and data collected throughout the contract period, the effective partnering tools were identified. Kaluarachchi and Jones (2007) made an attempt to identify key criteria that were relevant in the partnering process and draw out lessons which could benefit the housing industry through the experience of Amphion Consortium. Bresnen and Marshall (2002) used two projects cases to draw out a number of key implications for understanding partnering in practice. Of the implications, attributing project success/failure to partnering is by no means a straightforward exercise; and wider organisational structures and cultures often have an impact upon partnering relationships.

Ozorhon et al. (2008a) pointed out the significance of the quality of partners relations for successful international construction joint ventures. Findings of the study also suggest that the level of organizational fit between the partners had the moderate influence on the joint venture performance. In the other work, Ozorhon et al. (2008b) suggested that differences in organizational culture had a greater impact on international joint venture performance than differences in national and host country culture. The analysis failed to provide evidence that the joint venture performance is

affected by differences between the culture of the host country and the culture of a partner.

Problem exists in partnering process. One reason is that this type of procurement method remains in an evolutionary phase (Naoum, 2003). There is a need to identify the issues emerging during implementation. Bresnen and Marshall (2000) have contributed to the debate about the nature and merits of a partnering approach by exploring the presumed link between partnering and cultural change within the industry. They concluded that it was only by fully appreciating the effects of such complexity that a more realistic and practical approach to the development and implementation of partnering would emerged.

Ng et al. (2002) identified fifteen problematic issues from six contractors involved in unsuccessful project partnering relationships in Australia. The results indicate that the unwillingness of the client to fully commit to the partnering agreement was the main reason for ineffective project partnering. Most problematic issues experienced in project partnering with the government construction procurement involve the failure of stakeholders to develop the required attitudes to make project partnering effective. The financial procedures adopted by the clients were detrimental to the commitment of stakeholders to the partnering. The client's lack of compromise, a lack of intimacy in relationship between the client and contractor could also have a negative influence on project partnering.

Chan et al. (2003) conducted a questionnaire survey to measure the problems faced by parties implementing partnering in Hong Kong. Thirty one problem statements of partnering were identified. All the three parties,

client, contractor, consultant, agreed that parties were faced with commercial pressure which compromised the partnering attitude, parties had little experience with partnering approach, and uneven levels of commitment among project participants were the three most important problems in partnering projects. It was also concluded that the construction culture should be changed to openness, trust, communication, and commitment and establish a win-win attitude among practitioners in order to fully implement partnering concept in the Hong Kong construction industry.

< Table 2.2 > Summary of some previous studies

	Gardiner and Simmons (1998)	Koraltan and Dikbas (2002)	Ng et al (2002)	Chan et al (2003a)	Chan et al (2006)	Mason (2007)	Kaluarachchi and Jones (2007)	Chen et al (2008)
Partner concept unfamiliarity		*	*	*	*	*		*
Relationship problems			*	*	*			*
Trust problems			*	*	*		*	*
Communication problems	*		*	*			*	*
Culture problems		*	*	*	*			*
Insufficient problem solving	*		*	*				*
Commitment problems	*	*	*	*	*	*		*
Inadequate involvement in partnership			*	*		*	*	*
Training and educating problems		*	*	*	*		*	*
Empowerment problems			*	*			*	*
Regulations and laws problems		*	*				*	*

Chan et al (2006) in a work to find answer for question “partnering for construction excellence – a reality or myth?” pointed out nine difficulties of

partnering projects. Bresnen (2007) sought to redress a dearth of critically informed work that attempted to understand the problems and limitations of partnering in practice, by taking a critical approach that inverted some commonly-held assumptions about the relationship between partnering and organization. Chen et al. (2008) introduced critical factors related to not only partnership success but partnership failure in Taiwan.

Table 2.2 presents a summary of several previous studies about some problems in implementing partnering in construction.

2.4 Success factor for construction partnering

In a business context, a success factor is defined as any knowledge, skill, trait, motive, attitude, value or other personal characteristics that is essential to perform the job or role and that differentiates solid from superior performance (Long, 2003). Rockart (1979) defined CSFs as those few key areas of activity in which favorable results are absolutely necessary for a particular manager to reach his or her goals. Boynton and Zmud (1984) defined CSFs as those few things that must go well to ensure success for a manager and an organization, and therefore, they represent those managerial or enterprise areas that must be given special and continual attention to bring about high performance.

In general construction, a large amount of researches about CSFs were presented in literature. Sanvido et al. (1992) proposed general factors affecting project success. Chua et al. (1999) identified different sets of CSFs for different project objectives. Hyvari (2006) evaluated CSFs in project management and examined their relationships with organizational conditions.

Nguyen et al. (2004); Toor and Ogunlana (2008) interested in large-scale construction projects from developing countries. Aksorn and Hadikusumo (2008) identified CSFs of safety programs in Thai construction projects. Yu et al (2006) investigated CSFs in construction project briefing by way of content analysis. Lam et al (2008) identified determinants of successful design and build projects in Hong Kong context. Tiong (1992), Tiong (1996), Jefferies et al (2002), Zhang (2005) examined CSFs for various aspects of public-private partnership projects.

Since the application of partnering concept has become popular in recent decades, researches about success factors in implementing this procurement type have been vigorous. Crane et al. (1997) proposed a partnering process model that consisted of five phases, from 'owner's internal alignment' to 'partner selection' to alliance alignment' 'to project alignment' to 'work process alignment'. In each step, various success factors were identified to ensure a successful partnering. Larson (1997) surveyed 291 construction projects to examine the relationship between specific partnering related activities and project success. The findings suggested that a comprehensive approach be applied to partnering on construction projects and that top management support for teamwork across organizations is critical to success.

Cheng et al (2000) developed a partnering framework and identified the CSFs based on a review of the partnering literature. The framework highlighted the influence of contextual characteristics and management skills on partnering success. The CSFs identified and discussed in the framework are effective communication, conflict resolution, adequate resources, management support, mutual trust, long-term commitment, coordination, and creativity. It is asserted that performance measures can be subjective or

objective. And these measures are the positive outcomes accumulated during the process.

A conceptual model of partnering used a three-stage process – formation, application, and completion and reactivation was presented by Cheng and Li (2001) and Cheng et al (2002, 2004). Several aspects of research about success factors were presented in these works to facilitate the partnering implementation through the proposed model. Success factors were investigated for a certain stage. The AHP survey helped to determine the comparability of the factors in individual process stages. The four common success factors are top management support, open communication, effective coordination, and mutual trust.

Black et al (2000) using a UK-wide postal questionnaire survey, the opinions of different types of organization were assessed in relation to success factors and benefits of partnering. The research indicated that certain requirements must be met if partnering is to succeed. In particular, trust, communication, commitment, a clear understanding of roles, consistency and a flexible attitude are necessary. Partnering can and does work, but all project participants must re-think their attitudes and work to make projects more efficient, successful and free of conflict.

Paying attention to UK construction industry as well, Beach et al (2005) was concerned with evaluating the progress of partnering adoption. A conceptual framework of success factors was presented. Three new aspects of successful partnering were identified: best value, service and dependency, which when reviewed in the context of the four categories of key elements,

previously identified in the literature: commitment, processes, tools and outcomes, appeared to fit into the outcome category.

< **Table 2.3** > Previous studies about partnering success factors

Success factor	Larson (1997)	Cheng et al (2000)	Black et al (2000)	Cheng and Li (2001, 2002)	Cheng and Li (2004)	Beach et al (2005)	Chan et al (2006)	Tang et al (2006)	Chen and Chen (2007)	Chen et al (2008)
Mutual trust		*	*	*	*		*	*	*	*
Communication		*	*	*	*	*		*	*	*
Coordination	*	*	*	*	*		*	*	*	*
Commitment		*	*	*	*	*	*	*	*	*
Management support	*	*		*	*					
Continuous improvement	*		*	*	*	*			*	*
Expertise			*	*					*	*
Equity						*		*		
Problem/conflict resolution	*	*		*		*	*	*		
Goals		*		*		*				
Culture			*						*	*
Resources		*	*	*					*	*
Empowerment			*						*	*
Formation	*		*	*		*	*	*	*	*
Experience	*			*						
Creativity		*		*			*			

In the Taiwanese context, Chen and Chen (2007) and Chen et al (2008) identified and assessed critical factors as certain requirements that must be met for partnering to be successful. Chan et al (2006) based on the case study of six selected projects; a best practice partnering framework was developed for Hong Kong context. Focusing on the mainland of China, Tang et al (2006) presented a finding of a study that was conducted to develop and test a partnering model that revealed the relationships between critical success factors of partnering and demonstrated their importance to construction.

Table 2.3 summarizes the previous studies about success factors of partnering application in construction. Mutual trust, communication, coordination, and commitment appeared to be important to most countries. Dependent on context of each certain country, other factors could emerge as success factors for partnering. Conforming to suggestion in Toor and Ogunlana (2008) that more studies should be conducted in other countries to account for the nature and structure of the local construction industry.

2.5 Chapter conclusion

It is shown from literature review that the research area is context specific. Conducting a study in Vietnam could obviously derive valuable findings contributing to the global knowledge. Moreover, research about application of partnering concept in Vietnam has not received the attention from the international research community in general, or from local researchers in particular. This study is attempting to fill in the gap.

CHAPTER 3

METHODOLOGY

3.1 Introduction

Selecting a proper methodology is the most important step in this research. It is due to the unavailability of documented data of completed projects for research in Vietnam, a questionnaire survey has been decided to be employed. The role of a questionnaire is to provide a standardized interview across all subjects. This is so that all respondents are asked the questions that are appropriate to them, and so that, when those questions are asked, they are always asked in exactly the same way (Brace, 2004).

The questionnaire is the medium of communication between the researcher and the subject, albeit sometimes administered on the researcher's behalf by an interviewer. In the questionnaire, the researcher articulates the questions to which he or she wants to know the answers and, through the questionnaire, the subjects' answers are conveyed back to the researcher. The questionnaire can thus be described as the medium of conversation between two people, albeit that they are remote from each other and never communicate directly (Brace, 2004).

In this study, the difficulty is the far distance between the researcher and the targeted respondents. To overcome the difficulty, the questionnaire has already been considered as a most sufficient medium of remote conversation

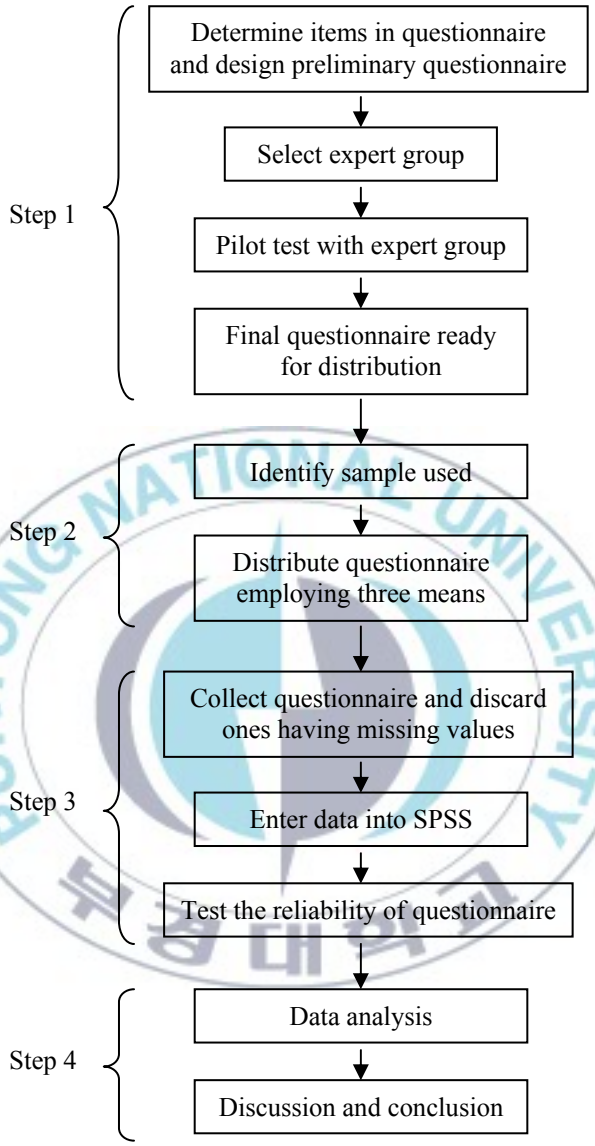
between researcher and respondents. The following principles are maintained during survey design and implementation:

- To pick up enough sample size considering the common response rate;
- To phrase and organize the questions in a clear and logical way;
- To avoid offensive or sensitive questions;
- To maintain the length of questions so that the respondent could finish them within a short time period, e.g., 30 minutes.
- To pilot test the questionnaire by potential respondents;
- To send appropriate reminders to non-respondents.

To analyze the obtained questionnaires to receive the meaningful information, statistical and multivariate data analysis tools and techniques should be carried out. The next sections will briefly present the tool and techniques employed in this research.

3.2 Questionnaire survey

Questionnaire was chosen as the survey method for this study. The survey can be divided roughly into four steps: (1) Questionnaire design, (2) Questionnaire distribution, (3) Questionnaire collection and initial test, and (4) Analysis and discussion. The survey process is displayed in Figure 3.1.



< **Figure 3.1** > Flowchart of questionnaire survey process

Step 1 – Questionnaire design

In the first step, pilot test with expert group will be conducted to test the questionnaire. Before conducting the pilot test, potential items were extracted

from literature review, case analysis published in newspaper and discussions of practitioners in professional fora. These works helped to form a preliminary questionnaire.

It is decided to test this first-version of the questionnaire with experts. A group of six experts were invited to participate in this pilot test. The experts are practitioners in the Vietnamese construction industry. They have experience of not only practicing in construction industry but also in partnering projects. All of them have at least twelve years of construction experience. The experts are asked to review the sufficiency and appropriateness of the problems and the structure of the questionnaire. Two rounds of pilot tests are needed to finish the test. After that, all items considered as potential in Vietnamese partnering projects are finalized and included in the final questionnaire (See Appendix 2).

The questionnaire consists of five sections.

- Section (1) consists of respondents' personal information.
- Section (2) is concerned with success factors of partnering implementation in construction project.
- Section (3) is concerned with degree of success of partnering in the respondent project.
- Section (4) is concerned with potential incentives of partnering approach.
- Section (5) is concerned with problematic factors in partnering projects.

< **Table 3.1** > Five point Likert's scale employed in this thesis

Research objective		Scale					
No.	Description	Quantitative			Qualitative		
1	Incentives	1	<=>	5	Strongly disagree	<==>	Strongly agree
2	Problems	1	<=>	5	Strongly disagree	<==>	Strongly agree
3	Success factors	1	<=>	5	Not significant	<==>	Very highly significant

< **Table 3.2** > Ten point scale

Objective	Scale					
	Quantitative			Qualitative		
Degree of success of partnering in construction project	1	<==>	10	Completely unsuccessful (Worst score)	<==>	Completely successful (Best score)

< **Table 3.3** > Survey questions

No.	Question's objective	Description
1	Incentives	*"Please indicate the degree of your agreement on the following potential incentives that could be obtained from partnering process with scale"*
2	Problems	*"Please indicate the degree of your agreement on the following factors that could be problems causing adversarial effects in partnering process, with scale"*
3	Success factors	*"Please circle the number that best reflects the degree of significance of the contribution of the following factors in developing your partnering project"*
4	Degree of success of partnering in construction project	*"Please indicate the degree of success of the partnering in the project which you have experience follow the scale"*

Respondents were requested to rate their agreement according to five-point Likert scale from 1 to 5 except for level of success. With the degree of success of partnering, respondents were asked to rate on ten-point scale from 1 to 10. The assigned scales are presented in Table 3.1 and Table 3.2. The answers are based on projects the respondents participated in. The questions employed to survey are presented in Table 3.3. The respondents were also requested to add other problem(s) that they have experienced in their partnering projects to the list.

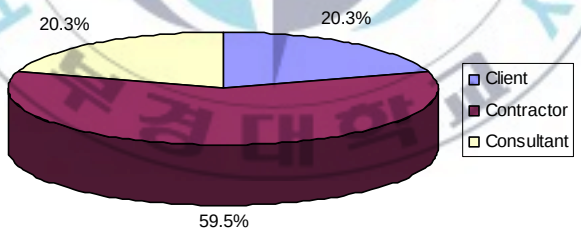
Step 2 – Questionnaire distribution

This study is intended to investigate the application of partnering approach in the construction industry in Vietnam. The goal is the perceptions of the two sectors in the market: foreign sector and local (Vietnamese) sector. In other words, this study aims at eliciting views and opinions from local and foreign construction professionals who have experience with partnering implementation in Vietnam. Because there is no organization recording or managing the construction practitioners profiles in Vietnam. The researcher employs a self-administered questionnaire distribution. The involved practitioners in the sample are identified through construction companies' web-pages, construction companies' charters, project case analyses, professional fora, and researcher's personal relationship. Even though the invited participants are pre-specified, to be completely sure about the experience of respondents with partnering construction projects, a question is added in the questionnaire. This question is "Do you have experience to take part in partnering project(s)?". All returned questionnaires with answer "No" are discarded from the analysis.

Hand delivery, postage and e-mailing are the three delivery methods employed to distribute the questionnaires. In the questionnaire, a section of consent is designed to explain about the objective of the research. After one month, a remind contact was conducted to persons who do not reply the questionnaire.

Step 3 – Questionnaire collection

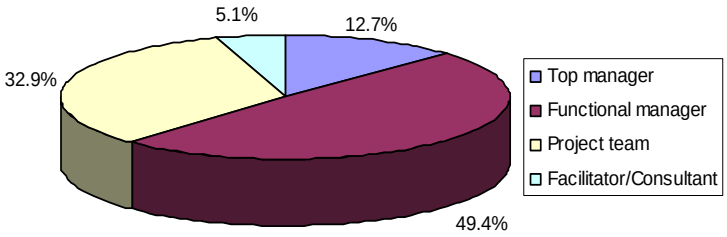
A total of 330 questionnaires have been sent to specified practitioners sample. A total of 79 valid returned questionnaires accounted for a response rate of about 24% are used for analysis. SPSS statistical software is used to process the data. The Cronbach's alpha coefficient of internal consistency value, which is considered to be reliable if value > 0.70, is used to test scale score. In the next chapters, the Cronbach's alpha coefficients corresponding with chapter's content has been shown.



< **Figure 3.2** > Party of respondent in project

Out of 79 returned questionnaires, 20.3% were from clients; 59.5% were from contractors; and 20.3% were from consultants (Figure 3.2). Regarding the position of respondents, 12.7% were top managers; 49.4% were functional managers; and project team members and partnering facilitators accounted for 32.9% and 5.1% respectively (Figure 3.3). About 15.2% of the respondents have experience less than 5 years, 36.7% respondents have 5-10

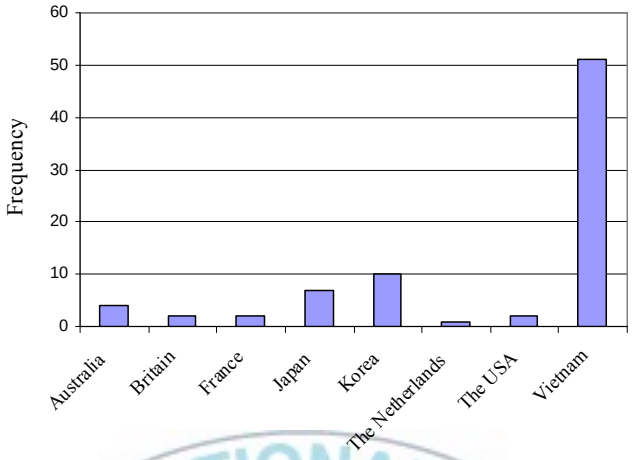
years of experience, 40.5% respondents have 10-15 years of experience and 7.6% respondents have more than 15 years of experience (Figure 2.3).



< **Figure 3.3** > Position of respondent in project

< **Figure 3.4** > Experience of respondent

Regarding the origin of respondent organization, 26 responses (32.9%) were from foreign sector and the remainders (53 responses or 67.1%) were from Vietnamese sector. A detail of nationality of respondents' organizations is presented in Figure 3.5.



< Figure 3.5 > Nationality of respondent organization

Step 4 – Analysis and discussion

The responses are entered into SPSS software package. This activity makes out the data set for this study. The detail analysis and discussion has been presented in the following chapters.

3.3 Analysis tools and techniques

In this section, the statistical tools and techniques employed in this study has been briefly presented.

3.3.1 Descriptive analysis

Min and Max

- *Min* (minimum) value is the smallest value of a set. In this thesis, min value is the smallest value of the respondents' rating for each item in the questionnaire.

- *Max* (maximum) value is the largest value of a set. In this thesis, max value is the largest value of the respondents' rating for each item in the questionnaire.

Mean

Mean is a measure of central tendency that is used very often. The mean value of one item is computed by adding all respondents' ratings and dividing by the number of respondents for this item

$$Mean = \frac{\sum X_i}{N} \quad (3.1)$$

Where:

- Xi: rating of respondent number i;
- N: number of respondents (sample size)

Standard deviation

Standard deviation is a measure of the variability or dispersion of the data set. A low standard deviation indicates that the data points tend to be very close to the mean, whereas high standard deviation indicates that the data are spread out over a large range of values. The standard deviation is the square root of the variance. It is represented by the symbol σ (the lower case Greek letter sigma).

$$Standard\ \ deviation = \sqrt{\frac{\sum (X_i - mean)^2}{N}} \quad (3.2)$$

3.3.2 Ranking

A ranking is a relationship between a set of items such that, for any two items, the first is either 'ranked higher than', 'ranked lower than' or 'ranked equal to' the second.

The purpose of this study is to investigate the perceptions of foreign and Vietnamese organizations. Mean score method is employed to analyze the data in the beginning. The rating of respondents according to five point scale is used to compute mean score for each item. Items in each group are ranked based on their computed scores. The rule is “item having higher mean score is ranked higher than item having lower mean score”.

3.3.3 Spearman ranking correlation test (Spearman rho)

The Spearman’s coefficient of rank correlation (r_S) is used to demonstrate whether there is a correlation between the ranking orders of the respondent groups.

$$r_s = 1 - \frac{6\sum d^2}{N(N-1)^2} \qquad (3.3)$$

Where:

- d = the difference in rank of two groups;
- N = total number of response.

The null hypothesis that the rankings based on respondent’s rating are correlated will be rejected at the significance level of 0.05.

- Null hypothesis: H_0 = No significant agreement on the ranking (r_S=0)

- Alternative: H_a = Significant agreement on the ranking ($r_S \neq 0$)

3.3.4 Kendall's coefficient of concordance

The Kendall's coefficient of concordance (W) is used to measure the agreement level of problems ranking of respondents within an individual group. If there is a complete lack of consensus within a particular group on the ranking of the problems under study, W will be zero. A perfect agreement, on the other hand, will result in W having a value of one (Chan et al, 2003).

$$W = \frac{\sum_{1}^{n} \left(R_i - \overline{R}\right)^2}{\frac{1}{12} N\left(N^2 - 1\right)} \qquad (3.4)$$

Where:

- n . number of items being ranked
- R_i= average of the ranks assigned to the ith item;
- $\overline{R}$ = the average of the ranks assigned across all items.

If the Kendall's coefficient of concordance (W) is significant at the level of 0.05, a reasonable degree of consensus is indicated. The null and alternative hypotheses are stated as follow:

- Null hypothesis: H_0 = respondents' ratings are unrelated to each other within each group (W=0).

- Alternative: H_a = respondents' ratings are related to each other within each group (W≠0).

3.3.5 Test of difference of mean ratings between two groups

In this test, the goal is to compare the means of two samples. Because perception of foreign sector does not depend on perceptions of local sector, the two samples have been considered as independent. The independent samples t-test is conducted.

The use of a t-test makes three assumptions:

- The first is that the data are normally distributed.
- The second is that each sample has been taken at random from its respective population
- And the third is that for an independent sample test, the variances are the same.

The first assumption is satisfied because the central limit theorem states that the distribution of the means of samples of about 25 or more taken from any population will be approximately normal (McKillup, 2005). The two testing samples are randomly selected in this study. The second assumption is satisfied. The third assumption will be tested with Levene's test of equal variance. If the Levene's test is significant (p value less than 0.05), the two variances are significantly unequal. If it is not significant (p value greater than 0.05), the two variances are approximately equal. If the Levene's test is not significant, we meet third assumption.

Based on the results of Levene's test, the appropriate independent t-tests are applied. If the resulted p-value is less than the significant level of 0.05 the null hypothesis that there exists indifference between two groups about mean values could be rejected.

- Null hypothesis: H_o = the means of the two groups are not significantly different.
- Alternate: H_a = the means of the two groups are significantly different.

3.3.6 Factor analysis

There may be possible relationships between partnering items. To uncover the underlying relationships, factor analysis method was applied.

The major aim of factor analysis is the orderly simplification of a large number of inter-correlated measures to a few representative constructs or factors. Factor analysis is based on the assumption that all variables are correlated to some degree. Therefore, those variables that share similar underlying dimensions should be highly correlated, and those variables that measure dissimilar dimensions should yield low correlations (Robert, 2006).

There are three basic steps to factor analysis:

1. Testing the applicability of factor analysis.
2. Extraction of initial factors.
3. Rotation of the extracted factors to a terminal solution.

The communality for a given variable can be interpreted as the proportion of variation in that variable explained by the extracted factors. The communalities of all problems included in factor model must be greater than 0.5 (rule of thumb) to signify the reliability of the model.

As factor analysis is based on correlations between measured variables, a correlation matrix containing the inter-correlation coefficients for the variables should be inspected. There is a need of sufficient significant correlations in data matrix to justify the application of factor analysis. Bartlett's test of sphericity which indicates whether the correlation matrix is not an identity matrix must be significant at 0.05. The Kaiser-Meyer-Olkin measure of sampling adequacy should be above 0.5 (Sharma, 1996).

According to latent root criterion, all extracted components must have eigenvalues larger than 1. As a rule of thumb, factor loadings less than 0.5 are suppressed and only problems with loading having larger than 0.5 are shown in the factor analysis result. The Varimax rotation method was employed in this study.

3.3.7 Multinomial logistic regression analysis

The multinomial logistic regression is an extension of binomial logistic regression and the chances of occurrence of a particular value of response variable are compared with the chances of occurrence of the reference value of the response variable (Iyer and Jha, 2006). This type of regression is useful in situations where one wants to be able to classify subjects based on values of a set of predictor variables. Koksal and Arditi (2004) briefly introduced multinomial logistic regression as follow.

The baseline logit simply compares each category to a baseline category where all the coefficients for the variables are 0

$$logit\left(\frac{p(category_i)}{p(category_j)}\right) = \beta_{i0} + \beta_{i1}X_1 + \beta_{i2}X_2 + \ldots + \beta_{ip}X_p \qquad (3.5)$$

Where β_{i0} = intercept; β_{i1} to β_{ip} = logistic regression coefficients

X_1 to X_p = independent variables.

The above function is called the logit, which is the natural logarithm of the odds that the event will occur. If the baseline category is *j* then the function above defines the i^{th} category of the baseline category. It is possibly to calculate the probability of a category's occurrence by using the following equation (g_i is the logit function of category *i*):

$$p(category_i) = \frac{e^{g_i}}{\sum_{k=1}^{j} e^{g_k}} \qquad (3.6)$$

The interpretation of the results is drawn mainly from "odds ratio", "log of odds ratio", and "the current value" of the explanatory variable which is compared with the reference value. In this thesis, the reference value is the best outcome of partnering approach in construction project, "completely successful" or "10" point. The regression procedures and results explanation in this thesis adopt the one presented in Iyer and Jha (2006).

Odds ratio (e^B)

Odds ratio is the ratio of likelihood of occurrence of an event to the likelihood of nonoccurrence of that event. If the chances of occurrence of an

event M (the current value of the response variable) is p, the chances of occurrence of performance rating not being M or other than M will be q=(1−p). Since it is a binomial case and all comparisons are made with reference value (the event N), chances of the event not being M will be reckoned with chances of the event being N. The e^B value has the form:

$$e^B = \frac{p}{q} = \frac{p}{1-p} \tag{3.7}$$

Alternatively, the value of p and q can be determined from e^B and can be written as:

$$p = \frac{e^B}{1+e^B} \text{ and } q = \frac{1}{1+e^B} \tag{3.8}$$

The event M and event N in the present study pertain to the values of response variable, i.e., event M represents the occurrence of project performance of some desired level (degree of success of partnering in construction project) called as "current value" having values as 1, 2, and so on up to 9; and event N will be the "reference level" which is taken as 10.

Log of Odds ratio

It is obvious from the name "log of odds ratio", this quantity is denoted by B. This component is regarded more for its sign, which determines the impact of explanatory variable on the outcome of response variable. For the event M, if the analysis shows positive sign to B, it implies that any increase in the value of explanatory variable will increase the likelihood of event being M. Conversely, the negative value of B indicates that increase in the value of explanatory variable will decrease the likelihood of event being M, i.e., occurrence of the response variable being at the current level. Since the

performance level is compared with 10, decrease in the likelihood value of performance rating at the current level will indicate the increase in the likelihood value of reference performance rating and vice versa.

The magnitude of impact of explanatory variable on the current value of the response variable is determined by the magnitude of the odds ratio, e^B. More precisely, one unit increase in the value of explanatory variable causes odds ratio to change by $(1-e^B)$ times. The new or changed value of odds ratio would now be:

$$e^B\left[1-\left(1-e^B\right)\right]=e^{2B} \tag{3.9}$$

Accordingly, the new value of likelihood of event M, p' (say) and that of event N, q' (say) after change due to one unit of explanatory variable will be $e^{2B}/(1+e^{2B})$ and $1/(1+e^{2B})$, respectively. If Δp and Δq are the changes in the values of likelihood of events M and N, they can be written as given below:

$$\Delta p = p_{new} - p_{old} = p' - p = \frac{e^{2B}}{1+e^{2B}} - \frac{e^B}{1+e^B} \tag{3.10}$$

$$\Delta q = q_{new} - q_{old} = q' - q = \frac{1}{1+e^{2B}} - \frac{1}{1+e^B} \tag{3.11}$$

Δp would indicate the change in likelihood of project performance being at the current level and Δq would indicate the change in likelihood of project performance of not being at the current level, i.e., being at the reference level of 10. The values of Δp and Δq are thus complementary to each other. It could be further interpreted that the negative value of Δp which indicates decreasing chances of the project performance being at the current level, is also associated with the positive value of Δq indicating increasing chances of alternate event, i.e., performance level being at 10. These lead us to conclude

that a negative value of Δp indicates improvement in the performance level towards 10 from the current level. On the other hand, a positive value of Δp indicates increasing chances of performance of the project being at the same level and decreasing chances of performance being at the alternate level of 10. These lead us to conclude that with a positive value of Δp there will be diminishing chances of further improvement. This logic is used for interpretations of results of statistical analyses of responses.

3.3.8 Discriminant analysis

Discriminant analysis (DA) is a multivariate data analysis which is well documented in many textbooks such as Sharma (1996) and Robert (2006). Short description about the technique presented in NCSU (NCSU) is quoted hereafter. Discriminant analysis is used to classify cases into the values of a categorical dependent. If discriminant function analysis is effective for a set of data, the classification table of correct and incorrect estimates will yield a high percentage correct.

Multiple discriminant analysis (MDA) is an extension of discriminant analysis and a cousin of multiple analysis of variance (MANOVA), sharing many of the same assumptions and tests. MDA is used to classify a categorical dependent which has more than two categories, using as predictors a number of interval or dummy independent variables. MDA is sometimes also called discriminant factor analysis or canonical discriminant analysis.

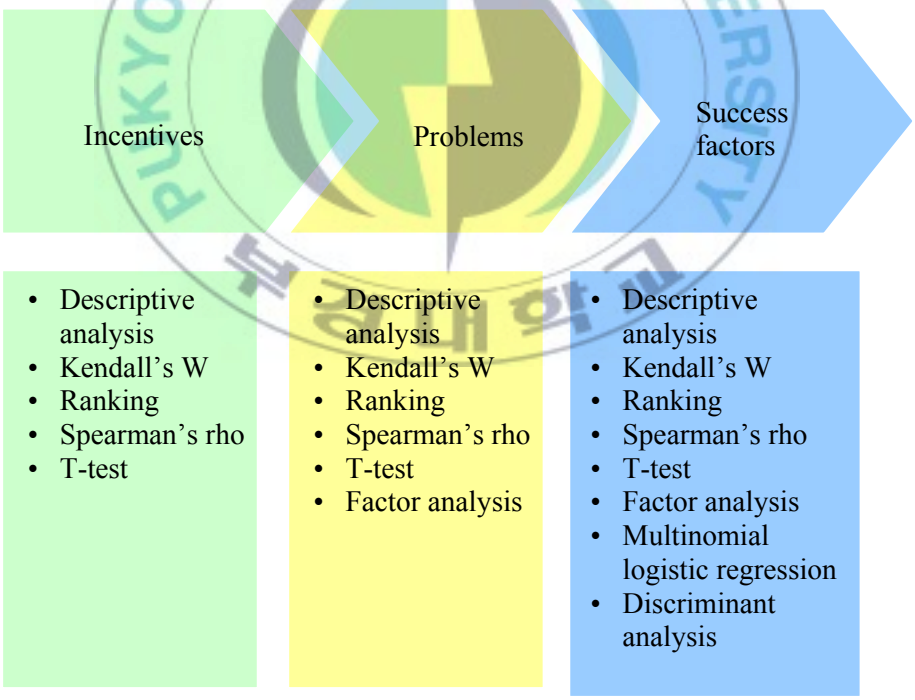
DA is an earlier alternative to logistic regression, which is now frequently used in place of DA as it usually involves fewer violations of assumptions (independent variables needn't be normally distributed, linearly related, or

have equal within-group variances), is robust, handles categorical as well as continuous variables, and has coefficients which many find easier to interpret.

Discriminant analysis shares all the usual assumptions of correlation, requiring linear and homoscedastic relationships, and untruncated interval or near interval data.

3.3.9 Summary of employed statistical tools and techniques

A summary of tools and techniques used to analyze data corresponding to each research objective is graphically presented in Figure 3.6.



< **Figure 3.6** > Summary of tools and techniques used to analyze data

CHAPTER 4

INCENTIVES OF PARTNERING APPROACH IN CONSTRUCTION

4.1 Introduction

The wider adoption of partnering concept should be encouraged in the construction industry in Vietnam as it has been shown anecdotally to improve performance and reduce confrontation in the industry. It is similar to construction management concept, partnering is relatively recent applied in Vietnam although it has been widely used in several countries including USA, Japan, UK, Hong Kong, Taiwan, China ect. However, partnering in the construction industry has been by no means accepted in Vietnam. Partnership could be built between Vietnamese counterparts as well as between Vietnamese and foreign partners. Organizations enter into partnerships possibly in order to overcome limitation of capability, access new market, and tend to many other else.

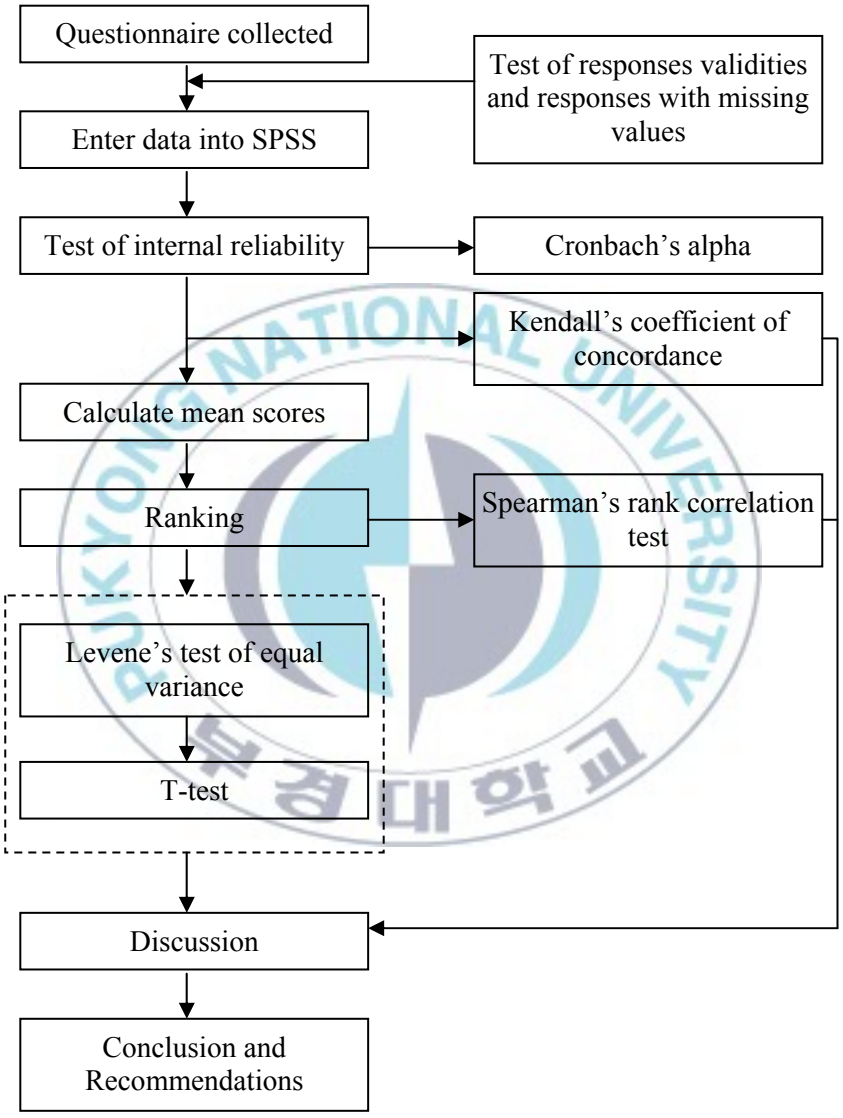
Incentives may create strong motivation for participants. Tang et al (2006) asserted that incentives make risk allocation between parties fairer and project success is the outcome of the interaction of variety of techniques associated with incentives. Such that incentive scheme should appropriately be designed and introduced.

The main reason for introducing incentives to the partnering process is that project benefits should be equitably shared among participants (Tang et al, 2008). Incentives afford partners a genuine opportunity to work together to achieve good results, and may create a more proactive, cooperative relationship between contracting parties (Bresnen and Marshall, 2000a)

The motivational incentives should not be negligible. Understanding the incentives of this concept can motivate practitioners to adapt it. More generally, research on partnering as a whole is notable for its heavy reliance on anecdotal evidence and prescription (Bresnen and Marshall, 2000a). Chen (2003) asserted that more dynamic and complex environments provide stronger incentives for firms to select contract-based alliances. And that the nationality of partners has a positive effect on the choice of alliance forms. Through partnering and the active involvement of all key parties, the project burden such as conflicts, claims or work defects is more likely to be reduced or minimized (Chan et al, 2003). It is necessary to portray a comprehensive picture of incentives for partnering practice in Vietnam.

In this chapter, the findings of questionnaire survey of partnering incentives are reported. It is hoped that more partnering arrangements should be actively adopted into the current construction procurement system so that participants can get pleasure from the incentives of partnering. The objectives of this study were to investigate and introduce what incentives/benefits the practitioners are likely to be obtained when applying partnering approach in the Vietnamese construction market. The analysis is based on the perceptions of foreign and Vietnamese sectors. Furthermore, the chapter has examined the level of importance of partnering incentives through mean score. It has

ranked partnering incentives in terms of mean score and has also tested the consensus between two sectors about incentives perception.



< **Figure 4.1** > Flowchart of chapter research process

Following this section of introduction, the next section will be devoted to the literature review of researches about partnering incentives. Data analysis

will be presented in section 2. The last two sections will present the chapter recommendations and conclusion.

Figure 4.1 portrays the process of research in this chapter.

4.2 Data analysis

4.2.1 Potential partnering incentives and incentive perspectives in Vietnamese construction

After pilot test (see description in chapter 2), twenty four partnering incentives are considered as suitable with Vietnamese context included in the final questionnaire. The twenty four potential incentives are presented in Table 4.1 and subjectively grouped into four groups: financial perspective, performance improvement perspective, brand and competition perspective, and learning and growth perspective. The ideas to group incentives are:

- Incentives related to financing are grouped into “Financial perspective”.
- Incentives related to the improvement of project performance are grouped into “Performance improvement perspective”.
- Incentives related to the improvement of company’s brand and company’s competition in the market are grouped into “Brand and competition perspective”.
- Incentives related to the improvement of capability of employees and system are grouped into “Learning and growth perspective”.

< **Table 4.1** > Twenty four potential incentives and their group

No.	Incentives	Group name
1	To reduce risk exposure	
2	To achieve cost saving	
3	To share risks more equitably among parties	Financial perspective
4	To improve return on resources	
5	To have assured financing	
6	To achieve faster construction time	
7	To improve construction quality	
8	To improve design quality	
9	To reduce design cycle	
10	To reduce supervision costs	Performance improvement perspective
11	To improve project programs	
12	To reduce rework	
13	To reduce paper-work	
14	To improve safety performance	
15	To achieve better productivity	
16	To achieve less adversarial relationship	
17	To increase customer satisfaction	Brand and competition perspective
18	To increase market share	
19	To increase bidding advantages	
20	To increase understanding amongst parties	
21	To improve administration	
22	To motivate employees	Learning and growth perspective
23	To learn mutually among participants	
24	To increase opportunity for innovation	

4.2.2 Mean score and ranking

All collected questionnaires are at first checked for adequacy and missing. Questionnaires with missing values are discarded from data set. The collected data has been analyzed using computer software, namely SPSS. The Cronbach's alpha coefficients of internal consistency reliable test for foreign and Vietnamese sectors are 0.852 and 0.897, respectively (Table 4.2). The scales are considered as reliable since the obtained coefficient is higher than the suggested coefficient of 0.7.

< **Table 4.2** > Cronbach's alpha coefficient

Sector	Cronbach's alpha
Foreign sector	0.852
Vietnamese sector	0.897
All-cases	0.888

< **Table 4.3** > Descriptive analysis – foreign sector perception

No.	Incentives	N	Range	Min	Max	Mean	Std. Deviation
1	To reduce risk exposure	26	3	2	5	3.577	0.703
2	To achieve cost saving	26	2	3	5	3.769	0.710
3	To share risks more equitably among parties	26	3	2	5	3.269	1.002
4	To improve return on resources	26	3	2	5	3.538	0.811
5	To have assured financing	26	3	2	5	3.385	0.983
6	To achieve faster construction time	26	2	3	5	3.769	0.765
7	To improve construction quality	26	4	1	5	4.038	0.824
8	To improve design quality	26	2	3	5	4.000	0.566
9	To reduce design cycle	26	4	1	5	3.115	0.909
10	To reduce supervision costs	26	4	1	5	2.692	0.736
11	To improve project programs	26	4	1	5	3.269	1.079
12	To reduce rework	26	4	1	5	3.846	0.967
13	To reduce paper-work	26	3	1	4	3.038	0.774
14	To improve safety performance	26	3	2	5	3.615	0.804
15	To achieve better productivity	26	4	1	5	3.808	0.849
16	To achieve less adversarial relationship	26	3	2	5	4.038	0.824
17	To increase customer satisfaction	26	2	3	5	3.962	0.720
18	To increase market share	26	4	1	5	3.654	0.797
19	To increase bidding advantages	26	4	1	5	3.846	0.967
20	To increase understanding amongst parties	26	3	2	5	4.000	0.748
21	To improve administration	26	2	3	5	3.885	0.516
22	To motivate employees	26	4	1	5	3.808	0.749
23	To learn mutually among participants	26	4	1	5	4.077	0.845
24	To increase opportunity for innovation	26	3	2	5	3.423	0.758

Descriptive analyses of responses of two sectors are presented in Table 4.3 and 4.4.

< **Table 4.4** > Descriptive analysis – Vietnamese sector perception

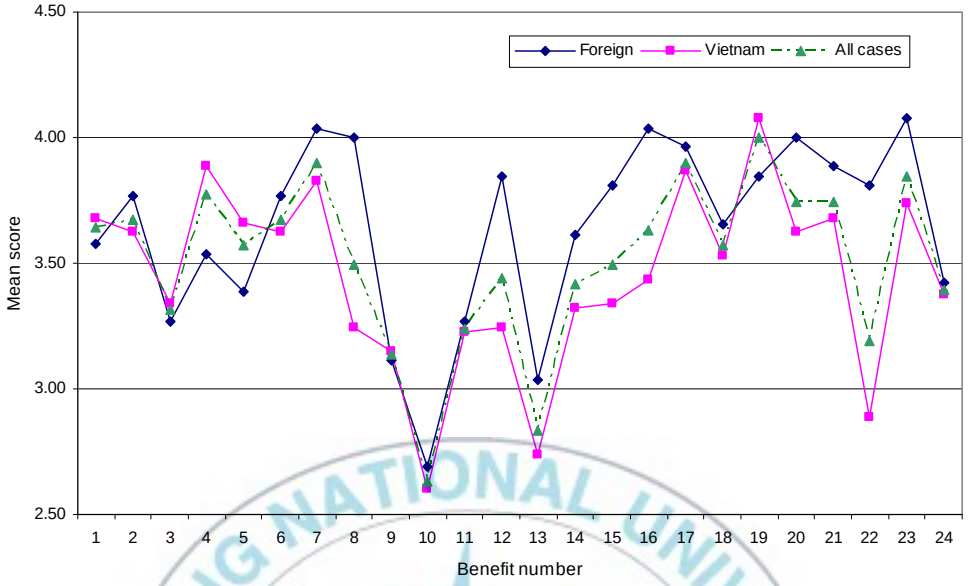
No.	Incentives	N	Range	Min	Max	Mean	Std. Deviation
1	To reduce risk exposure	53	3	2	5	3.679	0.894
2	To achieve cost saving	53	3	2	5	3.623	0.925
3	To share risks more equitably among parties	53	4	1	5	3.340	0.960
4	To improve return on resources	53	3	2	5	3.887	0.824
5	To have assured financing	53	3	2	5	3.660	0.939
6	To achieve faster construction time	53	3	2	5	3.623	0.985
7	To improve construction quality	53	4	1	5	3.830	0.935
8	To improve design quality	53	2	2	4	3.245	0.806
9	To reduce design cycle	53	4	1	5	3.151	0.969
10	To reduce supervision costs	53	4	1	5	2.604	1.025
11	To improve project programs	53	4	1	5	3.226	0.974
12	To reduce rework	53	4	1	5	3.245	1.054
13	To reduce paper-work	53	4	1	5	2.736	1.112
14	To improve safety performance	53	4	1	5	3.321	1.252
15	To achieve better productivity	53	4	1	5	3.340	0.898
16	To achieve less adversarial relationship	53	3	2	5	3.434	0.844
17	To increase customer satisfaction	53	3	2	5	3.868	0.708
18	To increase market share	53	4	1	5	3.528	0.868
19	To increase bidding advantages	53	4	1	5	4.075	0.997
20	To increase understanding amongst parties	53	3	2	5	3.623	0.904
21	To improve administration	53	3	2	5	3.679	0.779
22	To motivate employees	53	3	1	4	2.887	0.954
23	To learn mutually among participants	53	4	1	5	3.736	0.902
24	To increase opportunity for innovation	53	3	2	5	3.377	0.740

The mean scores and ranking of incentives according to Foreign and Vietnam groups are presented in Table 4.5. Furthermore, these incentives' means and ranks according to all cases are also presented in this Table.

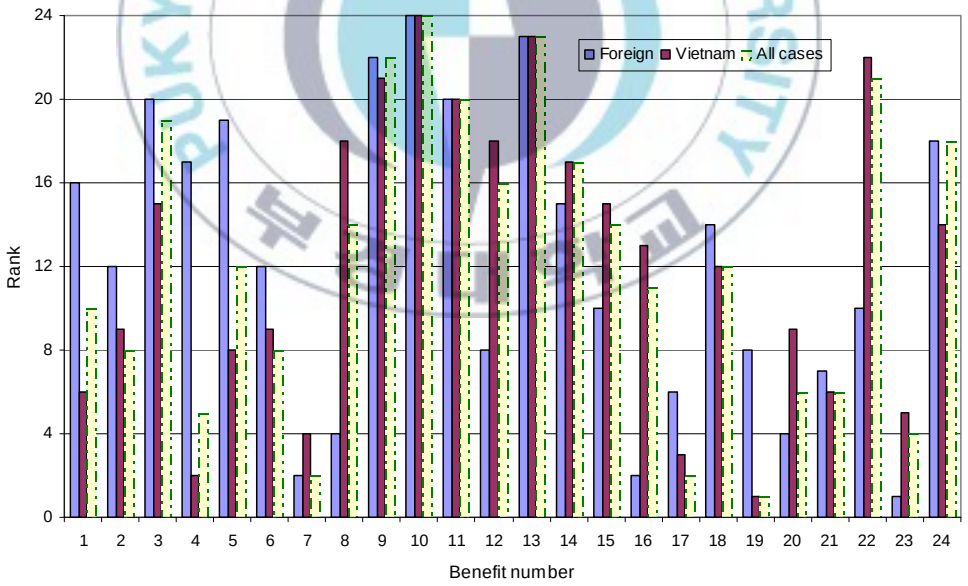
Figure 4.2 and Figure 4.3 graphically show the mean score values and rankings of incentives. The closely scattered pattern in Figure 4.2 indicates that, in general, participants in Vietnam exhibit a positive attitude towards partnering incentives.

< **Table 4.5** > Ranking of incentives

No.	Incentives	Foreign		Vietnam		All cases	
		Mean	Rank	Mean	Rank	Mean	Rank
1	To reduce risk exposure	3.58	16	3.68	6	3.65	10
2	To achieve cost saving	3.77	12	3.62	9	3.67	8
3	To share risks more equitably among parties	3.27	20	3.34	15	3.32	19
4	To improve return on resources	3.54	17	3.89	2	3.77	5
5	To have assured financing	3.38	19	3.66	8	3.57	12
6	To achieve faster construction time	3.77	12	3.62	9	3.67	8
7	To improve construction quality	4.04	2	3.83	4	3.90	2
8	To improve design quality	4.00	4	3.25	18	3.49	14
9	To reduce design cycle	3.12	22	3.15	21	3.14	22
10	To reduce supervision costs	2.69	24	2.60	24	2.63	24
11	To improve project programs	3.27	20	3.23	20	3.24	20
12	To reduce rework	3.85	8	3.25	18	3.44	16
13	To reduce paper-work	3.04	23	2.74	23	2.84	23
14	To improve safety performance	3.62	15	3.32	17	3.42	17
15	To achieve better productivity	3.81	10	3.34	15	3.49	14
16	To achieve less adversarial relationship	4.04	2	3.43	13	3.63	11
17	To increase customer satisfaction	3.96	6	3.87	3	3.90	2
18	To increase market share	3.65	14	3.53	12	3.57	12
19	To increase bidding advantages	3.85	8	4.08	1	4.00	1
20	To increase understanding amongst parties	4.00	4	3.62	9	3.75	6
21	To improve administration	3.88	7	3.68	6	3.75	6
22	To motivate employees	3.81	10	2.89	22	3.19	21
23	To learn mutually among participants	4.08	1	3.74	5	3.85	4
24	To increase opportunity for innovation	3.42	18	3.38	14	3.39	18



< **Figure 4.2** > Mean score value of incentive



< **Figure 4.3** > Ranking of incentive

The rankings of incentives seem diverse between Foreign and Vietnam groups. The top five incentives of each group are presented in Table 4.6. In

top five, there are two incentives that have appeared in both groups, namely 'to learn mutually among participants (4.08, rank 1st; and 3.75 rank 5th)' and 'to improve construction quality (4.04, rank 2nd; and 3.83, rank 4th)'. In Foreign group category 'to achieve less adversarial relationship (4.04, rank 2nd)', 'to increase understanding amongst parties (4.00, rank 4th)', and 'to improve design quality (4.00, rank 4th)' are ranked in the next positions respectively. Vietnam group considers 'to increase bidding advantages (4.08, rank 1st)', 'to improve return on resources (3.89, rank 2nd)' and 'to increase customer satisfaction (3.87, rank 3rd)' as the most important incentives to motivate the partnering approach in Vietnam. It is shown that the incentives in top five of both sectors are both tangible and intangible. The results are different from findings of Black et al (2000) and Beach et al (2005) which are notable that the top five incentives are intangible.

< **Table 4.6** > Top five incentives

Foreign		Vietnam	
Rank	Incentives	Rank	Incentives
1	To learn mutually among participants	1	To increase bidding advantages
2	To improve construction quality	2	To improve return on resources
2	To achieve less adversarial relationship	3	To increase customer satisfaction
4	To increase understanding amongst parties	4	To improve construction quality
4	To improve design quality	5	To learn mutually among participants

In the top five incentives of foreign sector, the prominent features are related to 'to get familiar with Vietnamese market' and 'to improve project quality'. It can be inferred that foreign sector is on their entry-mode to Vietnamese construction market. Improving project quality will improve the

image and prestige of the organization in the new market. On the other hand, the two most important incentives according to Vietnamese sector are related to economic manners. Economic pressures possibly affect their commitment to partnership.

< **Table 4.7** > Kendall coefficient of concordance

No.	Incentives	Mean rank of Kendall's W test		
		Foreign	Vietnam	All-cases
1	To reduce risk exposure	11.37	13.86	13.04
2	To achieve cost saving	13.10	13.71	13.51
3	To share risks more equitably among parties	9.50	11.64	10.94
4	To improve return on resources	11.21	15.82	14.30
5	To have assured financing	10.79	13.82	12.82
6	To achieve faster construction time	12.69	13.57	13.28
7	To improve construction quality	15.94	15.56	15.68
8	To improve design quality	15.75	10.80	12.43
9	To reduce design cycle	7.90	10.29	9.51
10	To reduce supervision costs	5.15	7.00	6.39
11	To improve project programs	10.85	10.94	10.91
12	To reduce rework	15.15	11.58	12.76
13	To reduce paper-work	7.60	7.69	7.66
14	To improve safety performance	12.33	11.69	11.90
15	To achieve better productivity	13.83	11.48	12.25
16	To achieve less adversarial relationship	15.60	12.73	13.67
17	To increase customer satisfaction	14.40	15.44	15.10
18	To increase market share	12.75	12.88	12.84
19	To increase bidding advantages	13.92	16.64	15.75
20	To increase understanding amongst parties	15.23	13.89	14.33
21	To improve administration	14.69	14.23	14.38
22	To motivate employees	14.02	8.22	10.13
23	To learn mutually among participants	16.23	14.94	15.37
24	To increase opportunity for innovation	10.00	11.58	11.06
	N	26	53	79
	Kendall's Coefficient (W)	0.217	0.165	0.146
	Chi-square	129.898	201.453	264.634
	Significance	0.000	0.000	0.000

The results of Kendall's Coefficient of Concordance (W) for all items are tabulated in Table 4.7. Kendall's coefficients of concordance (W) for the rankings of incentives among Foreign and Vietnam groups are 0.217 and 0.165 respectively. The significance levels of these values are both 0.000. It can be concluded that the respondent's rankings within a certain group are related. The response consensus within each group is achieved. For all-cases, the same conclusion is achieved.

4.2.3 Test the rating consensus between sectors

The computed Spearman rank correlation coefficients are presented in Table 4.8.

< **Table 4.8** > Spearman's rank correlation test

		Foreign	Vietnamese	All cases
Foreign	Spearman rho	1.000	0.487*	0.695**
	Sig. level	1.000	0.050	0.010
Vietnamese	Spearman rho	0.482*	1.000	0.947**
	Sig. level	0.050	1.000	0.010
All cases	Spearman rho	0.695**	0.947**	1.000
	Sig. level	0.010	0.010	1.000

Note: *: significant at 5%; **: significant at 1%

The Spearman coefficient (r_S) between foreign and Vietnam groups is 0.487. The level of significance is 0.050. It can be inferred from this result that there is a strong correlation between two sectors in ranking the incentives regardless the existence of some locally slightly contrary opinions. The degree of correlation is generally even at 48.2%. The correlations between all-cases and the two sectors are high. These degrees of correlation are 69.5% and 94.7% (with foreign and Vietnamese, correspondingly). It means that all-cases ranking order could be used as intermediary ranking order of two

sectors. Since the Spearman rank correlation test does not suggest whether an individual incentive is not different across the two respondent groups, the next task will focus on t-test to investigate the aforementioned mention.

In Table 4.9, the Levene's test results are presented in the second and third column. T statistics values and significance of t-test are shown in the following columns. Levene's test was carried out to test the violation of equality of variance assumption. Levene's test resulted in seven factors showed the signs of violation at 5% confidence level. These seven items are: "To increase understanding amongst parties (p=0.033)", "To improve administration (p=0.014)", "To improve design quality (p=0.000)", "To reduce supervision costs (p=0.008)", "To motivate employees (0.036)", "To reduce paper-work (p=0.003)", and "To improve safety performance (p=0.010)".

Based on the Levene's test results, t-tests were carried out. The results of t-test showed that the opinions between two respondent groups about the incentives' level of importance were diverse. There was an agreement between two groups in majority of incentives. However, the consensuses did not exist in five incentives at the significance level of 0.05. The five incentives are 'to achieve less adversarial relationship' (t-value=3.015; p=0.003), 'to improve design quality' (t-value=4.814; p=0.000), 'to achieve better productivity' (t-value=2.216; p=0.030), 'to reduce rework' (t-value=2.444; p=0.017), and 'to motivate employees' (t-value=4.677; p=0.000). In all of these five items, the foreign group rates are always more severe than those of Vietnam group.

< **Table 4.9** > Levene's test and t-test results

No.	Incentives	Levene's test		T-test	
		F statistic	Sig.	T statistic	Sig.
1	To reduce risk exposure	1.935	0.168	-0.511	0.611
2	To achieve cost saving	1.960	0.166	0.711	0.479
3	To share risks more equitably among parties	0.524	0.471	-0.302	0.764
4	To improve return on resources	0.350	0.556	-1.774	0.080
5	To have assured financing	0.344	0.559	-1.208	0.231
6	To achieve faster construction time	2.220	0.140	0.666	0.507
7	To improve construction quality	1.570	0.214	0.966	0.337
8	To improve design quality	17.589	0.000**	4.814	0.000**
9	To reduce design cycle	2.891	0.093	-0.156	0.876
10	To reduce supervision costs	7.305	0.008**	0.439	0.662
11	To improve project programs	0.713	0.401	0.177	0.860
12	To reduce rework	3.856	0.053	2.444	0.017*
13	To reduce paper-work	9.276	0.003**	1.406	0.164
14	To improve safety performance	6.998	0.010*	1.263	0.211
15	To achieve better productivity	2.377	0.127	2.216	0.030*
16	To achieve less adversarial relationship	1.339	0.251	3.015	0.003**
17	To increase customer satisfaction	0.020	0.889	0.549	0.585
18	To increase market share	1.063	0.306	0.620	0.537
19	To increase bidding advantages	0.002	0.964	-0.970	0.335
20	To increase understanding amongst parties	4.709	0.033*	1.963	0.054
21	To improve administration	6.384	0.014*	1.395	0.168
22	To motivate employees	4.554	0.036*	4.677	0.000**
23	To learn mutually among participants	0.478	0.491	1.612	0.111
24	To increase opportunity for innovation	0.001	0.976	0.256	0.799

Note: **: significant at 0.01; *: significant at 0.05

The foreign sector might be conscious about the new market. The adversarial relationship arising during project implementation could cause bad effects on their market entry mode. Partnering with Vietnamese counterparts, foreign partner can move away the adversarial relationships between parties frequently existed in traditional procurement methods. Furthermore, foreign partner can employ the familiarity of Vietnamese

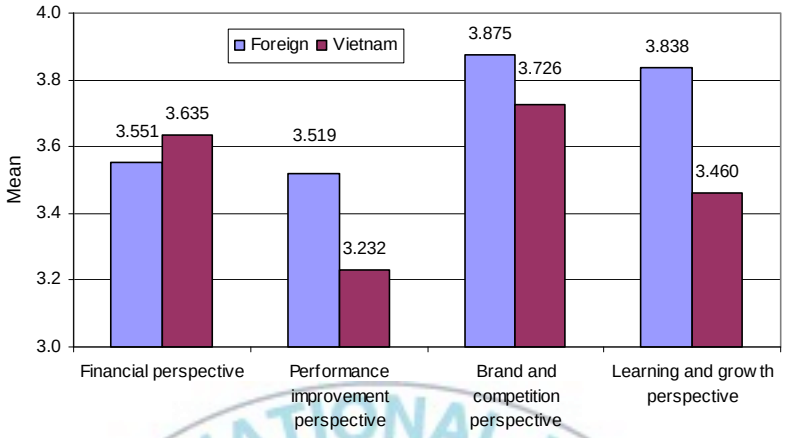
partners with market conditions, culture, and legal framework which currently being the severe difficulties with overseas companies.

Partnering fosters an atmosphere of teamwork approach to achieve common goals. An effective partnering process will encourage quality awareness and emphasize achievement-oriented working styles that help to improve design quality, to reduce reworks and to achieve better productivity. These ideas seem unpopular with Vietnamese practitioners' perception. Le-Hoai et al. (2008) identified that mistake in design was one of the main causes of projects delay and cost overrun.

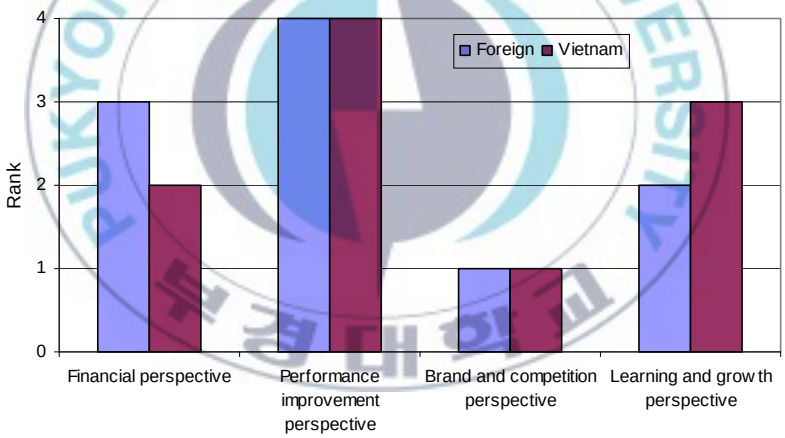
The two sectors held different viewpoints in the rating of the incentive "to motivate employees". This disagreement may explain the different thinking between two sectors. Bureaucracy and directive style is common in Vietnamese thinking. Vietnamese managers have not paid much attention to making an exciting working environment to motivate their employees achieving better working performance. Change of think is not willing to be accepted in the near future.

4.2.4 Ranking groups (perspective) of incentives

To deeply examine the importance of perspectives in the incentive scheme of two sectors, means of the four perspectives are calculated and the perspectives are ranked. Table 4.10 shows the means and rankings of the four groups according to the perceptions of two sectors. It is noticed that the mean of perspective is taken as the average of respondents' ratings of incentives in this perspective. The values in Table 4.10 are graphically presented in Figure 4.4 and Figure 4.5.



< **Figure 4.4** > Mean score of the perspective



< **Figure 4.5** > Rank of the perspective

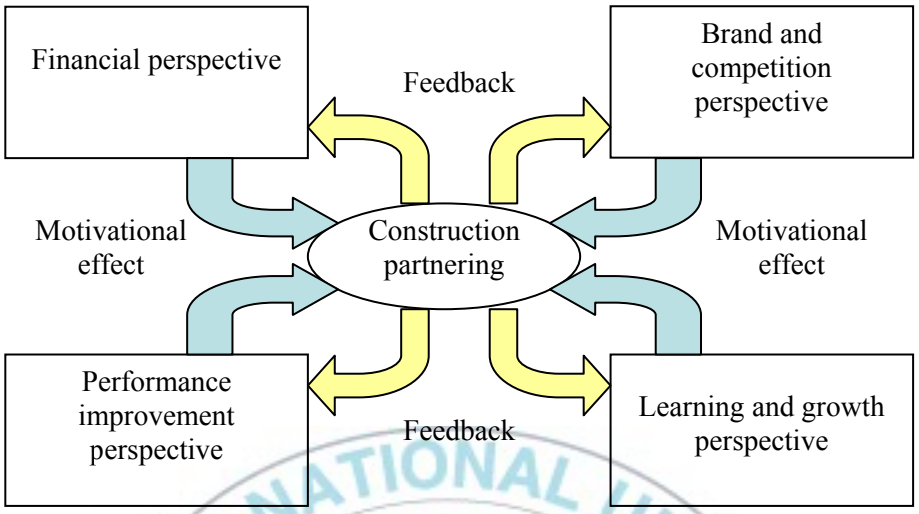
< **Table 4.10** > Score and rank of perspective

Perspective	Foreign		Vietnam	
	Mean	Rank	Mean	Rank
Financial perspective	3.551	3	3.635	2
Performance improvement perspective	3.519	4	3.232	4
Brand and competition perspective	3.875	1	3.726	1
Learning and growth perspective	3.838	2	3.460	3

"Brand and competition" is identified as priority of incentives of both sectors. It is shown that both sectors appreciate the improvement of organization's image and advantages to pursue the partnership. The perspective consisted of the incentives to improve performance ranks fourth in both sectors. Both foreign and Vietnamese sectors consider this perspective least important when joining a partnership. They least expect these incentives when joining a partnership in Vietnam.

The other two perspectives have the opposite positions in the ranking orders of the two groups. Foreign sector rates learning and growth perspective higher than financial perspective. In the opposite side, Vietnamese ranks financial perspective second and learn and growth perspective third. This result one more time reinforces the judgment that foreign partners pay more attention to their entry-mode in Vietnam. While Vietnamese partners search for financial opportunities rather than chances of learn and growth.

Figure 4.6 shows the four perspectives of partnering incentives in the construction industry in Vietnam. The use of incentives systems could reinforce the collaborative ways of working by the motivational effects. The applications of partnering concept will then feedback to organization through the obtained benefits. It needs further studies to investigate deeply the mechanisms of incentives in Vietnam construction market.



< **Figure 4.6** > Four perspectives of partnering incentives in Vietnamese context

4.3 Chapter recommendations

This study shows that, in general, different sectors have different perceptions about degree of importance of several incentives. The top incentives of foreign sector show that they are concerning with their entry mode to new market. On the other hand, Vietnamese sector is mainly concerning with economics related incentives. The participants in a partnership should pay attention to their partners' incentives goals to foster the relationship. Provide the motivation through incentives could push partners to give an extra effort or to more commit to partnership.

As the partnering concept is considered as an innovating arrangement and the use of incentives can encourage the partnering application, incentives should be encouraged during the implementation process. This study restricted in its scope investigates the potential incentives that the participants

in Vietnamese construction market have been used. This is only the first step in research field about incentives. To enhance the developments and applications of this concept, further studies should be conducted, some of which are illustrated below:

- Future researches should base on incentives investigated in this study and develop the incentive schemes. Furthermore, the measurement system to measure incentives should be developed. An example could be found in Tang et al (2008).

- The weights of incentives vary on each project according to priorities of project's parties and other features, so practitioners must decide their own weight scale suited with distinct projects.

- Previous researches indicated that different types of projects can apply incentives more or less (Tang et al, 2008). Future researches should be conducted to examine the effects of project features such as project types, project delivery system ect. on the incentives application.

- The incentives perception and the use of incentives could be variable over project parties. Future studies could follow this direction.

- Case studies should be presented to encourage the application through the real lessons (case study).

4.4 Chapter conclusion

Incentives motivating the application of partnering approach in Vietnamese construction market are identified. The opinions of foreign sector and Vietnamese sector are investigated. Both two sectors agree that 'to learn mutually among participants' and 'to improve construction quality' are the two of five most important incentives. Foreign group also ranks 'to achieve less adversarial relationship', 'to increase understanding amongst parties', and 'to improve design quality' in top five. On the other hand, 'to increase bidding advantages', 'to improve return on resources' and 'to increase customer satisfaction' are the three most important incentive factors.

Tests of Kendall's coefficient of concordance show that, within a certain sector, all respondents statistically meet the agreement on ranking incentives. In the other word, the practitioners within a certain sector (foreign or Vietnamese) perceive similarly about their incentives when practicing partnering in construction projects in Vietnam. The further analyses also have demonstrated that there is a consensus about the rankings of items between two sectors.

However, there are some disagreements about the mean score rating (degree of importance) between two sectors. This means that the culture of parent organization possibly influence the perception about partnering incentives. Furthermore, the real situations of sectors possibly affect their perception about incentives. The foreign sector is on the entry-mode to the new prosperous market while the local sector pays most attention to economics conditions.

The findings show that the incentives of partnering in construction in Vietnam can be grouped into four perspectives. Brand and competition

perspective is considered as most important while performance improvement perspective is considered as least essential with respect to both sectors. Learning and growth perspective and financial perspective are the two perspectives having divergent opinions between foreign and local participants. Foreign participants pay more attention to learning and growth than to financial side.

The misunderstanding possibly raises adversarial relationship between counterparts. The research results help the practitioners in Vietnamese market comprehend the targeted objectives of counterparts. Through clearly understanding about the incentives of partnering concept, it is hoped that partnering arrangement will be propagated to employ its advantages.

CHAPTER 5

PROBLEMS IN IMPLEMENTING PARTNERING ARRANGEMENT IN CONSTRUCTION

5.1 Introduction

Traditional confrontational style of construction management is becoming out of place and cooperative teamwork offers greater chance to achieve project objectives (Cheung et al, 2003). Partnering concept has been a prosperous arrangement in construction industry in recent years. This new approach has been proved to be applicable to Vietnamese case. It is similar to other countries as well; however, many problems have emerged during partnering implementation process. These difficulties and problems need considerable attention. That is because partnering cannot solve all the problems in the industry. It is totally dependent on the people who drive it since partnering is only a management technique (Slater, 1998).

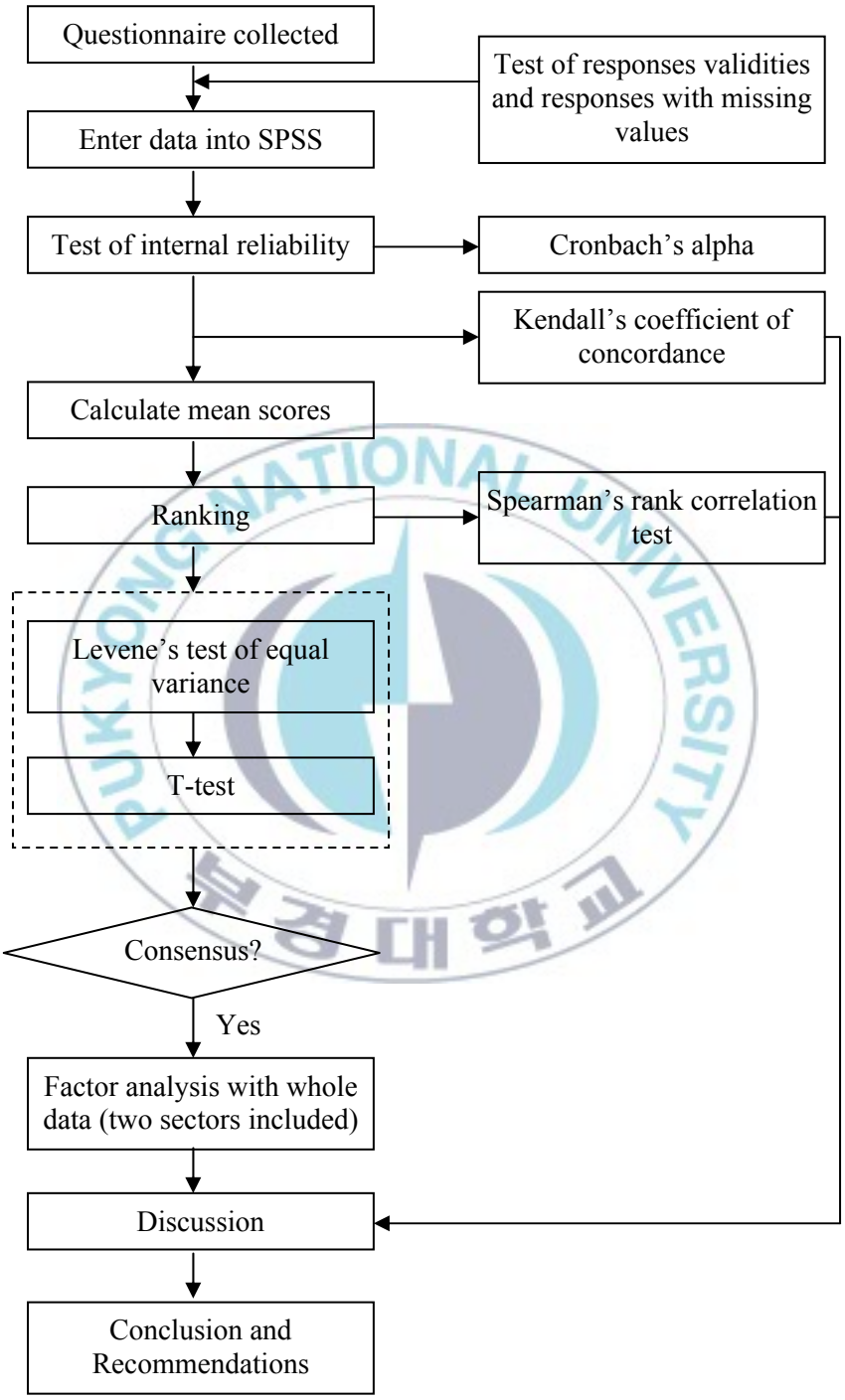
Problem exists in all processes. Partnering is not an exception. Many problems have arisen during the application of the partnering concept. Partnering in the construction industry context might be seen as a fragile phenomenon, often dependent on the convergence of a number of key commercial and organisational supporting conditions (Bresnen, 2007). The development, implementation, and success of a partnering arrangement are

very much concerned with the management of paradoxes, contradictions and unintended consequences (Bresnen, 2007). A preparedness to address problem quickly and at the lowest level will promote effective project partnering (Ng et al, 2002).

Understanding the potential problems can help participants to avoid reinventing the wheel. The objective of this study is to investigate the problematic factors emerging during the implementation process of partnering in Vietnam construction projects based on the perceptions of foreigners and local people. Furthermore, this chapter will examine the importance level of problems through mean scores, will test the consensus between two sectors about problems perception and will uncover the underlying relationships between problems.

This section presents the introduction of this chapter. The next section will be devoted to the literature review of researches about problematic factors arising in the partnering implementation process. Descriptive analysis of the problems in Vietnam construction industry will be presented in section 2. Due to the good agreement between two sectors, factor analysis technique is applied to uncover the underlying dimensions of problems and presented in section 3. The last two sections will present the chapter recommendations and conclusion.

Figure 5.1 portrays the process of research in this chapter.



< **Figure 5.1** > Flowchart of chapter research process

5.2 Descriptive analysis

5.2.1 Mean score and ranking

After pilot test, twenty problems are considered as potential to hinder the partnering implementation in the construction industry in Vietnam. These potential problems (see Table 5.2) are included in the final questionnaire. Data from 79 valid returned questionnaires were inputted into SPSS, statistical software used to process the data. The test yielded Cronbach's alpha coefficient of internal consistency values of 0.955, 0.896 and 0.921 for foreign, Vietnamese and all-cases respectively (see Table 5.1). These coefficients are considered to be reliable (>0.70).

Descriptive analyses of responses of two sectors are presented in Table 5.2 and 5.3. The number of respondents on each level is presented. The majority of respondents are distributed on level "3" and "4". It means that problems are existent in the process of implementing partnering in construction projects. But these problems are not too critical that cause severe adversarial effects on practicing partnering concept. It is encouraged to fix these difficulties to enhance the application of innovative arrangement.

< **Table 5.1** > Cronbach's alpha coefficient

Sector	Cronbach's alpha
Foreign sector	0.955
Vietnamese sector	0.896
All-cases	0.921

< **Table 5.2** > Response of foreign sector

No.	Problems	N	Response					Mean	Std. Dev.
			1	2	3	4	5		
1	Unsolved arguments (ignorance or allowing arguments raising)	26	1	2	6	12	5	3.69	1.01
2	Partner(s) disagree to compromise	26	0	3	4	18	1	3.65	0.75
3	Owner's lack of authority	26	1	6	6	10	3	3.31	1.09
4	Partners' attitudes conceded by commercial pressure	26	0	0	7	10	9	4.08	0.80
5	Lack of training and guidance	26	0	2	11	8	5	3.62	0.90
6	Flexibility restricted by bidding approach	26	0	6	10	10	0	3.15	0.78
7	Lack of continuous, open and honest communication	26	0	4	2	15	5	3.81	0.94
8	Partners' lack of win-win attitude	26	0	9	0	13	4	3.46	1.14
9	Partner(s) with no commitment to cooperation	26	2	3	6	13	2	3.38	1.06
10	Lack of close relationship in partnership	26	0	8	11	5	2	3.04	0.92
11	Key subcontractor(s) not involved in partnering process	26	2	4	8	10	2	3.23	1.07
12	Designer and other consultant(s) not included in partnering process	26	0	5	8	12	1	3.35	0.85
13	Partners unsuitable with specific project	26	2	6	3	8	7	3.46	1.33
14	Dealing with large bureaucratic organization(s)	26	0	4	7	8	7	3.69	1.05
15	Manager's lack of profession knowledge	26	2	3	4	8	9	3.73	1.28
16	Problems with blueprints and regulations	26	0	4	3	15	4	3.73	0.92
17	Lack of experience with partnering approach	26	1	4	8	7	6	3.50	1.14
18	Partners failed to build a trust relationship	26	0	5	4	15	2	3.54	0.90
19	Partners failed to share information	26	0	4	2	17	3	3.73	0.87
20	Unfair sharing of risks or rewards	26	2	2	5	14	3	3.54	1.07

< **Table 5.3** > Response of Vietnamese sector

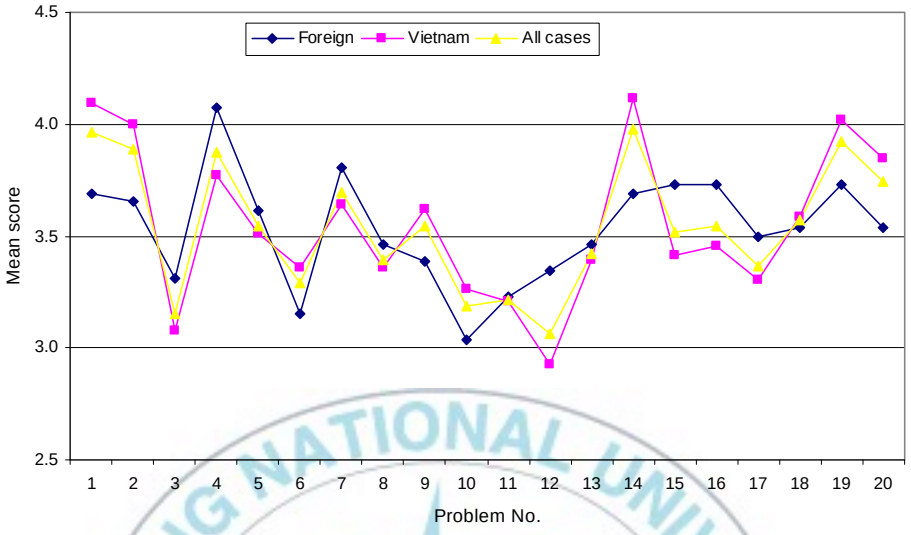
No.	Problems	N	Response					Mean	Std. Dev.
			1	2	3	4	5		
1	Unsolved arguments (ignorance or allowing arguments raising)	53	1	4	4	24	20	4.09	0.97
2	Partner(s) disagree to compromise	53	0	1	8	34	10	4.00	0.65
3	Owner's lack of authority	53	5	18	10	8	12	3.08	1.34
4	Partners' attitudes conceded by commercial pressure	53	0	2	15	29	7	3.77	0.72
5	Lack of training and guidance	53	0	8	15	25	5	3.51	0.87
6	Flexibility restricted by bidding approach	53	0	14	14	17	8	3.36	1.04
7	Lack of continuous, open and honest communication	53	0	12	4	28	9	3.64	1.02
8	Partners' lack of win-win attitude	53	0	13	14	20	6	3.36	0.98
9	Partner(s) with no commitment to cooperation	53	0	11	6	28	8	3.62	0.99
10	Lack of close relationship in partnership	53	2	10	15	24	2	3.26	0.94
11	Key subcontractor(s) not involved in partnering process	53	2	18	6	21	6	3.21	1.15
12	Designer and other consultant(s) not included in partnering process	53	4	21	6	19	3	2.92	1.14
13	Partners unsuitable with specific project	53	2	8	15	23	5	3.40	0.99
14	Dealing with large bureaucratic organization(s)	53	0	0	11	25	17	4.11	0.72
15	Manager's lack of profession knowledge	53	0	11	18	15	9	3.42	1.01
16	Problems with blueprints and regulations	53	2	10	11	22	8	3.45	1.08
17	Lack of experience with partnering approach	53	1	12	10	30	0	3.30	0.89
18	Partners failed to build a trust relationship	53	0	9	8	32	4	3.58	0.86
19	Partners failed to share information	53	0	2	6	34	11	4.02	0.69
20	Unfair sharing of risks or rewards	53	0	6	11	21	15	3.85	0.97

All problems were calculated for their mean scores and ranked according to origins of respondent organizations. The problem having the highest mean score was ranked first, and so forth. Table 5.4 present the ranking results of problems of partnering in construction according to two distinctive groups of

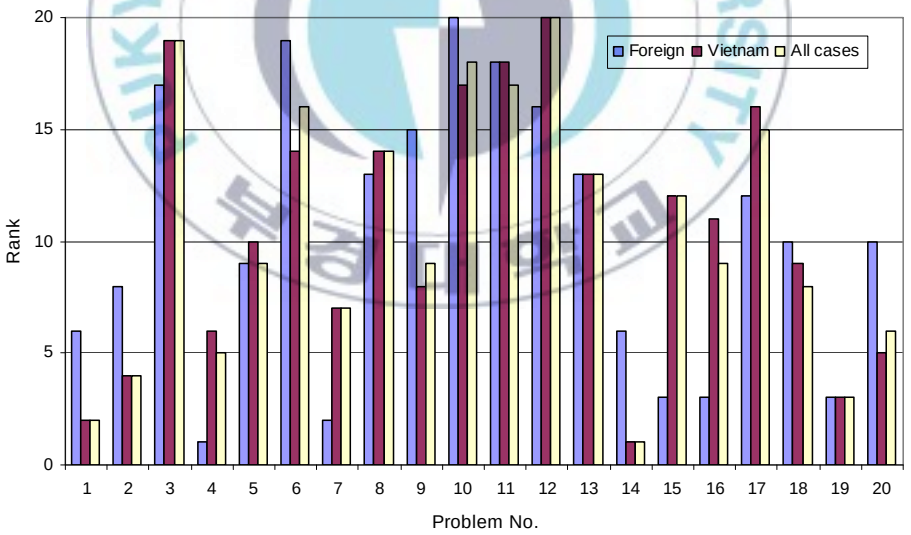
respondents and all respondents. Figure 5.2 and 5.3 shows the mean scores and ranking of foreign sector, Vietnamese sector and all-cases. The closely scattered pattern in Figure 5.2 indicates that, in general, participants in construction partnering in the Vietnamese construction industry exhibit a negative attitude towards problems in partnering execution process.

< **Table 5.4** > Ranking of problems

No.	Problems	Foreign		Vietnam		All cases	
		Mean	Rank	Mean	Rank	Mean	Rank
1	Unsolved arguments (ignorance or allowing arguments raising)	3.69	6	4.09	2	3.96	2
2	Partner(s) disagree to compromise	3.65	8	4.00	4	3.89	4
3	Owner's lack of authority	3.31	17	3.08	19	3.15	19
4	Partners' attitudes conceded by commercial pressure	4.08	1	3.77	6	3.87	5
5	Lack of training and guidance	3.62	9	3.51	10	3.54	9
6	Flexibility restricted by bidding approach	3.15	19	3.36	14	3.29	16
7	Lack of continuous, open and honest communication	3.81	2	3.64	7	3.70	7
8	Partners' lack of win-win attitude	3.46	13	3.36	14	3.39	14
9	Partner(s) with no commitment to cooperation	3.38	15	3.62	8	3.54	9
10	Lack of close relationship in partnership	3.04	20	3.26	17	3.19	18
11	Key subcontractor(s) not involved in partnering process	3.23	18	3.21	18	3.22	17
12	Designer and other consultant(s) not included in partnering process	3.35	16	2.92	20	3.06	20
13	Partners unsuitable with specific project	3.46	13	3.40	13	3.42	13
14	Dealing with large bureaucratic organization(s)	3.69	6	4.11	1	3.97	1
15	Manager's lack of profession knowledge	3.73	3	3.42	12	3.52	12
16	Problems with blueprints and regulations	3.73	3	3.45	11	3.54	9
17	Lack of experience with partnering approach	3.50	12	3.30	16	3.37	15
18	Partners failed to build a trust relationship	3.54	10	3.58	9	3.57	8
19	Partners failed to share information	3.73	3	4.02	3	3.92	3
20	Unfair sharing of risks or rewards	3.54	10	3.85	5	3.75	6



< **Figure 5.2** > Mean score of problem



< **Figure 5.3** > Ranking of problem

The top five problems among two respondent groups are shown in Table 5.5. The foreign sector considers ‘partners' attitudes governed by commercial pressure’ as the first critical problem factor while the Vietnamese sector

places ‘dealing with large bureaucratic organization(s)’ in the first position. A foreign company, in most cases, partners with one or more Vietnamese firms. The pressure on the margins or financial problem of the counterparts embarrasses the foreign partner. Due to commercial pressure, project quality and other priority criteria are not guaranteed. This will possibly damage the foreign companies’ image and prestige in the market. Bureaucracy problem did not only originate from the government departments but even from the partner’s organizations. Dealing with bureaucratic organizations will impede the effectiveness of partnering arrangement (Chan et al, 2003a) but established culture is hard to change (Lazar, 1997).

The second ranked problems by the foreign and Vietnamese companies are ‘lack of continuous, open and honest communication’ and ‘unsolved arguments (ignoring or allowing issues to slide and escalate)’ respectively. Communication is important in project management. Continuous, open and honest communication can solve effectively all difficulties or issues during the partnering implementation. However, communication is an inherent weakness of Vietnamese firms (Le-Hoai et al. 2008). The foreign companies interested in partnering sought the unpleasantness from this problem. Arguments must be solved sufficiently to prevent them from further escalations that possibly ruin the partnership. Bureaucratic working style, inertia force, and incompetence often allow the issues to arise.

‘Manager's lack of profession knowledge’ and ‘problems with blueprints and regulations’ share the third position according to the foreign group. The partnering concept is something new with Vietnamese and sometimes misunderstood by managers. The managers’ role is not only to provide lip service, but also to support the staff to commit to the partnering. This

requires the change of working style and requires the competency of managers. The foreign companies stressed the problems with blueprints and regulations reflect the fact that they have not got familiar with the complexity of regulation system in Vietnam. This problem is a widespread encountered difficulty even with the Vietnamese counterparts.

< Table 5.5 > Top five critical problems

Foreign		Vietnam	
Rank	Problem	Rank	Problem
1	Partners' attitudes governed by commercial pressure	1	Dealing with large bureaucratic organization(s)
2	Lack of continuous, open and honest communication	2	Unsolved arguments (ignoring or allowing arguments rising)
3	Manager's lack of profession knowledge	3	Partners failed to share information
3	Problems with blueprints and regulations	4	Partner(s) disagree to compromise
3	Partners failed to share information	5	Unfair sharing of risks or rewards

The last two positions in top five according to Vietnamese group are ‘partner(s) disagree to compromise’ and ‘unfair sharing of risks or rewards’ correspondingly. The partners’ disagree to compromise their benefits or goals for the common benefits of the partnering. Economic conditions mostly cause the uncompromised. Sharing of risks and rewards presents the equitable relationship between partners. The gain-share/pain-share mechanism can promote the commitment of parties. In Vietnam, the managers rarely keep this mechanism’s effects in mind when pursuing their partnering projects.

Only one of problem indicators ‘partners failed to share information’ appears in the top five in both of the two sectors. Many companies are not willing to share information about their technical know-how with partners because they may jealously guard such proprietary knowledge (Bresnen and

Marshall, 2000). Le-Hoai et al (2008) indicated that information issue between parties caused projects delays and cost overrun. Failure to share information could raise the skepticism, a crack in a collaborative structure.

The other problems out of top five are severely inhibiting the process of partnering implementation in the Vietnamese context. All practitioners concerning this innovating approach should seriously consider these problems to ensure the adequacy of their own business.

Table 5.6 presents the result of Kendall's coefficient of concordance test. Coefficient of concordance (W) for the rankings of problems among foreign companies is 0.098; and among Vietnamese companies is 0.135. The significance levels of these values are both 0.000. It can be concluded that the respondent's rankings within a certain group are related. The response consensus within each group is achieved. This results in the consensus within all-cases group.

< **Table 5.6** > Kendall coefficient of concordance

No.	Problems	Mean rank of Kendall's W test		
		Foreign	Vietnam	All-cases
1	Unsolved arguments (ignorance or allowing arguments raising)	12.04	14.04	13.38
2	Partner(s) disagree to compromise	11.63	12.93	12.51
3	Owner's lack of authority	9.50	8.25	8.66
4	Partners' attitudes conceded by commercial pressure	13.31	11.75	12.27
5	Lack of training and guidance	10.96	10.21	10.46
6	Flexibility restricted by bidding approach	8.04	9.30	8.89
7	Lack of continuous, open and honest communication	12.19	10.89	11.32
8	Partners' lack of win-win attitude	10.10	9.25	9.53
9	Partner(s) with no commitment to cooperation	9.40	11.10	10.54
10	Lack of close relationship in partnership	7.42	9.06	8.52
11	Key subcontractor(s) not involved in partnering process	7.96	8.72	8.47
12	Designer and other consultant(s) not included in partnering process	9.33	7.03	7.78
13	Partners unsuitable with specific project	9.96	9.51	9.66
14	Dealing with large bureaucratic organization(s)	11.69	13.64	13.00
15	Manager's lack of profession knowledge	11.83	9.59	10.33
16	Problems with blueprints and regulations	11.73	9.96	10.54
17	Lack of experience with partnering approach	10.38	8.81	9.33
18	Partners failed to build a trust relationship	10.56	10.69	10.65
19	Partners failed to share information	11.58	12.83	12.42
20	Unfair sharing of risks or rewards	10.38	12.43	11.76
	N	26	53	79
	Kendall's Coefficient (W)	0.098	0.135	0.103
	Chi-square	48.494	135.709	155.057
	Significance	0.000	0.000	0.000

5.2.2 Test the consensus between two sectors

The Spearman rank correlation test is shown in Table 5.7. The computed Spearman rank correlation coefficient (r_S) is 0.701 between foreign and Vietnamese sectors. The level of significance is 0.000. It can be inferred from

this result that there is a strong correlation between two sectors in ranking the problems. Although some locally slightly contrary opinions exist, the degree of correlation is generally even at 70.1%. The correlation between a certain sector and all-cases is also statistically significant.

Since the Spearman rank correlation test does not suggest whether an individual problem is not different across the two respondent groups, the next task will focus on t-test to investigate the aforementioned mention.

< Table 5.7 > Spearman's rank correlation test

		Foreign	Vietnamese	All cases
Foreign	Spearman rho	1.000	0.701*	0.758*
	Sig. level	1.000	0.000	0.000
Vietnamese	Spearman rho	0.701*	1.000	0.987**
	Sig. level	0.050	1.000	0.000
All cases	Spearman rho	0.758*	0.987*	1.000
	Sig. level	0.010	0.010	1.000

Note: *: significant at 1%

In Table 5.8, the Levene's test results are presented. Levene's test was carried out to test the violation of equality of variance assumption. Levene's test resulted in four factors showed the signs of violation at 5% confidence level. These four items are: "Flexibility restricted by bidding approach (p=0.03)", "Designer and other consultant(s) not included in partnering process (p=0.01)", "Partners unsuitable with specific project (p=0.01)", "Dealing with large bureaucratic organization(s) (p=0.01)".

Based on the Levene's test results, t-tests were carried out. The results of t-test showed that the null hypothesis can be accepted at significance level of 5% except for 'Partner(s) disagree to compromise'. This means that, in

general, the differences of opinion about mean rating between the two groups are insignificant. T-test results are also tabulated in Table 5.8.

< **Table 5.8** > Levene's test and t-test results

No.	Problems	Levene's test		T-test	
		F statistic	Sig.	T statistic	Sig.
1	Unsolved arguments (ignorance or allowing arguments raising)	0.43	0.512	-1.71	0.091
2	Partner(s) disagree to compromise	2.91	0.092	-2.12	0.037*
3	Owner's lack of authority	2.25	0.138	0.77	0.446
4	Partners' attitudes conceded by commercial pressure	0.40	0.529	1.69	0.095
5	Lack of training and guidance	0.06	0.810	0.50	0.616
6	Flexibility restricted by bidding approach	5.20	0.025*	-0.97	0.333
7	Lack of continuous, open and honest communication	1.28	0.262	0.70	0.488
8	Partners' lack of win-win attitude	1.90	0.172	0.42	0.679
9	Partner(s) with no commitment to cooperation	0.14	0.713	-0.98	0.328
10	Lack of close relationship in partnership	0.97	0.327	-1.01	0.316
11	Key subcontractor(s) not involved in partnering process	1.82	0.181	0.09	0.931
12	Designer and other consultant(s) not included in partnering process	7.08	0.009**	1.85	0.069
13	Partners unsuitable with specific project	6.22	0.015*	0.22	0.826
14	Dealing with large bureaucratic organization(s)	8.35	0.005**	-1.84	0.074
15	Manager's lack of profession knowledge	1.61	0.208	1.19	0.236
16	Problems with blueprints and regulations	2.66	0.107	1.12	0.265
17	Lack of experience with partnering approach	2.38	0.127	0.85	0.400
18	Partners failed to build a trust relationship	0.14	0.709	-0.22	0.826
19	Partners failed to share information	3.10	0.082	-1.59	0.116
20	Unfair sharing of risks or rewards	0.19	0.661	-1.30	0.199

Note: **: significant at 0.01; *: significant at 0.05

In next section, factor analysis technique was applied. Due to good statistical agreement between two sectors in both ranking and mean rating

about problems available in partnering projects in Vietnam, all data could be used as a whole for further analysis.

5.3 Factor analysis

5.3.1 Factor analysis application

The correlation matrix is calculated and presented in Table 5.9. There are many correlation coefficients significant at level of 0.05. There are sufficient correlations in data matrix to justify that the application of factor analysis is possible.

< **Table 5.9** > Correlation matrix

Success factor	Success factor													
	1	2	3	4	5	6	7	8	..	..	25	26	27	28
1	1.00	**0.60**	**0.52**	0.10	**0.33**	0.03	0.14	**0.58**	..	..	**0.45**	**0.37**	0.06	**0.50**
2	**0.60**	1.00	**0.40**	0.07	0.21	-0.01	0.17	**0.40**	..	..	**0.42**	**0.47**	**0.32**	**0.43**
3	**0.52**	**0.40**	1.00	**0.26**	**0.39**	**0.53**	**0.39**	**0.56**	..	..	**0.43**	**0.39**	0.12	**0.41**
4	0.10	0.07	**0.26**	1.00	-0.09	0.19	-0.05	0.00	..	..	0.06	-0.20	-0.15	0.13
5	**0.33**	0.21	**0.39**	-0.09	1.00	**0.25**	**0.37**	**0.57**			**0.47**	**0.65**	0.18	**0.42**
6	0.03	-0.01	**0.53**	0.19	**0.25**	1.00	**0.42**	**0.26**			**0.36**	**0.24**	0.20	**0.37**
7	0.14	0.17	**0.39**	-0.05	**0.37**	**0.42**	1.00	**0.44**			**0.33**	**0.47**	**0.54**	**0.54**
8	**0.58**	**0.40**	**0.56**	0.00	**0.57**	**0.26**	**0.44**	1.00			**0.58**	**0.62**	**0.33**	**0.52**
..	..	..							..	..			..	..
..	..	..							..	..			..	..
25	**0.45**	**0.42**	**0.43**	0.06	**0.47**	**0.36**	**0.33**	**0.58**			1.00	**0.49**	0.18	**0.59**
26	**0.37**	**0.47**	**0.39**	-0.20	**0.65**	**0.24**	**0.47**	**0.62**			**0.49**	1.00	**0.30**	**0.43**
27	0.06	**0.32**	0.12	-0.15	0.18	0.20	**0.54**	**0.33**	..	..	0.18	**0.30**	1.00	**0.44**
28	**0.50**	**0.43**	**0.41**	0.13	**0.42**	**0.37**	**0.54**	**0.52**	..	..	**0.59**	**0.43**	**0.44**	1.00

Note: Value in bold is significant at 0.05

This section presents factor analysis application to analyze latent relationships between problems. All communality values of problems are more than 0.5. Thus, all twenty problems are appropriate for factor analysis.

Table 5.10 depicts the KMO and Bartlett's test results. In this table, Bartlett's test of sphericity having significance level at 0.000 with chi-square value of 840.478 indicates that the correlation matrix is not an identity matrix. Kaiser-Meyer-Olkin measure of sampling adequacy is satisfactory with the value of 0.572. All these parameters justify that the factor analysis is applicable.

< **Table 5.10** > KMO and Bartlett's test results

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.572
Bartlett's Test of Sphericity	Approx. Chi-Square	840.478
	df	190
	Sig.	0.000

The communalities of all problems included in factor model are greater than 0.5 to signify the reliability of the model. The communalities are presented in Table 5.11.

< **Table 5.11** > Communalities

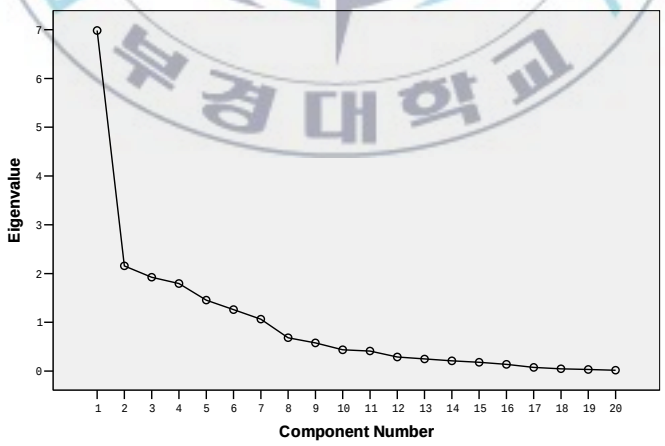
No.	Problems	Initial	Extraction
1	Unsolved arguments (ignorance or allowing arguments raising)	1	0.837
2	Partner(s) disagree to compromise	1	0.904
3	Owner's lack of authority	1	0.955
4	Partners' attitudes conceded by commercial pressure	1	0.852
5	Lack of training and guidance	1	0.810
6	Flexibility restricted by bidding approach	1	0.844
7	Lack of continuous, open and honest communication	1	0.668
8	Partners' lack of win-win attitude	1	0.786
9	Partner(s) with no commitment to cooperation	1	0.852
10	Lack of close relationship in partnership	1	0.900
11	Key subcontractor(s) not involved in partnering process	1	0.880
12	Designer and other consultant(s) not included in partnering process	1	0.888
13	Partners unsuitable with specific project	1	0.760
14	Dealing with large bureaucratic organization(s)	1	0.834
15	Manager's lack of profession knowledge	1	0.838
16	Problems with blueprints and regulations	1	0.790
17	Lack of experience with partnering approach	1	0.778
18	Partners failed to build a trust relationship	1	0.866
19	Partners failed to share information	1	0.831
20	Unfair sharing of risks or rewards	1	0.772
	Extraction Method: Principal Component Analysis.		

According to latent root criterion, seven components, with eigenvalues higher than 1, could be extracted. Figure 5.3 is the scree plot of twenty items analyzed. Table 5.12 presents total variance explained results. In this table, eigenvalues of components, and variance explained before and after varimax rotation are included. With seven extracted components, the total amount of variance explained is 83.22%. The remaining variance that could not be explained by seven components only accounts for 16.78%.

Table 5.13 presents the un-rotated component matrix of factor analysis technique. However, to examine the underlying relationships (grouping) between problems, the rotated factor loadings are employed.

< **Table 5.12** > Total variance explained

Comp.	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumul. %	Total	% of Variance	Cumul. %	Total	% of Variance	Cumul. %
1	6.98	34.92	34.92	6.98	34.92	34.92	3.26	16.31	16.31
2	2.16	10.79	45.71	2.16	10.79	45.71	3.16	15.80	32.11
3	1.92	9.62	55.33	1.92	9.62	55.33	2.57	12.85	44.95
4	1.80	8.98	64.31	1.80	8.98	64.31	2.31	11.55	56.50
5	1.46	7.28	71.59	1.46	7.28	71.59	1.93	9.63	66.13
6	1.26	6.31	77.89	1.26	6.31	77.89	1.92	9.59	75.72
7	1.07	5.33	83.22	1.07	5.33	83.22	1.50	7.50	83.22
8	0.68	3.42	86.64						
9	0.58	2.89	89.53						
10	0.44	2.19	91.72						
…	…	…	…						



< **Figure 5.3** > Scree plot

< **Table 5.13** > Un-rotated component matrix

No.	Problems	Component						
		1	2	3	4	5	6	7
1	Unsolved arguments (ignorance or allowing arguments raising)	0.55	0.43	-0.33	0.25	-0.31	0.05	-0.28
2	Partner(s) disagree to compromise	0.29	0.31	-0.10	0.51	-0.23	0.49	0.40
3	Owner's lack of authority	0.80	-0.15	-0.06	-0.13	-0.45	0.25	-0.05
4	Partners' attitudes conceded by commercial pressure	0.25	0.27	0.45	-0.43	-0.47	0.11	0.31
5	Lack of training and guidance	0.53	-0.26	-0.40	0.15	0.04	-0.43	0.30
6	Flexibility restricted by bidding approach	0.56	-0.25	0.16	-0.60	-0.14	-0.19	0.19
7	Lack of continuous, open and honest communication	0.54	-0.43	0.36	0.11	0.13	-0.15	-0.08
8	Partners' lack of win-win attitude	0.84	0.11	-0.18	0.14	0.05	-0.05	-0.13
9	Partner(s) with no commitment to cooperation	0.62	0.56	0.17	-0.22	0.20	-0.18	-0.01
10	Lack of close relationship in partnership	0.51	0.60	0.02	-0.13	0.51	0.07	0.00
11	Key subcontractor(s) not involved in partnering process	0.41	-0.33	-0.24	-0.44	0.34	0.44	0.20
12	Designer and other consultant(s) not included in partnering process	0.71	-0.06	-0.26	-0.36	0.07	0.37	-0.21
13	Partners unsuitable with specific project	0.65	-0.02	0.13	0.32	-0.04	0.15	-0.44
14	Dealing with large bureaucratic organization(s)	0.41	-0.15	0.65	0.45	-0.05	-0.06	0.11
15	Manager's lack of profession knowledge	0.73	-0.42	0.00	0.17	-0.30	-0.01	0.14
16	Problems with blueprints and regulations	0.69	-0.31	0.00	-0.18	-0.06	-0.18	-0.38
17	Lack of experience with partnering approach	0.74	0.36	-0.12	0.01	0.04	-0.17	0.22
18	Partners failed to build a trust relationship	0.54	-0.32	-0.44	0.31	0.32	-0.06	0.27
19	Partners failed to share information	0.23	-0.25	0.57	0.16	0.45	0.40	0.02
20	Unfair sharing of risks or rewards	0.69	0.31	0.33	0.04	0.12	-0.26	0.07
	Extraction Method: Principal Component Analysis. 7 components extracted.							

Table 5.14 presents the grouping results. Loadings in the table are rotated loadings after seven iterations. The seven extracted components are named as follows:

- Component 1: **Unsuitability of partnering application**
- Component 2: **Lack of commitment to partnering**
- Component 3: **Unfamiliarity with partnering concept**
- Component 4: **Poor communication between partners**
- Component 5: **Lack of key stakeholders' involvement**
- Component 6: **External constraint issues**
- Component 7: **Failure to compromise**

The seven components cover various aspects that hindered the application of partnering concept in the Vietnamese construction industry. The most important is the unsuitability of applying partnering concept for project. Lack of commitment to partnership is the second highly ranked problem. Unfamiliarity with partnering concept, poor communication and lack of key stakeholders' involvement in partnering process also cause difficulties for partnering projects. External constraints also raise problems in the Vietnamese context. Reaching compromise is necessary for successful partnership. In Vietnam, this factor is a weakness and has been hindering partnering success.

< **Table 5.14** > Factor analysis results

Component	Loading	Eigenvalue	Variance explained (%)
Component 1 – Unsuitability of partnering application		**6.983**	**34.917**
Partners unsuitable with specific project	0.73		
Poor attitude of client's authority	0.72		
Unsolved arguments (ignoring or allowing issues to slide and escalate)	0.72		
Problems with blueprints and regulations	0.63		
Partners' lack of win-win attitude	0.60		
Component 2 – Lack of commitment to partnering		**2.158**	**10.791**
Lack of close relationship in partnership	0.90		
Partner(s) with no commitment to cooperation	0.87		
Unfair sharing of risks or rewards	0.70		
Lack of experience with partnering approach	0.67		
Component 3 – Unfamiliarity with partnering concept		**1.924**	**9.621**
Lack of training and guidance	0.87		
Partners failed to build a trust relationship	0.79		
Manager's lack of profession knowledge	0.56		
Component 4 – Poor communication between partners		**1.795**	**8.976**
Partners failed to share information	0.82		
Dealing with large bureaucratic organization(s)	0.80		
Lack of continuous, open and honest communication	0.64		
Component 5 – Lack of key stakeholders' involvement		**1.456**	**7.280**
Key subcontractor(s) not involved in partnering process	0.91		
Designer and other consultant(s) not included in partnering process	0.67		
Component 6 – External constraint issues		**1.261**	**6.307**
Partners' attitudes governed by commercial pressure	0.86		
Flexibility restricted by bidding approach	0.68		
Component 7 – Failure to compromise		**1.065**	**5.327**
Partner(s) disagree to compromise	0.92		
Cumulative variance explained			**83.22**

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
Rotation converged in 7 iterations.

5.3.2 Discussion on factor analysis result

5.3.2.1 Unsuitability of partnering application

This component has explained a variance of 34.92%. It comprises of five problems like *partners unsuitable for specific project; poor attitude of client authority; unsolved arguments (ignoring or allowing issues to slide and escalate); problems with blueprints and regulations;* and *partners' lack of win-win attitude*. Since partnering is to employ and maximize each participant's resources or strength to achieve project goal, having a partner who is unsuitable to project characteristics may endanger partnership and project the implementation process. Partnering requires changing traditional relationships (Chan et al., 2003) so the poor attitude of client authority makes the other parties, such as contractors, lack confidence in current working relation. The other problem was the inadequate behaviour towards argument arising during the process. If any argument is not properly addressed it can escalate and break up the partnership. It is necessary that all related-works in a partnering must be communicated to and reviewed by all partners. Partners should aim at win-win attitude. Problems with blueprints and regulations are common thus they need to be taken care of. The owner and slave attitude spoils partnering as well.

5.3.2.2 Lack of commitment to partnering

The second component has explained 10.79% of the total variance of problems. Attributes of this component focus on the deficient commitment to partnering. *Close relationship* not being established in a partnership deterred parties to express opinions in an integrating culture. Participants felt that they did not work for a partnering organization but they worked for their original

organizations as representatives. After all, *partners had no commitment to this cooperation* mission. Participants did not think about common objectives. The two possible reasons for this are *unfair sharing of risks or rewards* and *lack of experience with the partnering approach*.

5.3.2.3 Unfamiliarity with partnering concept

This component consists of three problems regarding the unfamiliarity in practicing the partnering concept. 9.62% of variance is explained by this component. Adopting the partnering form requires the adaptation of new techniques and concepts. Training and guidance works are necessary for personnel to become familiar with this new working style and environment. *Lack of training and guidance* provokes a possibility of collapse of multilateral organization. Mutual trust is a fundamental issue for inter-firm like partnering projects (Lui and Ngo, 2004). *Failing to build a trust relationship* in any alliance affects its outcomes. To achieve a successful partnering project, imprint of managerial related contribution is significant. Incompetent leaders will ruin even a complete mechanism. Problem with *manager's lack of knowledge* about driving partnering project should be given serious attention.

5.3.2.4 Poor communication between partners

Communication is an important concern not only in partnering projects but in all types of projects. In this paper, component, namely poor communication which accounts for 8.97% of variance, consists of three items such as *partners failed to share information; dealing with large bureaucratic organization(s);* and *lack of continuous, open and honest communication*. It is essential for a partnering approach that parties are encouraged to change

behavior and attitudes in developing a working culture. Skepticism should be excluded thanks to continuous, open and honest communication. Moreover, timely sharing of information helps to resolve any conflict effectively. Dealing with large bureaucratic organizations will impede the project partnering arrangement in terms of their ability to form open and honest working relationships (Ng et al, 2002).

5.3.2.5 Lack of key stakeholders' involvement

This component is named 'lack of key stakeholders' involvement' because it consists of two problems related to exclusion of relevant parties during the partnering process. These two problems are *key subcontractor(s) not involved in partnering process* and *designer and other consultant(s) not included in partnering process*. Partnering does not only exist between owners and contractors but also involves many parties such as subcontractors, consultants, suppliers, designers etc. (Chan et al 2003). They are likely to embrace the partnering philosophy as a much more productive and profitable way of doing business than the adversarial approach (Love, 1997). Moreover, stakeholders' commitment could be reduced due to the lack of involvement of relevant subcontractors in the partnering process (Ng et al, 2002). This component explained 7.28% of the variance.

5.3.2.6 External constraint issues

This component consists of *partners' attitudes governed by commercial pressure* and *flexibility restricted by bidding approach* which explains 6.30% of the variance. Commercial pressure affects the attitudes of counterparts in a partnership, mostly their commitment. According to Ng et al (2002), reduction of contractor's commitment to project could originate from the

client's implementation of the competitive tendering approach, which in turns puts pressure on the margins of contractors. Chan et al (2003) suggested that project stakeholders need to reach a balance between commercial interests and partnering attitudes. Partnering process is an innovative arrangement that differs much from traditional delivery methods. Choosing a wrong bidding approach to apply for partnering restricts the advantages of this concept.

5.3.2.7 Failure to compromise

This component contains only one problem related to compromise. The amount of variance explained by this component is 5.32%. Partners' failure to compromise possibly breaks mutual trust based relationship. The commitment to partnering weakens. As reported by Ng et al (2002), the unwillingness of client to compromise its financially detrimental administrative procedures to achieve increased commitment from the contractor should be perceived as a lack of commitment to project partnering.

5.4 Chapter recommendations

To attain a successful partnering and take advantages of this type of arrangement, it is necessary for practitioners in the Vietnamese construction industry to pay attention to the following recommendations:

- **Ensure the application of partnering is suitable**: Partners in the partnership should be suitable with project characteristics. All partners should develop proper attitudes with the partnering, of which the win-win attitude is the most important. Any argument should be sufficiently resolved. It is not a waste of time to focus on problems with blueprints and regulations.

- **Commit fully to the partnering**: Partners must commit to the built partnership. The commitment is developed through making a close relationship and ensuring a fair sharing of risks/rewards. Inadequate commitment can result from the inexperience of partners.

- **Ensure familiarity with partnering arrangement**: Training and guidance must be provided for participants in partnership. Managers must have professional knowledge, particularly about the partnering philosophy. Mutual trust is a key determinant of successful partnering so partners must successfully build a trust relationship in this multilateral organization type.

- **Ensure good communication in partnership**: Effective communication channels should be setup to be certain of continuous, open and honest communication. Complaints about communication must be minimized. All partners should feel free to share information.

- **Ensure key stakeholders included in partnering**: Key designers, consultants and subcontractors must be involved in partnering process to improve relationships and reduce technical problems.

- **Reduce influences of external issues**: Partners need to balance between their commercial interests and partnering attitudes. It is essential to select an appropriate bidding approach that does not restrict the flexibility of partnering arrangement.

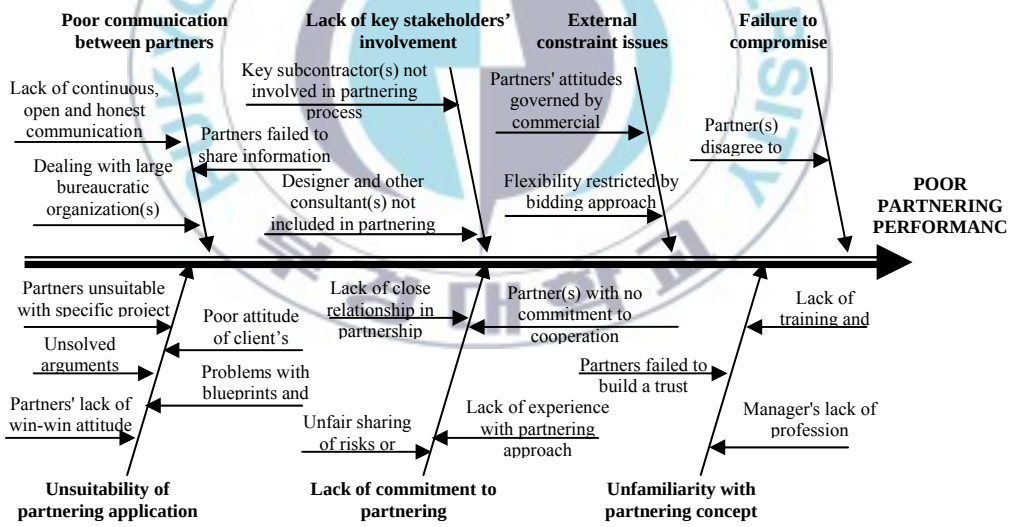
- **Compromise**: All partners perceive that compromise helps to derive solutions to problems and help to build the commitment in partners. They must compromise their needs and goals in the partnership.

5.5 Chapter conclusion

Partnering has become a promising arrangement for construction practitioners in Vietnam. However, many difficulties have emerged during the implementation process. The potential problems being addressed will increase the probability of attaining a success partnership. In this chapter, the potential difficulties were investigated through a questionnaire survey of the opinions of foreign and local construction organizations. *Partners' attitudes governed by commercial pressure* was the most concerned problem with foreign organizations while *dealing with large bureaucratic organization(s)* was the most severe problem of local practitioners. The study indicated that the perceptions of the two groups were not statistically different in both ranking and rating mean scores of issues. It meant that both foreign and Vietnamese sectors faced the similar contexts when practising the partnering arrangement in the Vietnamese construction market. It is simpler for the participants to take care of a unique list of issues, regardless of their partner's origin.

Further analysis with factor analysis technique pointed out seven underlying dimensions of problems existing in the partnering process. The seven dimensions are: *unsuitability of partnering application; lack of commitment to partnering; unfamiliarity with the partnering concept; poor communication between partners; lack of key stakeholders' involvement;*

external constraint issues; and *failure to compromise*. Such entities covered a wide range of difficulties when practicing this new concept. Figure 5.4 presents the fishbone diagram of problematic factors in Vietnamese construction partnering context. The research results indicated that the partnering concept is a quite new procurement method in Vietnam. More attention should be paid to the training and education tasks for both managers and personnel. It can be also concluded that the construction practitioners should adapt the partnering approach through changing behavior or attitude to openness, trust, communication, compromise, and commitment. Cultural change is needed serves merely to flag up what is in fact a range of issues and problems (Bresnen and Marshall, 2000).



< Figure 5.4 > Fishbone diagram of problems in partnering implementation in Vietnam

The results from this study should help practitioners in the Vietnamese market to comprehend the problems existing while executing a partnering.

Through clear understanding about potential problems, it is hoped that partnering arrangement will be propagated to employ its advantages. By concentrating on the identified potential problems reported in this paper, the professionals are likely to mitigate the effects of these problems on their current or future partnership. It is also a chance for managers to review their organizations' capability of employing the new concept.

To more actively introduce partnering arrangement to Vietnamese construction participants; it is necessary that researches about success factors should be conducted. This type of research will be presented in the next chapter. A partnering mechanism fit to the Vietnam conditions should be explored as well. The research and development task should be paid more attention to in the construction industry in Vietnam.

CHAPTER 6

SUCCESS FACTORS FOR CONSTRUCTION PARTNERING

6.1 Introduction

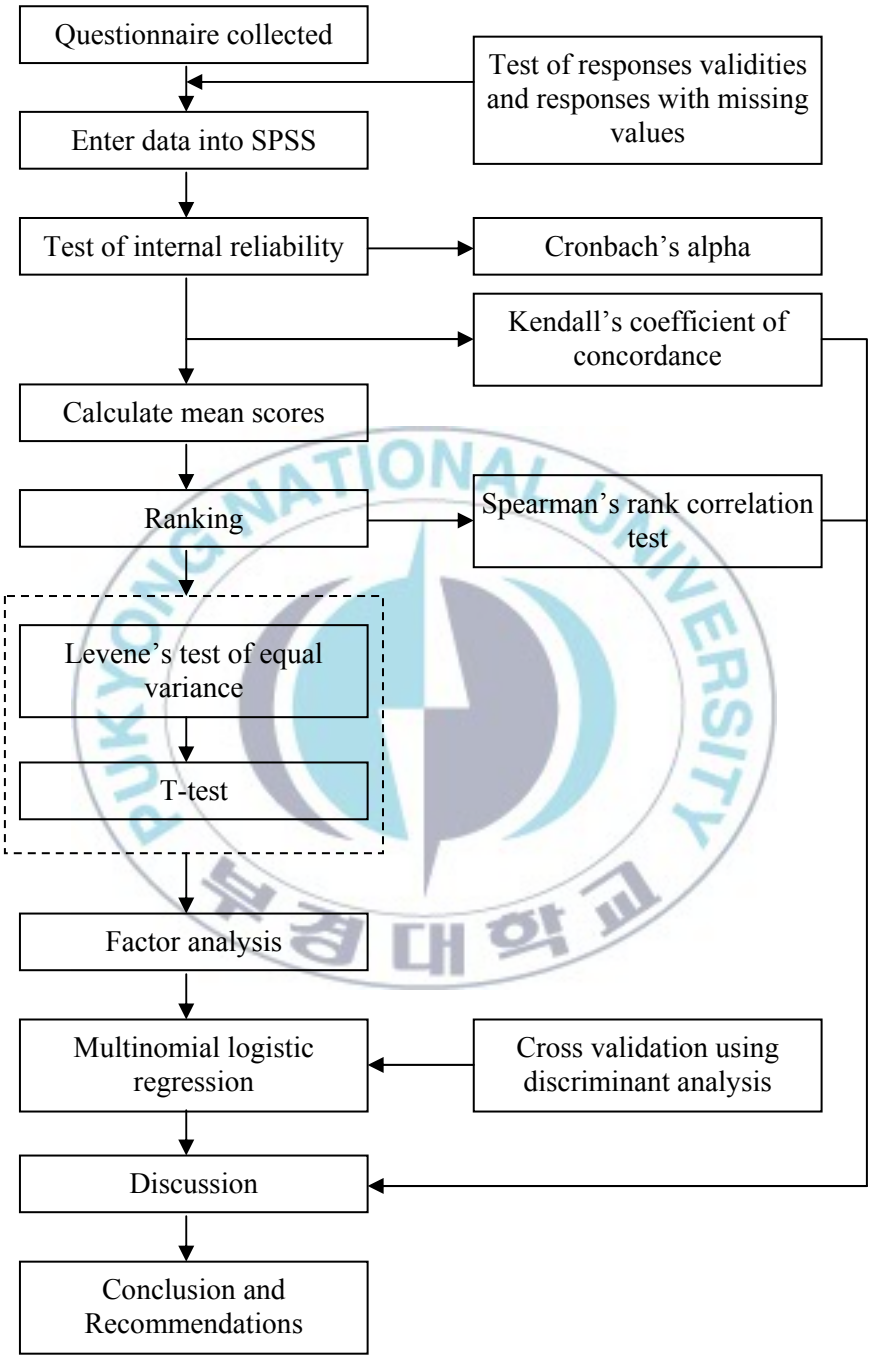
Some inherent difficulties of construction projects that come from characteristics of construction industry such as adversarial relationships between parties create an unfavorable environment which could jeopardize the success of projects. In the world, in the late 1980s partnering emerged as a new project delivery method which seeks to create a win/win attitude between parties (Tang et al, 2006). Partnering is a concept which provides a framework for the establishment of mutual objectives among the building team with an attempt to reach an agreed dispute resolution procedure as well as encouraging the principle of continuous improvement (Naoum, 2003). Thus partnering in construction project provides a trust based environment to encourage participants in project to maximize their contributions to obtain a successful project.

Through addressing critical success factors (CSF) the strategy could be established to enhance project performance (Toor and Ogunlana, 2008). Critical success factors are those few things that must go well to ensure success for a manager or an organization thus they represent those managerial or enterprise areas that must be given special and continual attention to bring about high performance. And CSFs include issues vital to an organization's

current operating activities and to its future success (Boynton and Zmud, 1984). Firms that understand, manage and exploit underlying differences in perception of success factors stand well to 'benefit from being able to devise better strategies that aim at improving resource use, project delivery processes and productivity which in turn enables them to compete more effectively in the market' (Toor and Ogunlana, 2008; Phua, 2004).

In Vietnam, partnering has been widely applied from late 1990s and 2000s. Though partnering is common in practice, there is little effort in literature to provide prescriptions for its application. Because the researches related to CSFs are meaningful, it is necessary to address the CSFs. This chapter pays attention to success factors of partnering implementation in construction projects in Vietnamese context. Successfully address the critical success factors, it is hoped that the strategy performance of partnering in Vietnam would improve. Furthermore, after CSFs of partnering are identified, a model will be developed using multiple logistic regression technique. The model can serve as a tool to help the practitioners in developing, adjusting and improving their strategy to enhance the performance.

This section presents the introduction of this chapter. The next section will be devoted to the literature review of researches about success factors either in the partnering field or in general construction field. Descriptive analysis of the CSFs will be presented in section 2. Factor analysis technique is applied to uncover the underlying dimensions of CSFs and presented in section 3. Multiple logistic regression application will be shown in section 4. The last two sections will present the chapter recommendations and conclusion. Figure 6.1 portrays the process of research in this chapter.



< **Figure 6.1** > Flowchart of chapter research process

6.2 Descriptive analysis

6.2.1 Mean score and ranking

After pilot test, twenty eight factors are considered as potential requirements that should be met for the successful partnering implementation in Vietnam context. Data from 79 valid returned questionnaires were inputted into SPSS, statistical software used to process the data.

As usual, the reliability of questionnaire's scale must be tested through the employment of Cronbach's alpha coefficient. The tests yielded Cronbach's alpha coefficient of internal consistency values of 0.887, 0.899 and 0.899, which are considered to be reliable, for foreign, Vietnamese and all-cases respectively (see Table 6.1).

< **Table 6.1** > Reliability Statistics

	N of Items	Cronbach's Alpha
Foreign	28	0.887
Vietnam	28	0.899
All cases	28	0.899

Table 6.2 shows the distribution of votes and the means and standard deviations of the score ratings of success factors of partnering application respected to foreign sector. On the view of this sector, 'Financial security' has the highest mean score of 4.346. Many factors have mean score ratings above 4. These factors are 'Commitment from top management', 'Mutual trust between parties', 'Adequate resources', 'Effective communication', 'Clear understanding about scope and objectives', 'Effective conflict resolution process', 'Long-term commitment', 'Empowerment of

stakeholders', 'Commitment to quality', 'Technical expertise', 'Dedicated team', and 'Flexibility to change'. The other factors have mean score ratings above 3. The distributions of responses on rating explain for the mean score values. Most respondents rate their answer on the levels 3, 4 and 5; in which level 4 is mostly focused. The foreign partners feel that many factors are important for their successful partnership.

Table 6.3 shows the rating frequency of success factors with respect to Vietnamese sector. Similar to previous sector, 'Financial security' has the highest mean score (4.566) out of twenty eight factors. The number of factors in this group, having mean score ratings above 4, is less than the number in foreign sector group. Six factors have mean score ratings above 4. Except for 'Financial security', these factors are 'Mutual trust between parties', 'Effective communication', 'Adequate resources', 'Commitment from top management', 'Clear understanding about scope and objectives'. Only one factor has the mean score below 3 that is 'Good cultural fit'. Distributions of responses of success factors which have mean score above 4 are much skewed to level number 4 and 5. With the other factors (mean score less than 4), distribution of response on rating level number 2 is rather crowded. The peaks of distributions are around 3 and 4. This explains that, except for the four highest rated factors, the ratings in this group are less critical than in the foreign sector group.

Table 6.4 shows the rating frequency of success factors with respect to all respondents. The distributions are right skewed. Most of the peaks are at level 4.

< **Table 6.2** > Summary of responses from foreign sector on significance index of CSFs

No.	Success factors	N	Rating frequency					Mean	Std. Dev.
			1	2	3	4	5		
1	Mutual trust between parties	26	0	1	3	14	8	4.115	0.766
2	Effective communication	26	0	1	5	9	11	4.154	0.881
3	Adequate resources	26	0	1	5	13	7	4.000	0.800
4	Long-term commitment	26	0	0	6	13	7	4.038	0.720
5	Commitment from top management	26	0	1	3	12	10	4.192	0.801
6	Clear understanding about scope and objectives	26	0	0	6	10	10	4.154	0.784
7	Early implementation of the partnering process	26	2	2	7	12	3	3.462	1.067
8	Commitment to continuous improvement	26	0	0	10	10	6	3.846	0.784
9	Acting consistent with objectives	26	0	2	2	18	4	3.923	0.744
10	Dedicated team	26	0	0	7	10	9	4.077	0.796
11	Flexibility to change	26	0	0	4	17	5	4.038	0.599
12	Commitment to quality	26	0	0	7	8	11	4.154	0.834
13	Total cost perspective	26	0	3	6	10	7	3.808	0.981
14	Good cultural fit	26	0	0	4	15	7	3.115	0.653
15	Company wide acceptance about the partnering	26	1	2	12	10	1	3.308	0.838
16	Technical expertise	26	1	0	4	12	9	4.077	0.935
17	Financial security	26	0	0	2	13	11	4.346	0.629
18	Questioning attitude about assumptions	26	0	2	4	14	6	3.923	0.845
19	Empowerment of stakeholders	26	0	0	8	6	12	4.154	0.881
20	Creativity of partnering team	26	0	0	10	12	4	3.769	0.710
21	Equity	26	0	2	4	13	7	3.962	0.871
22	Mutual vision, goals/objectives	26	0	1	8	12	5	3.808	0.801
23	Effective conflict resolution process	26	0	0	6	10	10	4.154	0.784
24	Educated and trained personnel for partnering	26	0	2	3	16	5	3.923	0.796
25	Effective coordination	26	0	0	6	15	5	3.962	0.662
26	Adequate partnering team building	26	0	2	6	9	9	3.962	0.958
27	Partnering experience	26	0	0	12	9	5	3.731	0.778
28	Joint problem solving	26	0	0	6	18	2	3.846	0.543

< **Table 6.3** > Summary of responses from Vietnamese sector on significance index of CSFs

No.	Success factors	N	Rating frequency					Mean	Std. Dev.
			1	2	3	4	5		
1	Mutual trust between parties	53	0	1	4	24	24	4.340	0.706
2	Effective communication	53	0	1	11	22	19	4.113	0.800
3	Adequate resources	53	2	2	5	11	33	4.340	1.055
4	Long-term commitment	53	0	4	12	28	9	3.792	0.817
5	Commitment from top management	53	0	1	7	16	29	4.377	0.790
6	Clear understanding about scope and objectives	53	0	3	10	23	17	4.019	0.866
7	Early implementation of the partnering process	53	2	10	19	15	7	3.283	1.045
8	Commitment to continuous improvement	53	0	12	14	20	7	3.415	0.989
9	Acting consistent with objectives	53	0	4	16	27	6	3.660	0.783
10	Dedicated team	53	0	10	5	28	10	3.717	0.988
11	Flexibility to change	53	2	3	17	26	5	3.547	0.889
12	Commitment to quality	53	0	7	15	17	4	3.717	1.007
13	Total cost perspective	53	0	20	13	13	7	3.132	1.075
14	Good cultural fit	53	4	14	17	16	2	2.962	1.018
15	Company wide acceptance about the partnering	53	1	12	17	18	5	3.264	0.984
16	Technical expertise	53	1	4	10	31	7	3.736	0.858
17	Financial security	53	0	0	6	11	36	4.566	0.694
18	Questioning attitude about assumptions	53	0	8	18	21	6	3.472	0.890
19	Empowerment of stakeholders	53	0	6	13	23	11	3.736	0.923
20	Creativity of partnering team	53	1	11	21	14	6	3.245	0.979
21	Equity	53	0	4	13	26	10	3.792	0.840
22	Mutual vision, goals/objectives	53	2	5	13	23	10	3.642	1.021
23	Effective conflict resolution process	53	0	5	10	31	7	3.755	0.806
24	Educated and trained personnel for partnering	53	0	4	20	24	5	3.566	0.772
25	Effective coordination	53	0	4	17	27	5	3.623	0.765
26	Adequate partnering team building	53	0	10	12	20	11	3.604	1.025
27	Partnering experience	53	1	7	20	19	6	3.415	0.929
28	Joint problem solving	53	0	4	10	29	10	3.849	0.818

< **Table 6.4** > Summary of responses on significance index of CSFs – All respondents

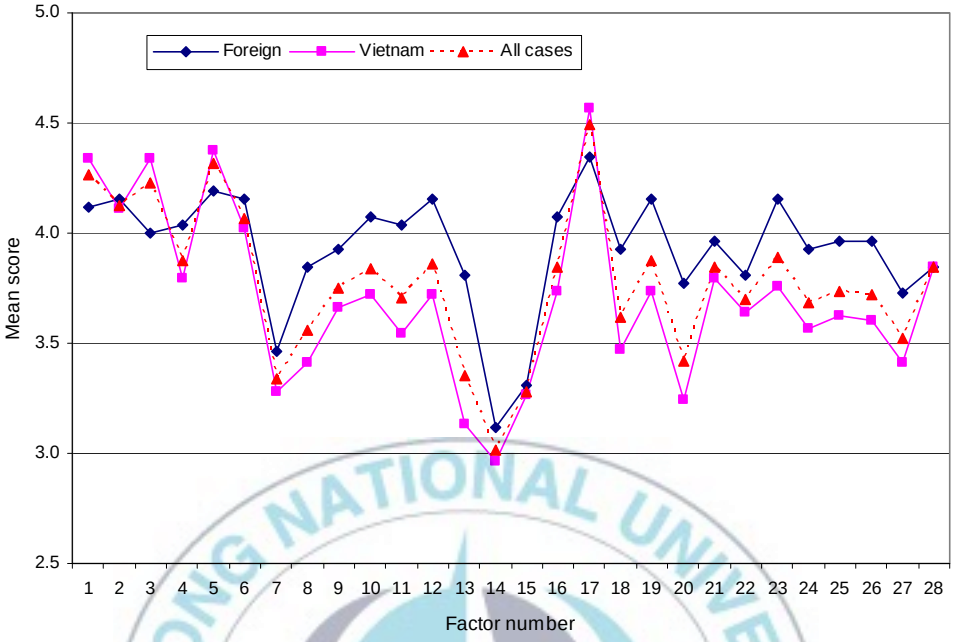
No.	Success factors	N	Rating frequency					Mean	Std. Dev.
			1	2	3	4	5		
1	Mutual trust between parties	79	0	2	7	38	32	4.266	0.729
2	Effective communication	79	0	2	16	31	30	4.127	0.822
3	Adequate resources	79	2	3	10	24	40	4.228	0.986
4	Long-term commitment	79	0	4	18	41	16	3.873	0.790
5	Commitment from top management	79	0	2	10	28	39	4.316	0.793
6	Clear understanding about scope and objectives	79	0	3	16	33	27	4.063	0.837
7	Early implementation of the partnering process	79	4	12	26	27	10	3.342	1.049
8	Commitment to continuous improvement	79	0	12	24	30	13	3.557	0.944
9	Acting consistent with objectives	79	0	6	18	45	10	3.747	0.776
10	Dedicated team	79	0	10	12	38	19	3.835	0.940
11	Flexibility to change	79	2	3	21	43	10	3.709	0.834
12	Commitment to quality	79	0	7	22	25	15	3.861	0.971
13	Total cost perspective	79	0	23	19	23	14	3.354	1.086
14	Good cultural fit	79	4	14	21	31	9	3.013	0.913
15	Company wide acceptance about the partnering	79	2	14	29	28	6	3.278	0.933
16	Technical expertise	79	2	4	14	43	16	3.848	0.893
17	Financial security	79	0	0	8	24	47	4.494	0.677
18	Questioning attitude about assumptions	79	0	10	22	35	12	3.620	0.896
19	Empowerment of stakeholders	79	0	6	21	29	23	3.873	0.925
20	Creativity of partnering team	79	1	11	31	26	10	3.418	0.928
21	Equity	79	0	6	17	39	17	3.848	0.849
22	Mutual vision, goals/objectives	79	2	6	21	35	15	3.696	0.952
23	Effective conflict resolution process	79	0	5	16	41	17	3.886	0.816
24	Educated and trained personnel for partnering	79	0	6	23	40	10	3.684	0.793
25	Effective coordination	79	0	4	23	42	10	3.734	0.746
26	Adequate partnering team building	79	0	12	18	29	20	3.722	1.012
27	Partnering experience	79	1	7	32	28	11	3.519	0.890
28	Joint problem solving	79	0	4	16	47	12	3.848	0.735

Table 6.5 tabulates the detailed rankings from two distinct sectors. This table also shows the rankings of overall respondents. The order of factors is the descending ranking order of all-case. The two highest rated factors are similar between two sectors, namely ‘Financial security’ and ‘Commitment from top management’. The CSFs ranked from first to sixth in Vietnam group are indifferent from the top six CSFs in all-cases. The factors which have most different rankings between two groups are in the range from third to eighteen positions based on the all-cases ranking. Factors ranked from nineteen to last have slight difference in ranking between foreign and Vietnamese sectors. ‘Good cultural fit’ is ranked last by both groups. It means that the most and the least important factors are apparent in the context. The different cultures make the different perceptions about intermediate factors. It is necessary to further test the correlation between ranking orders of two sectors.

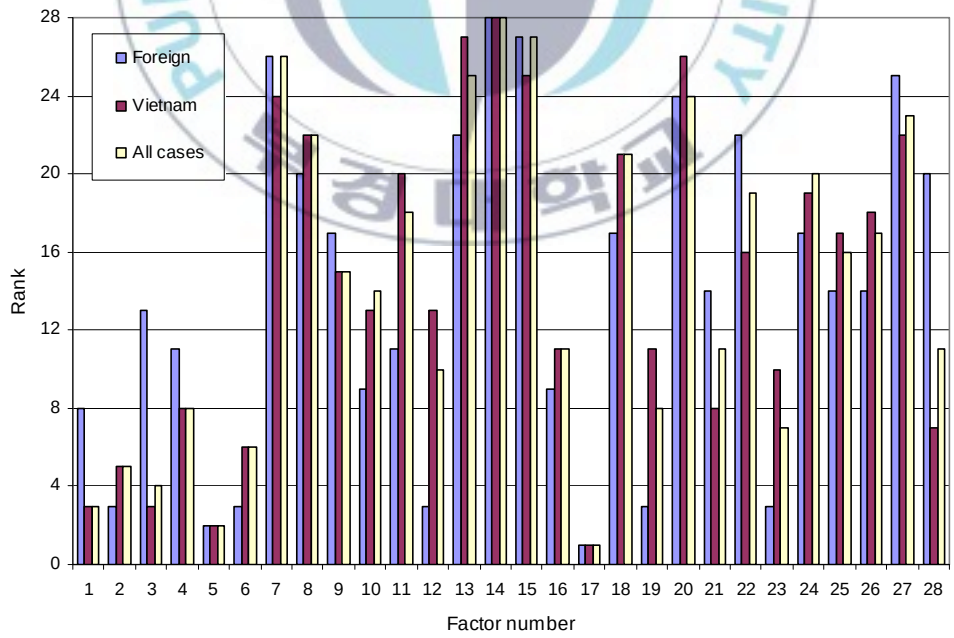
The mean values and rankings of CSFs appear in Figure 6.2 and 6.3. The mean score of the two sectors seems to follow a similar trend.

< **Table 6.5** > Ranking of CSFs

No.	Success factors	Foreign		Vietnam		All cases	
		Mean	Rank	Mean	Rank	Mean	Rank
17	Financial security	4.346	1	4.566	1	4.494	1
5	Commitment from top management	4.192	2	4.377	2	4.316	2
1	Mutual trust between parties	4.115	8	4.340	3	4.266	3
3	Adequate resources	4.000	13	4.340	3	4.228	4
2	Effective communication	4.154	3	4.113	5	4.127	5
6	Clear understanding about scope and objectives	4.154	3	4.019	6	4.063	6
23	Effective conflict resolution process	4.154	3	3.755	10	3.886	7
4	Long-term commitment	4.038	11	3.792	8	3.873	8
19	Empowerment of stakeholders	4.154	3	3.736	11	3.873	8
12	Commitment to quality	4.154	3	3.717	13	3.861	10
21	Equity	3.962	14	3.792	8	3.848	11
16	Technical expertise	4.077	9	3.736	11	3.848	11
28	Joint problem solving	3.846	20	3.849	7	3.848	11
10	Dedicated team	4.077	9	3.717	13	3.835	14
9	Acting consistent with objectives	3.923	17	3.660	15	3.747	15
25	Effective coordination	3.962	14	3.623	17	3.734	16
26	Adequate partnering team building	3.962	14	3.604	18	3.722	17
11	Flexibility to change	4.038	11	3.547	20	3.709	18
22	Mutual vision, goals/objectives	3.808	22	3.642	16	3.696	19
24	Educated and trained personnel for partnering	3.923	17	3.566	19	3.684	20
18	Questioning attitude about assumptions	3.923	17	3.472	21	3.620	21
8	Commitment to continuous improvement	3.846	20	3.415	22	3.557	22
27	Partnering experience	3.731	25	3.415	22	3.519	23
20	Creativity of partnering team	3.769	24	3.245	26	3.418	24
13	Total cost perspective	3.808	22	3.132	27	3.354	25
7	Early implementation of the partnering process	3.462	26	3.283	24	3.342	26
15	Company wide acceptance about the partnering	3.308	27	3.264	25	3.278	27
14	Good cultural fit	3.115	28	2.962	28	3.013	28



< **Figure 6.2** > Mean score of CSFs



< **Figure 6.3** > Ranking of CSFs

To have a consolidated view about top ten CSFs, Table 6.6 tabulates the top ten CSFs of the two sectors. The ten first ranked factors according to foreign respondents are 'Financial security' (4.346), 'Commitment from top management' (4.192), 'Effective communication' (4.154), 'Clear understanding about scope and objectives' (4.154), 'Commitment to quality' (4.154), 'Empowerment of stakeholders' (4.154), 'Effective conflict resolution process' (4.154), 'Mutual trust between parties' (4.115), 'Dedicated team' (4.077), and 'Technical expertise' (4.077). On the other hand, Vietnamese respondents rate 'Financial security' (4.566), 'Commitment from top management' (4.377), 'Mutual trust between parties' (4.340), 'Adequate resources' (4.340), 'Effective communication' (4.113), 'Clear understanding about scope and objectives' (4.019), 'Joint problem solving' (3.849), 'Long-term commitment' (3.792), 'Equity' (3.792), and 'Effective conflict resolution process' (3.755).

In the top ten factors, there are six factors in foreign group coincident with Vietnamese group. Of which, financial security and commitment from top management are placed first and second. Finance is a big concern of Vietnamese construction companies. Joining a partnership, finance burden will be shared amongst partners so that project could run smoothly. On the other hand, foreign participants find partners to share financial related risks when enter into the new market. To feel secure against finance, foreign partners are encouraged to employ partnering arrangement. The commitment from top management is the requirement for partnering success with all practitioners. The commitments embody the full support and commitment of senior management in formulating the strategy and direction of business activities (Cheng and Li, 2001). The partnering concept is rather new in

Vietnam. The new philosophy about working environment could be confusing with organization's personnel. The support from top management is vital.

< **Table 6.6** > Top ten CSFs

Foreign		Vietnam	
Rank	Factor	Rank	Factor
1	Financial security	1	Financial security
2	Commitment from top management	2	Commitment from top management
3	Effective communication	3	Mutual trust between parties
3	Clear understanding about scope and objectives	3	Adequate resources
3	Commitment to quality	5	Effective communication
3	Empowerment of stakeholders	6	Clear understanding about scope and objectives
3	Effective conflict resolution process	7	Joint problem solving
8	Mutual trust between parties	8	Long-term commitment
9	Dedicated team	8	Equity
9	Technical expertise	10	Effective conflict resolution process

The other four factors which all practitioners are unanimous in placing in the top ten are 'Effective communication', 'Clear understanding about scope and objectives', 'Effective conflict resolution process', and 'Mutual trust between parties'. All two sectors perceive the importance of issues related to partnering environment. Communication and clear scope and objectives are also the two success factors of construction project in Vietnam (Nguyen et al, 2004) regardless of project procurement type.

The foreign sector considers commitment to quality play an important role to obtain the partnering success. The other three factors peculiar to partnering environment include sufficient empowerment of stakeholders for

decision making, a dedicated team to work for mutual goals, and appropriate expertise putting in partnering projects.

Assuring adequate resources for partnering project is considered as vital under Vietnamese point of view. Issues relevant to resources have caused various difficulties for implementing construction projects in Vietnam (Long et al, 2004; Le-Hoai et al, 2008). The long-term commitment is perceived critical by Vietnamese organizations as well. They want to improve and maintain the close relationship with partners through reaching a good image in the current partnering project. To begin with a new partner is always harder than to continue with a familiar counterpart. Joint problem solving and equity are the two factors peculiar to teamwork attitude.

Table 6.7 presents the result of Kendall's coefficient of concordance test. Coefficient of concordance (W) for the rankings of problems among foreign companies is 0.132; and among Vietnamese companies is 0.198. The significance levels of these values are both 0.000. It can be concluded that the respondent's rankings within a certain group are related. The response consensus within each group is achieved. In the overall view point, the W value is 0.160 ($p=0.000$) lead to the conclusion that the responses are consensus within group.

< **Table 6.7** > Kendall's W concordance test

No.	Success factors	Kendall's W test - mean rank		
		Foreign	Vietnam	All cases
1	Mutual trust between parties	16.77	20.09	19.00
2	Effective communication	16.83	18.38	17.87
3	Adequate resources	14.67	20.57	18.63
4	Long-term commitment	15.10	15.45	15.34
5	Commitment from top management	16.75	20.24	19.09
6	Clear understanding about scope and objectives	16.77	16.96	16.90
7	Early implementation of the partnering process	10.71	11.00	10.91
8	Commitment to continuous improvement	12.83	11.77	12.12
9	Acting consistent with objectives	13.71	13.60	13.64
10	Dedicated team	16.29	15.05	15.46
11	Flexibility to change	15.27	13.26	13.92
12	Commitment to quality	16.77	14.91	15.52
13	Total cost perspective	13.31	10.17	11.20
14	Good cultural fit	7.04	8.27	7.87
15	Company wide acceptance about the partnering	8.73	10.36	9.82
16	Technical expertise	16.83	14.85	15.50
17	Financial security	18.77	21.77	20.78
18	Questioning attitude about assumptions	14.52	12.43	13.12
19	Empowerment of stakeholders	16.92	14.98	15.62
20	Creativity of partnering team	12.62	10.63	11.28
21	Equity	14.81	14.94	14.90
22	Mutual vision, goals/objectives	13.79	13.67	13.71
23	Effective conflict resolution process	16.10	14.72	15.17
24	Educated and trained personnel for partnering	14.92	13.06	13.67
25	Effective coordination	14.44	13.45	13.78
26	Adequate partnering team building	15.25	13.81	14.28
27	Partnering experience	12.04	12.11	12.09
28	Joint problem solving	13.46	15.48	14.82
	N	26	53	79
	Kendall's Coefficient	0.132	0.198	0.160
	Significance	0.000	0.000	0.000

6.2.2 Test the consensus between two sectors

The Spearman rank correlation test is shown in Table 6.8. The computed Spearman rank correlation coefficient (r_S) is 0.826 between foreign and Vietnamese sectors. The level of significance is 0.000. The null hypothesis that there is significant agreement between two sectors on the ranking of success factors can be accepted at level of confidence of 99%. The Spearman tests also show that the correlation between Vietnamese group ranking and all cases ranking is stronger than correlation between foreign group ranking and all cases ranking. This is because the dominance of Vietnam group size.

< **Table 6.8** > Spearman's rank correlation test

		Foreign	Vietnam	All cases
Foreign	Spearman's correlation	1.000	0.826	0.910
	Sig.	1.000	0.000*	0.000*
Vietnam	Spearman's correlation	0.826	1.000	0.971
	Sig.	0.000*	1.000	0.000*
All cases	Spearman's correlation	0.910	0.971	1.000
	Sig.	0.000*	0.000*	1.000

Note: *: significant at 0.01

The next task will focus on t-test to investigate whether an individual problem is not different across the two respondent groups. In Table 6.10, the Levene's test results are presented. Levene's test resulted in only two factors showed the signs of violation at 5% confidence level. These seven items are: 'Flexibility to change (p=0.005)', and 'Good cultural fit (p=0.017)'. Based on the Levene's test results, t-tests were carried out. T-test results are also tabulated in Table 6.9. The null hypothesis that the means of two separate sectors are equal can be accepted at significance level of 5% except for five factors. The five factors which the null hypothesis cannot be accepted are

'Flexibility to change (p=0.005)', 'Total cost perspective (p=0.009)', 'Questioning attitude about assumptions (p=0.034)', 'Creativity of partnering team (p=0.017)', and 'Effective conflict resolution process (p=0.040)'.

< **Table 6.9** > Levene's test and T-test

No.	Success factors	Levene's test		T test	
		F statistics	Sig.	T statistics	Sig.
1	Mutual trust between parties	0.279	0.599	-1.291	0.201
2	Effective communication	0.481	0.490	0.205	0.838
3	Adequate resources	3.548	0.063	-1.448	0.152
4	Long-term commitment	0.849	0.360	1.306	0.196
5	Commitment from top management	0.350	0.556	-0.974	0.333
6	Clear understanding about scope and objectives	0.028	0.868	0.671	0.504
7	Early implementation of the partnering process	0.003	0.959	0.709	0.481
8	Commitment to continuous improvement	3.667	0.059	1.941	0.056
9	Acting consistent with objectives	3.264	0.075	1.424	0.159
10	Dedicated team	1.189	0.279	1.616	0.110
11	Flexibility to change	8.507	0.005*	2.899	0.005*
12	Commitment to quality	1.563	0.215	1.912	0.060
13	Total cost perspective	0.971	0.328	2.700	0.009*
14	Good cultural fit	5.937	0.017*	0.808	0.422
15	Company wide acceptance about the partnering	1.807	0.183	0.194	0.847
16	Technical expertise	0.001	0.978	1.612	0.111
17	Financial security	0.207	0.650	-1.364	0.177
18	Questioning attitude about assumptions	2.374	0.127	2.153	0.034**
19	Empowerment of stakeholders	0.056	0.814	1.920	0.059
20	Creativity of partnering team	2.840	0.096	2.430	0.017**
21	Equity	0.219	0.641	0.830	0.409
22	Mutual vision, goals/objectives	1.993	0.162	0.727	0.470
23	Effective conflict resolution process	0.091	0.764	2.085	0.040**
24	Educated and trained personnel for partnering	1.914	0.171	1.911	0.060
25	Effective coordination	3.782	0.055	1.930	0.057
26	Adequate partnering team building	1.067	0.305	1.488	0.141
27	Partnering experience	0.899	0.346	1.494	0.139
28	Joint problem solving	3.061	0.084	-0.016	0.987

Note: *: significant at 0.01; **: significant at 0.05

Inertia forces in Vietnamese thinking possibly lessen the criticality of the flexibility to change which is necessary to construction, a dynamics, competitive, and high-risk industry. Regardless of procurement type, each project is a unique because project characteristics vary from project to project. Furthermore, partnering is a cooperative working environment in which each person must adjust himself to reach the mutual goals.

The total cost perspective means that the goal of the organization aims at reducing total cost of the activities instead of individual activity costs. This factor mostly relates to top managers who develop the strategy for organization. The foreign practitioners rate this factor rather high due to their overall profit attitude. The Vietnamese sector frequently concerns with trivial cost decrease and thus pays less attention to the overall benefits. However, both two sectors rank this factor in the lower part of the ranking order.

The next two factors having the different ratings between two sectors are related to the organizations' culture. The Vietnamese sector considers the straightforwardness in dealing business less important than foreign sector. Bureaucracy and directive style is not ready to make a working environment that fosters the creativity.

Even though there is a statistical difference between the perceptions of two sectors about the importance of an effective conflict resolution process, all of them rate this factor rather high. It is possibly explained that there are some Vietnamese participants who even do not clearly understand what the conflict resolution process is. Such concept is rather new with them. Nguyen et al (2004) pointed that competent manager and competent project team are critical for project success in Vietnam.

There are some factors received disagreements of perception between two sectors. The disagreements however are supposedly ignored. The disagreed factors almost ranked in the lower part of ranking order except effective conflict resolution process thus their roles are less serious than the others. With effective conflict resolution process, the first sentence in the abovementioned paragraph can be useful to explain the ignorance.

After some disagreements are ignored, data can be used as a whole for further analysis.

6.3 Factor analysis

6.3.1 Factor analysis application

The correlation matrix is calculated and presented in Table 6.10. There are many correlation coefficients significant at level of 0.05. It is concluded that there are sufficient correlations in data matrix to justify that the application of factor analysis is possible.

Factor analysis is employed to analyze latent relationships between the larger number of success factors. All twenty eight success factors are appropriate for factor analysis because their communalities are higher than 0.5 (see Table 6.12). Table 6.11 presents the KMO and Bartlett's test results. Bartlett's test of sphericity having significance level at 0.000 with chi-square value of 1258.335 indicates that the correlation matrix is not an identity matrix. Kaiser-Meyer-Olkin measure of sampling adequacy is satisfactory with the value of 0.685. All these parameters justify that the factor analysis is applicable.

< **Table 6.10** > Correlation matrix

Success factor	Success factor													
	1	2	3	4	5	6	7	8	..	..	25	26	27	28
1	1.00	**0.44**	0.00	0.19	0.05	-0.11	0.01	-0.22	..	..	-0.08	-0.05	**-0.27**	**-0.23**
2	**0.44**	1.00	**0.50**	**0.42**	**0.33**	0.06	0.22	0.04	..	..	**0.26**	0.03	0.01	0.05
3	0.00	**0.50**	1.00	**0.28**	**0.46**	**0.35**	0.18	**0.39**	..	..	**0.41**	0.14	0.01	0.19
4	0.19	**0.42**	**0.28**	1.00	**0.39**	**0.36**	**0.38**	0.18	..	..	**0.25**	0.04	0.17	0.19
5	0.05	**0.33**	**0.46**	**0.39**	1.00	0.16	0.04	0.19			0.17	0.19	0.15	0.08
6	-0.11	0.06	**0.35**	**0.36**	0.16	1.00	**0.24**	0.08			**0.31**	0.08	0.11	-0.05
7	0.01	0.22	0.18	**0.38**	0.04	**0.24**	1.00	**0.52**			**0.31**	**0.33**	**0.34**	0.22
8	-0.22	0.04	**0.39**	0.18	0.19	0.08	**0.52**	1.00			**0.29**	**0.27**	0.22	0.18
..	..	..							..	..			..	..
..	..	..							..	..			..	..
25	-0.08	**0.26**	**0.41**	**0.25**	0.17	**0.31**	**0.31**	**0.29**			1.00	**0.41**	0.09	0.16
26	-0.05	0.03	0.14	0.04	0.19	0.08	**0.33**	**0.27**			**0.41**	1.00	**0.33**	0.17
27	-0.27	0.01	0.01	0.17	0.15	0.11	**0.34**	0.22	..	..	0.09	**0.33**	1.00	**0.49**
28	**-0.23**	0.05	0.19	0.19	0.08	-0.05	0.22	0.18	..	..	0.16	0.17	**0.49**	1.00

Note: Value in bold is significant at 0.05

< **Table 6.11** > KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.685
Bartlett's Test of Sphericity	Approx. Chi-Square	1258.335
	df	378
	Sig.	0.000

< **Table 6.12** > Communalities

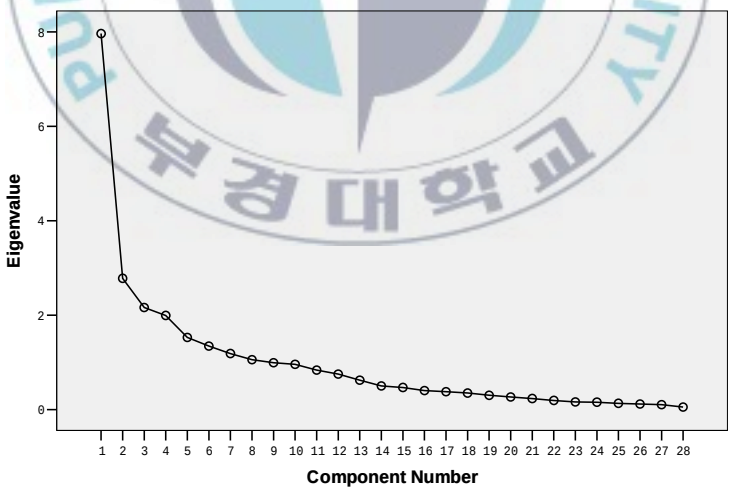
Success factors	Initial	Extraction
Mutual trust between parties	1.00	0.744
Effective communication	1.00	0.710
Adequate resources	1.00	0.830
Long-term commitment	1.00	0.782
Commitment from top management	1.00	0.608
Clear understanding about scope and objectives	1.00	0.797
Early implementation of the partnering process	1.00	0.775
Commitment to continuous improvement	1.00	0.622
Acting consistent with objectives	1.00	0.860
Dedicated team	1.00	0.612
Flexibility to change	1.00	0.597
Commitment to quality	1.00	0.763
Total cost perspective	1.00	0.527
Good cultural fit	1.00	0.809
Company wide acceptance about the partnering	1.00	0.790
Technical expertise	1.00	0.775
Financial security	1.00	0.567
Questioning attitude about assumptions	1.00	0.649
Empowerment of stakeholders	1.00	0.660
Creativity of partnering team	1.00	0.820
Equity	1.00	0.709
Mutual vision, goals/objectives	1.00	0.644
Effective conflict resolution process	1.00	0.662
Educated and trained personnel for partnering	1.00	0.676
Effective coordination	1.00	0.724
Adequate partnering team building	1.00	0.847
Partnering experience	1.00	0.704
Joint problem solving	1.00	0.757
Extraction Method: Principal Component Analysis.		

According to latent root criterion, eight components, with eigenvalues higher than 1, could be extracted. Figure 6.4 is the scree plot of twenty items analyzed. Through the eigenvalues, the variance explained by factors can be calculated. Table 6.13 presents total variance explained results. In this table, eigenvalues of components, and variance explained before and after varimax rotation are included. With eight extracted components, the total amount of

variance explained is 71.5%. The remaining variance that could not be explained by seven components only accounts for 28.5%.

< **Table 6.13** > Total variance explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7.97	28.45	28.45	7.97	28.45	28.45
2	2.78	9.93	38.38	2.78	9.93	38.38
3	2.16	7.72	46.11	2.16	7.72	46.11
4	1.99	7.12	53.23	1.99	7.12	53.23
5	1.53	5.46	58.68	1.53	5.46	58.68
6	1.35	4.80	63.49	1.35	4.80	63.49
7	1.19	4.24	67.73	1.19	4.24	67.73
8	1.06	3.77	71.50	1.06	3.77	71.50
9	0.99	3.54	75.04			
10	0.96	3.42	78.46			
..	..	..	..			



< **Figure 6.4** > Scree plot of success factors

To examine the underlying relationships (grouping) between problems, the rotated factor loadings are employed. The rotated loadings and component structure are presented in Table 6.14.

Loadings in the Table 6.14 are rotated loadings after thirteen iterations. The eight extracted components are named as follows:

- Component 1: **Dedication**
- Component 2: **Readiness**
- Component 3: **Coordination**
- Component 4: **Teamwork**
- Component 5: **Sufficiency**
- Component 6: **Leading**
- Component 7: **Balance**
- Component 8: **Clearness**

The eight components cover all aspects that required for a success application of partnering concept in the Vietnamese construction industry. The most critical component, based on the percentage of variance explained, is the dedication to the partnering. The readiness to apply partnering concept is the second highly ranked component. The coordination in partnership is the third critical success component of partnering in construction projects. Teamwork, sufficiency, leading, and balance also contribute to the success

partnering in the Vietnamese context. Clearness is the component that contributes least percent of variance explained of the total variance.

< **Table 6.14** > Component structure

Component	Loading	Eigenvalue	% variance explained
Component 1 - Dedication		**7.97**	**28.45**
Creativity of partnering team	0.752		
Acting consistent with objectives	0.734		
Flexibility to change	0.732		
Commitment to continuous improvement	0.673		
Total cost perspective	0.576		
Dedicated team	0.556		
Early implementation of the partnering process	0.507		
Good cultural fit	0.485		
Commitment to quality	0.464		
Component 2 – Readiness		**2.78**	**9.93**
Company's wide acceptance about the partnering	0.847		
Technical expertise	0.699		
Good cultural fit	0.618		
Effective communication	0.544		
Mutual trust between parties	0.528		
Early implementation of the partnering process	0.464		
Mutual vision, goals/objectives	0.412		
Long-term commitment	0.408		
Component 3 – Coordination		**2.16**	**7.72**
Effective coordination	0.715		
Educated and trained personnel for partnering	0.637		
Questioning attitude about assumptions	0.637		
Acting consistent with objectives	0.466		
Component 4 – Teamwork		**1.99**	**7.12**
Joint problem solving	0.814		
Partnering experience	0.735		
Mutual trust between parties	0.524		
Mutual vision, goals/objectives	0.415		
Component 5 – Sufficiency		**1.53**	**5.46**
Adequate resources	0.753		
Effective conflict resolution process	0.750		
Dedicated team	0.453		
Effective communication	0.440		

Component 6 – Leading		**1.35**	**4.80**
Financial security	0.658		
Commitment from top management	0.650		
Equity	0.581		
Long-term commitment	0.510		
Effective communication	0.406		
Component 7 – Balance		**1.19**	**4.24**
Adequate partnering team building	0.806		
Commitment to quality	0.645		
Empowerment of stakeholders	0.574		
Component 8 – Clearness		**1.06**	**3.77**
Clear understanding about scope and objectives	0.844		
Equity	0.415		
Long-term commitment	0.431		
Total variance explained			**71.50**

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
Rotation converged in 13 iterations.

Table 6.15 presents the component score coefficient matrix that used to calculate component scores (factor scores). The component scores will be used in the next analysis step. Example formulas of Component scores 1 and 2 are shown in equation 6.1 and 6.2 below:

$$\begin{aligned} \textit{Dedication (Component score 1)} = {} & 0.205 \times \textit{Creativity of partnering team} \\ & + 0.276 \times \textit{Acting consistent with objectives} \\ & + 0.272 \times \textit{Flexibility to change} \\ & + 0.256 \times \textit{Conmmitment to continuous improvement} \\ & + 0.172 \times \textit{Total cost perspective} \\ & + 0.135 \times \textit{Dedicated team} \\ & + ... \end{aligned} \quad (6.1)$$

$$
\begin{aligned}
Readiness\,(Component\ score\ 2) = {} & 0.261 \times Technical\ expertise \\
& + 0.310 \times Company'\ s\ wide\ acceptance\ about\ the\ partnering \\
& + 0.208 \times Good\ cultural\ \ fit \\
& + 0.064 \times Effective\ communication \\
& + 0.184 \times Mtual\ trust\ between\ parties \\
& + ...
\end{aligned}
\tag{6.2}
$$

Factor loadings are the correlation of each variable on the component and indicate the degree of correspondence between the variable and the component, with higher loadings making the variable representative of the component. Factor loadings are used to interpret the role of each variable plays in each component (Hair et al, 2009). The patterns (naming and structure) of extracted components characterized by high loading factors (significant correlation) are presented in Table 6.14. Discussions on patterns of components in the next section are based on the loading values.

On the other hand, the coefficients in Table 6.15 (to compute component score) tell the unique contribution of each variable to the component scores. Higher values on variables with higher loadings on a component will result in higher component score (Hair et al, 2009). However, a set of strongly collinear variables that are highly correlated with a component (high loading values presented in Table 6.14) are likely to have low weights in the component score coefficient matrix. Component scores are computed based on the loadings of all variables. Therefore, although the researcher is able to characterize a component by the variable with highest loadings, consideration must be given to other variables, albeit their lower influences on the component score (Hair et al, 2009). Component scores, standardized to have a mean value of 0 and a standard deviation of 1, are used to represent the components in the following analysis.

< **Table 6.15** > Component Score Coefficient Matrix

Success factors	Component							
	1	2	3	4	5	6	7	8
Mutual trust between parties	-0.032	0.184	-0.090	0.269	-0.039	0.172	0.159	-0.154
Effective communication	-0.060	0.144	0.049	-0.078	0.157	0.097	-0.029	-0.093
Adequate resources	0.020	-0.090	0.054	0.020	0.328	0.053	-0.169	0.035
Long-term commitment	0.045	0.064	0.052	0.059	-0.241	0.262	-0.219	0.257
Commitment from top management	-0.005	-0.149	0.031	0.027	0.067	0.337	-0.043	-0.013
Clear understanding about scope and objectives	-0.022	-0.069	-0.031	-0.029	0.037	-0.054	-0.048	0.554
Early implementation of the partnering process	0.119	0.145	-0.258	0.148	-0.008	-0.073	0.090	0.135
Commitment to continuous improvement	0.256	-0.066	-0.179	0.124	0.102	-0.015	-0.076	-0.026
Acting consistent with objectives	0.276	-0.162	0.209	-0.053	-0.112	0.153	-0.193	-0.225
Dedicated team	0.135	-0.049	0.023	-0.065	0.188	-0.065	-0.053	0.016
Flexibility to change	0.272	-0.036	-0.147	0.008	-0.045	0.056	-0.008	-0.049
Commitment to quality	0.028	0.038	-0.090	-0.023	0.019	-0.082	0.320	0.060
Total cost perspective	0.172	0.010	0.036	-0.097	-0.144	0.032	-0.050	0.082
Good cultural fit	0.124	0.208	0.105	0.116	-0.098	-0.116	-0.180	-0.143
Company wide acceptance about the partnering	-0.006	0.310	-0.053	0.053	-0.057	-0.008	-0.019	-0.100
Technical expertise	-0.089	0.261	0.021	-0.117	0.102	-0.188	-0.024	0.214
Financial security	0.068	-0.002	-0.168	-0.066	0.001	0.376	0.021	-0.142
Questioning attitude about assumptions	-0.086	-0.001	0.329	-0.030	-0.097	0.001	0.056	0.053
Empowerment of stakeholders	0.059	-0.059	0.033	-0.107	-0.198	0.132	0.264	-0.004
Creativity of partnering team	0.205	0.041	-0.088	-0.079	0.064	-0.095	0.032	0.031
Equity	-0.076	-0.033	-0.031	0.063	-0.135	0.299	0.107	0.232
Mutual vision, goals/objectives	-0.150	0.113	0.039	0.166	0.120	0.062	0.061	-0.032
Effective conflict resolution process	-0.040	0.016	-0.144	-0.017	0.411	-0.060	0.145	-0.039
Educated and trained personnel for partnering	-0.135	0.089	0.350	0.031	0.007	-0.089	0.056	-0.088
Effective coordination	-0.054	-0.074	0.402	-0.065	0.079	-0.103	-0.014	-0.017
Adequate partnering team building	-0.133	-0.067	0.086	-0.013	0.143	-0.069	0.489	-0.180
Partnering experience	0.044	-0.055	-0.194	0.339	-0.067	0.093	0.104	0.048
Joint problem solving	-0.061	0.058	0.097	0.389	0.023	-0.059	-0.108	-0.113

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

6.3.2 Discussion on factor analysis result

6.3.2.1 Dedication

This component has explained a variance of 28.45%. It comprises of nine success factors like *creativity of partnering team, acting consistent with objectives, flexibility to change, commitment to continuous improvement, total cost perspective, dedicated team, early implementation of the partnering process, good cultural fit,* and *commitment to quality*. Construction project is dynamics and intricate in nature. Even that, implementation of projects demands both artistic and scientific manner. Creativity and flexibility are important to partnering and even all types of construction projects. Creativity shows under various forms such as always think of novel ideas or like to use advanced techniques (Cheng et al., 2000). Nevertheless all actions must be consistent with the specified objectives of partnering projects. That is participants should ensure that they have synchronous goals and review their accomplishments in terms of their original goals (Chen and Chen, 2007).

The dedication to the partnership also is in the terms of commitment to quality and continuous improvement of parties in project. The commitment to quality is the continuous endeavors to achieve careful work, guarantee quality and last customer satisfaction of both sides in the partnership (Chen and Chen, 2007). The commitment to an organization-wide process of focused and on-going incremental innovation (cited in Cheng and Li, 2001). The goal of the organization should be to reduce the total cost of the activities instead of individual activity costs. It should be less concerned with trivial cost decrease while much focus on the overall profit attitude which much depends on top managers who develop the strategy for organization.

It is also necessary to build a dedicated partnering team and a good cultural fit to foster the dedication. A dedicated partnering team is a partnering team always fulfills their commitments well and on time (Tennyson, 2003). Although partnering can help to resolve many inherent problems of traditional procurement methods, it could be ruined by the culture conflict. A partnership is developed and formed on the coordination of various organizations with various distinct organizational cultures. Good cultural fit will facilitate partnering implementation and encourage the partnering members in dedication. In addition, the early implementation of the partnering process is a signs of dedication to partnering. The partnering process should be developed and started at the design stage of construction project to use the knowledge, expertise of parties to ensure the success (Beach et al. 2005).

6.3.2.2 Readiness

Readiness is vital to start and maintain a collaborative relationship. An organization is ready for partnering can promote its success. The readiness for partnering is represented through the wide acceptance of whole company/organization and the preparation of technical expertise and cultural issues. Partners must set up an effective communication system, develop and maintain the mutual trust in the partnership to reach the mutual goals. When all partners are ready for the partnership, the partnering process can be early implemented and the long-term commitment of partners is easy to obtain. In this study, the readiness component could explain 9.93% of variance of the success factors. Company highly unanimous with the partnering can safeguard the commitment to partnering. It is necessary to integrate the experienced, professional and skilled technical teams such as architects,

contractors, consultants for successfully wrapping up project (Chen and Chen, 2007). Culture is a critical factor as discussed in the aforementioned component and thus partner team personnel should be prepared for cultural fit. Developing an effective communication system can protect the smoothness of information transmission between parties to reduce and timely solve conflicts. Creating and sustaining a good mutual affection through mutual trust or shared mutual vision/goal could further the commitment of parties in fulfilling its obligation in an exchange relationship.

6.3.2.3 Coordination

Coordination is a widely recognized important factor for the success of partnering. In this study, coordination component accounts for 7.72% of variance. Achievement of effective coordination could obtain stability in an uncertain environment which can be attained by an increase in contact points between parties and sharing of information (Bayramoglu, 2001). Any unclear thing or conflict should be well informed among parties. The aim is to reduce the complaints about coordination problems such as misunderstanding or misinterpretation. The reduction of misunderstanding can be achieved through the questioning attitude that is feeling free to question any assumptions made by other parties (Black et al, 2000) directed to achieve win-win attitude. All personnel should be educated or trained about partnering before and during partnering implementation. Out of regular skills for working in partnering environment, it should focus on training about coordination. When coordination mechanism in partnering is well established, it could encourage whole members to act consistently with objectives. Participants have synchronous goals and review their accomplishments in terms of their original goals (Chen and Chen, 2007).

6.3.2.4 Teamwork

To obtain work success in collaborative environment, teamwork attitude is an indispensable factor that should be paid much attention to. In this study, teamwork is prominent as a critical component related to success of implementing partnering in construction in Vietnam. This component consists of four factors: *joint problem solving, partnering experience, mutual trust between parties,* and *mutual vision, goals/objectives*. The amount of variance explained of this component is 7.12%. According to description in Cheng and Li (2001), joint problem solving is a collective decision made by the partnering team to create alternatives for problematic issues. Joint problem solving is a productive technique of the teamwork style. Such resolution technique can create a commitment to mutually agreed solution because parties can gather together and share with each other their own views on the issues and their solving tactics (Cheng et al, 2000). Experience with partnering approach helps to speed up the partnering progress based on the knowledge, skills, tools, and practices accumulated through past events. These experience matters consume much time for training and perceiving. Mutual trust and shared mutual vision or goals within a team are crucial subjects for the team's members to work together. Each member works his own task in team and to be sure that the others fulfill their obligations in an exchange relationship.

6.3.2.5 Sufficiency

The sufficiency of partnering application can be described by *adequate resources* supplied, *effective conflict resolution process* adopted, *dedicated team* employed, and *effective communication* mechanism established. This

component explains 5.46% of variance of the success factors. Since a project requires a variety of skills and technology, each participating party must supplies required resources to share with others, which are enough to support a successful partnering (Cheng and Li, 2001). Adequate resources could facilitate problem solving by improving the capacity of organization to execute innovative ideas (Crowley and Karim, 1995). Conflict exists in all entities in which mutually interactive activities are present, especially in a partnership. If managed properly, conflict contributes to success of partnership because it is likely to lead to creative solutions, which enhance ability that partners to work together in the future (Crowley and Karim, 1995). Building a sufficient team for operating partnering organization smoothly has significant impact on achieving success. The team members should be dedicated to partnering team works with win-win attitudes. With such dedicated team, communication and conflict resolution processes have a chance to run effectively. Chen and Chen (2007) quoted that partnering requires timely communication of information and the maintenance of open, direct lines of communication among all project members. Through communication, adversarial relationships and misunderstanding between parties could be reduced.

6.3.2.6 Leading

Leading is also a critical component contributing to achieving successful performance of partnering. In this study, this component, explaining 4.8% of variance, consists of *financial security, commitment from top management, equity, long-term commitment,* and *effective communication*. To have assured financing is one of incentives of partnering implementation in construction industry in Vietnamese context. Financial security is the strategic goal

specified by the top management to join a partnership. Equity is also an important factor to be considered in launching a partnering. Equity will guarantee that all stakeholders' interests are considered when creating and reviewing the mutual goals. When financial security and equity can be obtained from the partnering, it will enhance the commitment from top management. The full support and commitment of senior management in formulating the strategy and direction of business activities represent the commitment from top management (Cheng and Li, 2001; Black et al., 1999). The support from senior management is always a prerequisite for successful partnering (Slater, 1998). And as a consequence of top management commitment, long-term commitment of partners in partnership will be promoted. That is the commitment of one party to maintain the current partnering relationship with other parties based on some positive aspect (Cheng and Li, 2001). Effective communication assures the transmission of information throughout the organization's hierarchy that supports the managers in executing their leading role. Team members can get timely and correctly commands or demands from top management and, conversely, managers can receive feedbacks from their staff.

6.3.2.7 Balance

The three factors grouped into one component, namely balance, are *adequate partnering team building, commitment to quality,* and *empowerment of stakeholders*. Balance is very important to the success of a partnership. This component can explain 4.24% of variance of success factors. A partnering team should consist of members from all involved parties where these representatives should be key executives and possess the authority to act on behalf of their organizations (Loraine, 1994). The

consistency and appropriateness of team's decisions are high and implementation process of these decisions could be facilitated. In addition, stakeholders must be equally empowered with the requisite decision making authority for efficient problem solving (Ng et al., 2002). The equal empowerment could promote the commitment of stakeholders to the partnering project. Moreover, it is necessary to reach a balance between quality and economic constraints. All sides in partnership present continuous improvement to achieve careful work, a guarantee of quality, and lasting customer satisfaction (Chen and Chen, 2007).

6.3.2.8 Clearness

Clearness is significant to success of all projects, especially partnering projects. The clearness will reduce misunderstanding and enhance mutual trust between parties. The ambiguous scope and objectives statement of parties is likely to raise adversarial relationship in partnership. On the other hand, having achieved clear understanding about scope and objectives of partners, the parties can then work together to make plans a reality (Crane et al, 1997). The clearness is also expressed in the form of equity. That is all stakeholders' interests are considered in creating mutual goals and there's a commitment to satisfy each stakeholder's requirements to ensure project satisfaction and success (Ng et al., 2002). This component can explain 3.77% of variance of success factors.

6.4. Level of partnering success

To measure the success of partnering in construction, many previous studies have been conducted in the field such as Crane et al (1999), Cheng et

al (2000), Cheung et al (2003), and Rowlinson et al (2006). Many criteria have been proposed. Cheng et al (2000) proposed that performance measures can be subjective or objective and these measures should help to set useful monitoring, control, evaluation, and correction of variations and improvements. The frequently used measures relate to cost, schedule, quality, safety, litigation, profit, stakeholders and community. Using such measures to estimate success index for project has ever been done in the literature for example Lam et al (2008). Several researches used qualitative scale to estimate measures of success and then estimate success level such as Handa and Adas (1996), Han et al (2007).

Successful/unsuccessful performance is likely to subjectively estimate according to appropriate respondents' perception. Menches and Hanna (2006) asked the respondents for rating the performance of project on the two-point scale: successful and less-than-successful. Chan et al (2004) requested the respondents rating perceptions of partnering success according to a five-point Likert scale (1= strongly disagree and 5 = strongly agree).

In this study, collecting various measures to estimate the level of partnering success seems to meet many difficulties such as geographical problem, reliability of answers of the respondents about the measures due to sensitivity of data, inertia of practitioners against scientific researches in Vietnam. In order to overcome the difficulties and guarantee an acceptable accuracy for research purpose, another scale is employed to ask the rating of respondents. The employed rating scale is ten-point scale (1 to 10 with 1 indicating unsuccessful (worst score) and 10 indicating successful (best score)) (please see chapter 2). Ten-point scale was similarly employed in Iyer and Jha (2006) to subjectively estimate the schedule performance of

construction projects in India. Koksal and Arditi (2004) also used ten-point scale to rate overall condition of construction company in a research about company decline.

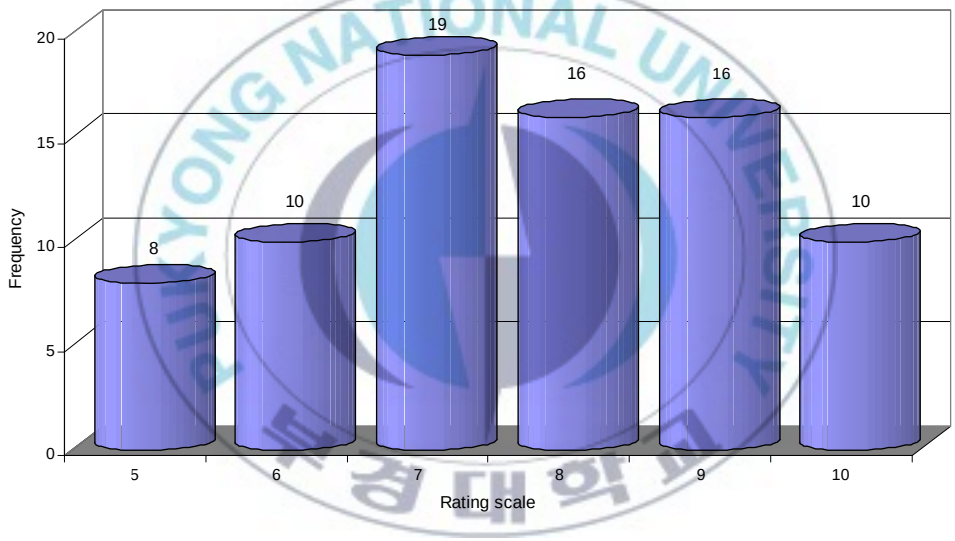
The statistics features of the responses and frequency of responses are tabulated in Table 6.16 and 6.17. The responses frequency is also depicted in Figure 6.5. There is no answer on level below 5. The median value is 8 and the mean value is 7.66. All of these values suggest that the outcome of partnering application in Vietnamese context is fine.

< **Table 6.16** > Statistics of level of partnering success

Type	Sub-type	Value
N	Valid	79
	Missing	0
Mean		7.66
Median		8
Std. Deviation		1.51
Variance		2.28
Skewness	Statistic	-0.13
	Std. Error	0.27
Kurtosis	Statistic	-0.90
	Std. Error	0.53
Range		5
Minimum		5
Maximum		10
Percentiles	25	7
	50	8
	75	9

< **Table 6.17** > Frequency analysis of level of partnering success

Valid value	Frequency	Percent	Cumulative Percent
5	8	10.1	10.1
6	10	12.7	22.8
7	19	24.1	46.8
8	16	20.3	67.1
9	16	20.3	87.3
10	10	12.7	100.0
Total	79	100	



< **Figure 6.5** > Frequency of level of partnering success

Table 6.18 presents the t-test result for difference between the two concerned sectors. The Levene's test and t-test results show that there is no statistically significant difference between two sectors about the level of partnering success responses. It suggests that the two sectors share a similar satisfaction about their partnership performance and the wider application of this type of procurement is prosperous in Vietnam.

< **Table 6.18** > T-test for difference between two sectors

	Levene's Test		T-test	
	F statistic	Sig.	T statistic	Sig. (2-tailed)
Partnering success level	5.123	0.026	1.583	0.118

< **Table 6.19** > Correlation of success level with success factors

No.	Success factor	Correlation coefficient	Significance (2-tailed)
1	Mutual trust between parties	-0.10	0.367
2	Effective communication	0.05	0.690
3	Adequate resources	0.27	0.017**
4	Long-term commitment	0.09	0.419
5	Commitment from top management	0.12	0.278
6	Clear understanding about scope and objectives	0.10	0.388
7	Early implementation of the partnering process	0.41	0.000*
8	Commitment to continuous improvement	0.66	0.000*
9	Acting consistent with objectives	0.63	0.000*
10	Dedicated team	0.46	0.000*
11	Flexibility to change	0.57	0.000*
12	Commitment to quality	0.45	0.000*
13	Total cost perspective	0.40	0.000*
14	Good cultural fit	0.35	0.002*
15	Company wide acceptance about the partnering	-0.04	0.721
16	Technical expertise	0.12	0.281
17	Financial security	0.22	0.054
18	Questioning attitude about assumptions	0.26	0.019**
19	Empowerment of stakeholders	0.34	0.002*
20	Creativity of partnering team	0.62	0.000*
21	Equity	0.12	0.296
22	Mutual vision, goals/objectives	-0.06	0.574
23	Effective conflict resolution process	0.23	0.043**
24	Educated and trained personnel for partnering	0.09	0.428
25	Effective coordination	0.42	0.000*
26	Adequate partnering team building	0.30	0.008*
27	Partnering experience	0.10	0.402
28	Joint problem solving	-0.06	0.606

Note: *: significant at 0.01; **: significant at 0.05

< **Table 6.20** > Correlation of success level with extracted components

No.	Component	Correlation coefficient	Significance (2-tailed)
1	Dedication	0.79	0.000*
2	Readiness	-0.13	0.267
3	Coordination	0.05	0.652
4	Teamwork	-0.04	0.734
5	Sufficiency	0.16	0.155
6	Leading	0.06	0.604
7	Balance	0.13	0.241
8	Clearness	-0.02	0.845

Note: *: significant at 0.01

The correlation coefficients are calculated to investigate the strength and direction of linear relationships between level of success and success factors. Pearson's correlation coefficients are presented in Table 6.19. The results indicate that almost all factors have positive correlations with success level. Many of them have correlation coefficients significant at 5%. Only some factors have negative correlations with the success level, however the correlations are not statistically significant. It needs further researches about these unusual problems to have deeper understanding about them. The results suggest that when implementing partnering in construction in Vietnam, practitioners are effectively deploying various CSFs to promote partnering performance.

The eight extracted underlying components are also correlated with the success level. The component scores are used to calculate the correlation coefficients of eight components against the success level. Pearson's correlation coefficients are presented in Table 6.20. There are three components have negative correlations. It can be explained that these three

components consist of the factors having negative correlations. It is similar to the aforementioned paragraph; the meaning of these three components should be further investigated. The results indicate that only one component, namely *dedication*, has positive significant correlation with the success level. The strength of association between this component and the success level is considerable. Dedication to partnership will strongly promote the performance of this partnership.

6.5 Modelling the affection of success factors to partnering success

Logistic regression analysis was employed to develop models of enhancing level of partnering in construction in Vietnam. Logistic regression is a conditional probability approach. Multinomial logistic regression is an extension of binomial logistic regression. The chances of occurrence of a particular value of response variable are compared with the chances of occurrence of the reference value of the response variable. In this study, the reference value is the level 10 of success scale. The forward entry stepwise method is used to identify the significant variables.

Validation is a very important step in the application of logistic regression technique. Built model should be tested with cases that are independent of the cases used in the development of the model. The sample is randomly divided into two sets: building and testing sets, which corresponding to the ratio of 90/10 (71 responses used for building and 8 responses used for testing purpose).

To cross-compare the classification rate of logistic regression, discriminant analysis is chosen. Discriminant analysis is a data analysis technique that can be used to classify categorical data. This technique is similar to logistic regression in terms of ability to classify but this technique requires some strict assumptions such as multivariate normality and equality of covariance matrices. The assumptions could be satisfied with the data used in this research. The building/testing sets used in analyzing logistic regression are reused in applying discriminant analysis. The step wise procedure is employed.

6.5.1 Developing multinomial logistic regression model

6.5.1.1 Developing model

The logistic regression model is developed with the success level as the dependent variable and all eight extracted components (using component scores – see component score formulas in previous section) as potential independent variables. The seventy-one projects in building set are put into SPSS software to develop the multinomial logistic regression model.

At first, a model is carried out with success level as the dependent variable and all twenty eight CSFs as potential independent variables. The step-wise process is stopped because the numerical problem is encountered. There is possibly a quasi-complete separation in the data. Either the maximum likelihood estimates do not exist or some parameter estimates are infinite. Unexpected singularities in the Hessian matrix are encountered. There are some possible causes: the relatively small sample size, the wide range of the estimating scale, and the large number of parameters (Koksal and Arditi, 2004; UNL). Since the sample size is fixed, the estimating scale

and the number of parameters should be reduced. To reduce the estimating scale, it is necessary to convert to ten-point scale (in fact, it is six point scale because the range of data set is 5) to a less point scale such as three-point. This is a researcher-subjectively-related process so the new scale possibly is biased by researcher. The last is to reduce the input parameters (variables). That is using the grouping output results of factor analysis technique application as the independent variables of logistic regression.

The stepwise method is applied and the summary of stepwise procedure is presented in Table 6.21. There are four steps needed to identify the logistic regression model. From the results in Table 6.21, the Akaike Information Criterion (AIC) meets at the last step (the lowest AIC). Even though the Bayesian Information Criterion (BIC) reveals that model in step 2 should be the final model (the lowest BIC) but, because BIC often points to a more parsimonious model than AIC (UNL) and chi-square test of effect selection test at step 4 is significant at 0.05, the last step model is chosen as the final model.

< **Table 6.21** > Step summary

Model	Action	Effect(s)	Model Fitting Criteria			Effect Selection Tests		
			AIC	BIC	-2 Log Likelihood	Chi-Square[a,b]	df	Sig.
Step 0	Entered	Intercept	258.572	269.886	248.572	.		
Step 1	Entered	Component 1	186.980	209.607	166.980	81.592	5	0.000
Step 2	Entered	Component 7	166.133	200.073	136.133	30.847	5	0.000
Step 3	Entered	Component 5	162.284	207.537	122.284	13.849	5	0.017
Step 4	Entered	Component 4	159.486	216.053	109.486	12.798	5	0.025

Stepwise Method: Forward Stepwise
[a]: The chi-square for entry is based on the likelihood ratio test.
[b]: The chi-square for removal is based on the likelihood ratio test.

Table 6.22 presents the model fitting information. Both the AIC and the BIC point that the final model is better fit than intercept-only model. Furthermore, the likelihood ratio test significant at level of 0.05 means that the final model is significantly different from the one with the constant only or the null hypothesis that all of the predictor effects are zero can be rejected. It is equivalent with at least one of the predictors is significantly related to the dependent variable.

< Table 6.22 > Model fitting information

Model	Model Fitting Criteria			Likelihood Ratio Tests		
	AIC	BIC	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	258.572	269.886	248.572			
Final	159.486	216.053	109.486	139.087	20	0.000

The likelihood ratio test can be employed to drop one variable from the model to create a nested reduced model. In this situation, the likelihood ratio test tests if the logistic regression coefficient for the dropped variable can be treated as 0, thereby justifying dropping the variable from the model. A no significant likelihood ratio test indicates no difference between the full and the reduced models, hence justifying dropping the given variable so as to have a more parsimonious model that works just as well (UNL). Table 6.23 shows the likelihood ratio test produced by SPSS. The likelihood ratio tests of individual parameters show that the model without a certain variable is significantly different from the final (full) model (significance level at 0.05) and therefore no variable should be dropped based on preference for the more parsimonious reduced model.

Table 6.24 contains the goodness of fit test results for final model. The goodness of fit test measures the fitness of the data collected to the model that is being proposed (Koksal and Arditi, 2004). The Pearson and deviance test are included. If the model fits well, the significant level of the two tests should be large. The findings of non-significance correspond to the concluding that the model adequately fits the data.

< **Table 6.23** > Likelihood ratio test

Effect	Model Fitting Criteria			Likelihood Ratio Tests		
	AIC of Reduced Model	BIC of Reduced Model	-2 Log Likelihood of Reduced Model	Chi-Square	df	Sig.
Intercept	169.026	214.280	129.026	19.541	5	0.002
Component 1	227.695	272.948	187.695	78.209	5	0.000
Component 4	162.284	207.537	122.284	12.798	5	0.025
Component 5	166.800	212.054	126.800	17.315	5	0.004
Component 7	178.690	223.944	138.690	29.204	5	0.000

The chi-square statistic is the difference in -2 log-likelihoods between the final model and a reduced model.
The reduced model is formed by omitting an effect from the final model.
The null hypothesis is that all parameters of that effect are 0.

< **Table 6.24** > Goodness of fit

	Chi-Square	df	Sig.
Pearson	146.128	300	1.000
Deviance	109.486	300	1.000

Another mean to investigate the model fit with data is classification table. This table is an output of SPSS program and is presented in Table 6.25. The classification table presents the observed and predicted groups. The overall correct rate of the model is 63.4%. The lowest prediction rate is at level 6 with the correct percent of 37.5. And next is at level 8 with the correct

percent is 46.2. The highest correct percent belongs to level 5 and the second is level 10. Level 7 stands at the third position with 68.8% correct. It is possibly explained that it is not really hard for a participant to rate level 5, 7, and 10 because these values represent the poor, average and very excellent performance outcomes, respectively. It is more difficult to rate the intermediate values such as 6 and 8. Level 9 represents the very good performance but it still needs a little effort to reach the excellence. Thus rating level 9 is likely to be easier than level 8. Focusing on the distribution of the predicted groups against the observed groups, the predicted level outputs are distributed around the observed level with the deviation value of ±1 level. This is possibly resulted from the difficulty in deciding a specific score for a subjective performance level. For a general purpose, it can be concluded that the final model obtains an acceptable fit with data.

< Table 6.25 > Classification table

Observed	Predicted						Percent Correct
	5	6	7	8	9	10	
5	7	1	0	0	0	0	87.5
6	2	3	3	0	0	0	37.5
7	0	1	11	4	0	0	68.8
8	0	0	2	6	5	0	46.2
9	0	0	0	3	10	3	62.5
10	0	0	0	0	2	8	80.0
Overall Percentage	12.7	7.0	22.5	18.3	23.9	15.5	63.4

The pseudo R^2 are not goodness-of-fit tests but rather attempt to measure strength of association the independent variables and dependent variable. The pseudo R^2 measures could confound goodness of fit and explanatory power of the model (Iyer and Jha, 2006). The multinomial logistic regression tool of SPSS produces three types of R^2 and Table 6.26 presents the results of the

three R^2 values. McFadden R^2 is a less common used measure which is based on log-likelihood kernels for the full versus the intercept-only models. Cox-Snell and Nagelkerke are the two common relevant values to report. Nagelkerke is a modification of the former to assure that it can vary from 0 to 1. From the results, the model accounts for between 85.9% and 88.6% of variability in the dependent variable. In this research, these values indicate that the model performs well.

< **Table 6.26** > Pseudo R-square

Pseudo R-Square	Value
Cox and Snell	0.859
Nagelkerke	0.886
McFadden	0.560

The parameters related to model's coefficients are tabulated in Table 6.27. According to the Wald test, only component 1 is significant at success level from 5 to 8 (reference level is 10) at 0.05. At significant level 0.1, component 7 is significant at success level 7. Component 4 and component 5 are significant at success level 9 at 0.05. For exploratory purpose, the chosen level of significance is 0.1. The logit functions (only significant and intercept presented) of the five states of success level are as follows:

$$Logit\ state\ 5/10 = -1.171 - 10.312 \times Component\ 1 \quad (6.3)$$

$$Logit\ state\ 6/10 = -0.849 - 9.997 \times Component\ 1 \quad (6.4)$$

$$Logit\ state\ 7/10 = 3.062 - 7.114 \times Component\ 1 + 1.777 \times Component\ 7 \quad (6.5)$$

$$Logit\ state\ 8/10 = 3.057 - 3.445 \times Component\ 1 \quad (6.6)$$

$$Logit\ state\ 9/10 = 0.827 + 1.455 \times Component\ 4 + 2.193 \times Component\ 5 \quad (6.7)$$

The logit function of state 10/10 is obviously 0. The baseline category is 10 then the probability of a category's occurrence can be calculated using the following family of equations:

$$p\left[occurence\ of\ level_{i\,(i\ =5\text{-}10)}\right]=\frac{e^{logit\ \ state\ \ i/10}}{\sum_{k=5}^{10} e^{logit\ \ state\ \ k/10}} \qquad (6.8)$$

< **Table 6.27** > Parameter estimate

Partnering success level (a)	Effect	B	Std. Error	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
								Lower Bound	Upper Bound
5	Intercept	-1.171	2.283	0.263	1	0.608			
	Component 1	-10.312	2.749	14.074	1	0.000	0.000	0.000	0.007
	Component 4	1.618	1.482	1.191	1	0.275	5.041	0.276	92.035
	Component 5	-1.502	1.650	0.829	1	0.363	0.223	0.009	5.654
	Component 7	-3.434	2.109	2.650	1	0.104	0.032	0.001	2.015
6	Intercept	0.849	1.741	0.238	1	0.626			
	Component 1	-9.997	2.643	14.302	1	0.000	0.000	0.000	0.008
	Component 4	0.646	1.427	0.205	1	0.651	1.908	0.116	31.266
	Component 5	-0.494	1.504	0.108	1	0.742	0.610	0.032	11.618
	Component 7	-1.794	2.002	0.803	1	0.370	0.166	0.003	8.414
7	Intercept	3.062	1.399	4.788	1	0.029			
	Component 1	-7.114	2.245	10.040	1	0.002	0.001	0.000	0.066
	Component 4	-0.591	1.186	0.248	1	0.618	0.554	0.054	5.661
	Component 5	-1.114	1.258	0.784	1	0.376	0.328	0.028	3.865
	Component 7	1.777	1.068	2.766	1	0.096	5.911	0.728	47.966
8	Intercept	3.057	1.350	5.126	1	0.024			
	Component 1	-3.445	1.703	4.094	1	0.043	0.032	0.001	0.898
	Component 4	0.671	0.664	1.023	1	0.312	1.957	0.533	7.183
	Component 5	0.548	1.077	0.259	1	0.611	1.730	0.210	14.271
	Component 7	1.173	0.858	1.869	1	0.172	3.231	0.601	17.358
9	Intercept	0.827	1.321	0.392	1	0.531			
	Component 1	-0.388	1.342	0.084	1	0.772	0.678	0.049	9.409
	Component 4	1.455	0.661	4.847	1	0.028	4.285	1.173	15.655
	Component 5	2.193	1.001	4.799	1	0.028	8.960	1.260	63.729
	Component 7	0.870	0.845	1.060	1	0.303	2.387	0.456	12.506

a: The reference category is: 10.

The negative coefficients of component 1 indicate that the increase in variable value of this component will decrease the likelihood of success of partnering being at the current level. This means that, conversely, the likelihood of achieving the partnering success level 10 will increase. The opposite situation exists in discussion of component 7, component 4, and component 5. That is any increase in variable value will decrease the likelihood of achieving better partnering success level. The very large values of component 1 coefficients (-10.31; -9.99; -7.11; -3.44) indicate a strong effect of this component on the success of partnering. This result is similar to the correlation analysis result between success level and component 1 score in the previous section.

The effects of components on a certain success level are analyzed through odd ratio analysis presented in Table 6.28. The aforementioned discussion about large value of B of component 1 is solidified through the p, q and Δp, Δq values. At level 5, 6, and 7, values of p of component 1 are nearly zero. That matter can be explained that the probability of the occurrence of level 5, 6, and 7 is much lower than the probability of the occurrence of level 10. From the result in this research, any improvement of dedication performance will improve the partnering performance. It can also be concluded that the partnering implementation in Vietnam context is prosperous.

Similarly, at the level 9, two components 4 and 5 are significant in stepwise logistic regression. It is surprised that in this level, the increase in the component value will diminish the chances of partnering performance improvement. With an increase in variable value by one unit, the chance of being at the current level will increase 13.8% and the probability of increase

the success to level 10 will decrease 13.8% with component 4. With component 5, these deviation values are 8.8% increase of chance of retaining at current level and 8.8% decrease of chance of jumping to level 10. A perfect performance is very difficult or fabulous goal to reach; level 9 is a very satisfactory and healthy degree for a partnership. Thus at this degree, effort should be put to maintain the current state is a wiser thinking than hoping to improve to higher state. At the near perfection, all aspects in a partnership should be considered. Focusing on any particular aspect could deteriorate the outcome of the partnering application.

< **Table 6.28** > Odd ratio analysis

Success level (a)		B	Exp(B)	p	q	Δp	Δq
5	Intercept	-1.171					
	Component 1	-10.312	0.000	0.000	1.000	0.000	0.000
6	Intercept	0.849					
	Component 1	-9.997	0.000	0.000	1.000	0.000	0.000
7	Intercept	3.062					
	Component 1	-7.114	0.001	0.001	0.999	-0.001	0.001
	Component 7	1.777	5.911	0.855	0.145	0.117	-0.117
8	Intercept	3.057					
	Component 1	-3.445	0.032	0.031	0.969	-0.030	0.030
9	Intercept	0.827					
	Component 4	1.455	4.285	0.811	0.189	0.138	-0.138
	Component 5	2.193	8.960	0.900	0.100	0.088	-0.088

a: The reference category is: 10.

6.5.1.2 Model validation

Besides assessing the goodness of fit, the model should be tested with cases independent from the cases used in developing process. The eight testing cases will be employed in this section.

At first, the logit function values are calculated for the eight testing cases using equations from 6.3 to 6.7. Second the probabilities of level occurrence are calculated. Table 6.29 presents the results of logit function values and probability of level occurrence for each testing case. To understand the numbers in the lower part of Table 6.29, case 1 will be taken as an example. The outputs show that the probability of occurrence at level 7 is highest at 45.8%. The next levels, which having high chance of occurrence, are level 8 and 9 with 33.6% and 16.4% probability, respectively. The chances for levels 5, 6 and 9 happen are nearly zero (or no chance). The sum of probability values from level 5 to level 10 will completely be a unit (100%).

< **Table 6.29** > Model validation – logit value and probability of success level

Testing case	Level 5	Level 6	Level 7	Level 8	Level 9	Level 10
			Logit function value			
1	-3.954	-3.547	2.439	2.127	1.411	0
2	-7.058	-6.556	-1.371	1.090	1.970	0
3	20.649	20.304	15.139	10.347	4.268	0
4	-5.959	-5.491	-0.859	1.457	1.225	0
5	12.423	12.330	12.701	7.598	2.933	0
6	-6.066	-5.594	1.317	1.422	-0.004	0
7	1.371	1.616	5.038	3.906	2.253	0
8	-2.626	-2.260	4.150	2.571	-9.289	0
			Probability of level occurrence			
1	0.001	0.001	0.458	0.336	0.164	0.040
2	0.000	0.000	0.022	0.261	0.629	0.088
3	0.584	0.414	0.002	0.000	0.000	0.000
4	0.000	0.000	0.046	0.470	0.373	0.110
5	0.309	0.281	0.408	0.002	0.000	0.000
6	0.000	0.000	0.378	0.420	0.101	0.101
7	0.018	0.023	0.690	0.223	0.043	0.004
8	0.001	0.001	0.817	0.168	0.000	0.013

Using the highest probability as the cut-off criteria to classify the testing cases, the results of classification are tabulated in Table 6.30. In this table,

the observed and predicted categories are presented and compared. There are five correctly classified cases corresponding to the correct prediction rate of the model over testing sample is 62.8%. There are only three, out of eight, misclassified cases. The misclassification, however, is not serious because the deviation is only 1 level. As discussed before, this possibly results from the difficulty in deciding a specific score for a subjective performance level. After testing, it can be concluded that the model performs well (good fit).

< **Table 6.30** > Model validation – category classification

Testing case	Success level		Correct ?
	Observed	Predicted	
1	8	7	No
2	9	9	Yes
3	6	5	No
4	7	8	No
5	7	7	Yes
6	8	8	Yes
7	7	7	Yes
8	7	7	Yes
Percent correct			5/8 = 62.8%
Note: highest probability is the cut-off criteria			

6.5.2 Discriminant analysis as a cross-compared classification rate technique

6.5.2.1 Discriminant model development

The building set is put into SPSS software to do discriminant analysis. First the homogeneity of covariance between any two predictor variables should be similar to the corresponding covariance in other groups (NCSU). Box's M test tests the null hypothesis of equal population covariance matrices. The result presented in Table 6.31 shows that this test is significant at 0.05. The null hypothesis is rejected or the assumption of equality of

covariance matrices cannot be obtained. But the group log determinants (Table 6.32) are not very dissimilar, and then a significant Box's M is usually ignored (NCSU). The effect of inequality of covariance matrices can be ignored.

< **Table 6.31** > Test of equality of covariance matrices

Type	Sub-type	Value
Box's M		99.075
F	Approx.	1.619
	df1	50
	df2	4385.400
	Sig.	0.004

Tests null hypothesis of equal population covariance matrices.

< **Table 6.32** > Log determinants

Partnering success level	Rank	Log Determinant
5	4	-3.017
6	4	-3.700
7	4	-1.313
8	4	-4.326
9	4	-4.195
10	4	-3.940
Pooled within-groups	4	-1.815

The ranks and natural logarithms of determinants printed are those of the group covariance matrices.

The stepwise discriminant analysis select variables entered into the discriminant model based on the power to effectively discriminating the categorical groups (Kim et al, 2008). The Wilks' lambda is employed to do this work. Table 6.33 presents the results of variable selection after stepwise procedure conducted. There are four components, namely component 1, component 4, component 5, and component 7, emerged as significant

variables in the model at 0.05. The four variables in discriminant model are similar to the four variables in multinomial logistic regression in the upper part of this section.

< **Table 6.33** > Results of variable selection

Step	Variable	Wilks' Lambda	F value	
			Statistic	Sig.
1	Component 1	0.324	27.079	0.000
2	Component 7	0.189	16.674	0.000
3	Component 5	0.153	11.322	0.000
4	Component 4	0.127	8.916	0.000

At each step, the variable that minimizes the overall Wilks' Lambda is entered.

< **Table 6.34** > Summary of canonical discriminant functions

Discriminant Function	Eigenvalue	% of Variance	Cumulative %	Canonical Correlation
1	2.866	76.905	76.9	0.861
2	0.552	14.820	91.7	0.597
3	0.295	7.919	99.6	0.477
4	0.013	0.356	100.0	0.114

First 4 canonical discriminant functions were used in the analysis.

< **Table 6.35** > Tests of the eigenvalue significance

Test of Function(s)	Wilks' Lambda	Chi-square	df	Sig.
1 through 4	0.127	134.154	20	0.000
2 through 4	0.491	46.253	12	0.000
3 through 4	0.762	17.667	6	0.007
4	0.987	0.857	2	0.651

Because there are six levels (categories) in this study, the number of discriminant functions is less than six. SPSS output shows that there are four discriminant functions can be extracted in the research. Table 6.34 presents

the eigenvalues and the percent of variance explained by these functions. The first function, the most important, can explain 76.9% of variance of research problem. The fourth function accounts for only 0.35% of variance. To test the significance of eigenvalues explained by each function, Wilks' lambda is employed. Table 6.35 shows the results of tests of the eigenvalue significance. With the large amount of accounted variance, the first three functions' tests are significant at 0.05. Conversely, test of fourth function is not significant. That means the contribution of fourth function to discriminating is limited.

Referred to NCSU, the canonical correlation is a measure of the association between the groups formed by the dependent and the given discriminant function. When canonical correlation is zero, there is no relation between the groups and the function. When the canonical correlation is large, there is a high correlation between the discriminant functions and the groups. Note that canonical correlation is used to tell how much each function is useful in determining group differences. A value of 1.0 indicates that all of the variability in the discriminant scores can be accounted for by that dimension. Table 6.34 also contains the canonical correlation coefficients of the functions. As can be seen, the first function (0.861) possesses the most discriminating power. The next two are the second (0.597) and the third (0.477) functions.

The coefficients of canonical discriminant functions are produced by SPSS and tabulated in Table 6.36. Deploying these coefficients in the form of equation, the four formulas are obtained as in equations from 6.8 to 6.11 below.

< **Table 6.36** > Coefficients of canonical discriminant functions

Variable	Function			
	1	2	3	4
Component 1	1.746	-0.255	-0.292	0.170
Component 4	0.087	-0.166	0.838	0.566
Component 5	0.471	-0.107	0.760	-0.760
Component 7	0.500	1.140	0.002	0.107
(Constant)	-0.040	0.023	-0.006	-0.008

$$Function\,1 = -0.040 + 1.746 \times Component\,1 + 0.087 \times Component\,4 + \\ + 0.471 \times Component\,5 + 0.500 \times Component\,7 \quad (6.8)$$

$$Function\,2 = 0.023 - 0.255 \times Component\,1 - 0.166 \times Component\,4 - \\ - 0.107 \times Component\,5 + 1.140 \times Component\,7 \quad (6.9)$$

$$Function\,3 = -0.006 - 0.292 \times Component\,1 + 0.838 \times Component\,4 + \\ + 0.760 \times Component\,5 + 0.002 \times Component\,7 \quad (6.10)$$

$$Function\,4 = -0.008 + 0.170 \times Component\,1 + 0.566 \times Component\,4 - \\ - 0.760 \times Component\,5 + 0.107 \times Component\,7 \quad (6.11)$$

The performance (model fit) is assessed using classification table in Table 6.37. The correct classification percent for categories 7 and 9 in this technique is slightly lower than in previous analysis. On the hand, correct percent of categories 6 and 8 is higher than logistic regression. In general, discriminant analysis obtains a little higher accuracy (64.79%) of classification than logistic regression. The better hit ratio (overall correct percent), even though, is not significant.

The discriminant model (DM) needs to be validated using the cases out of cases used to build the model. The purpose here is to test the generalization of the discriminant model. The next section is for model testing.

< **Table 6.37** > Classification table

Observed level	Predicted level						Percent correct
	5	6	7	8	9	10	
5	7	1	0	0	0	0	87.50
6	2	4	2	0	0	0	50.00
7	0	2	9	5	0	0	56.25
8	0	0	1	9	3	0	69.23
9	0	0	0	3	9	4	56.25
10	0	0	0	0	2	8	80.00
Overall percentage	12.68	11.29	21.82	39.53	53.85	100.00	64.79

6.5.2.2 Model testing

In this section, the testing set will be employed. The probability of being at a certain success level are computed and tabulated in Table 6.38. The calculation procedure is done under the assistance of SPSS software. For testing case 1, the highest probability is at level 8 (0.544) and the second highest is at level 9 (0.282). The difference between two probability values is large. With this testing case, there exists dissimilarity between two analysis models. For the testing case 2, the deviation between two highest probability values of DM is small (0.397/level 8 against 0.344/level 9) while the logistic model (LM) focuses on the particular level 9. The next two cases (cases 3 and 4) witness the similarity between DM and LM outputs. For cases 5 and 7, the dissimilarity, again, exists between DM and LM. With case 5, DM highly focuses on level 6 (73.3%) while LM just presents a little higher chance of occurrence of level 7 (than level 5). With case number 7, the inverse situation is observed. The same comments are extracted for the last two testing cases (cases 6 and 8). It is concluded that, in general, the performances (out of building set) of the two models are different.

< **Table 6.38** > Model validation – Probability of level occurrence

Testing case	Level 5	Level 6	Level 7	Level 8	Level 9	Level 10
1	0.000	0.002	0.091	0.544	0.282	0.081
2	0.000	0.001	0.021	0.397	0.344	0.237
3	0.695	0.305	0.000	0.000	0.000	0.000
4	0.003	0.006	0.055	0.413	0.253	0.270
5	0.100	0.733	0.147	0.018	0.001	0.000
6	0.000	0.001	0.132	0.512	0.259	0.095
7	0.014	0.081	0.245	0.468	0.137	0.055
8	0.000	0.001	0.992	0.003	0.000	0.004

< **Table 6.39** > Model validation – category classification

Testing case	Success level		Correct ?
	Observed	Predicted	
1	8	8	Yes
2	9	8	No
3	6	5	No
4	7	8	No
5	7	6	No
6	8	8	Yes
7	7	8	No
8	7	7	Yes
Percent correct			3/8 = 37.5%

Note: highest probability is the cut-off criteria

Using maximum probability as the cut-off criteria as well, the testing cases are classified into success level groups. Table 6.39 denotes the classification results. There are only three cases are classified correctly whereas five cases are wrongly done. It results in the low hit ratio value of 37.5%. Through testing the models with testing set, a conclusion can be obtained that the classification performance of multinomial logistic model is better than that of discriminant model.

6.5.3 Discussion on modeling results

The results of both LM and DM suggest that only four components have significant contribution to the success performance of partnering in the current Vietnamese context. The four components are: dedication, teamwork, sufficiency, and balance.

Dedication is vital for nearly all levels of performance in the Vietnamese context. That is the binding of thinking, acts, and efforts to achieving a successful partnering. Especially when the level of performance has a chance to improve, the role of dedication is more important. Dedication in Vietnamese context comprises various essential factors such as creativity, cultural fit, flexibility, commitment. These factors are clearly important for the new and less experienced participants with partnering concept who achieving low success level and hoping for improvement. On the other hand, with a perfect or nearly perfect partnership arrangement, all factors are well-prepared so that no factor plays a dominant role in the partnering process.

Surprisingly at level 7, the more focusing on the balance in a partnership, the less chance to achieve better performance. The balance component relates to the team building and the empowerment in the partnership. It can be explained that, at the intermediate level, it is necessary to focus on other problems than on balance of partnership. In the current Vietnamese conditions, to improve the performance from the average level, partners should concentrate on the dedication to their partnership other than pay most attention to building a team with equal/fair empowerment.

Another surprising finding is that teamwork and sufficiency have negative impact on the effort to improve the level 9. A possible explanation is

that level 9 is a near perfection so the participants have good experience with the concept and the applied mechanism has run well. Any change will break the fitness of this mechanism. Especially in the current conditions, the partnering practitioners in Vietnamese market should not try to improve the status of teamwork and sufficiency if their partnership is running well.

6.6 Chapter recommendations

6.6.1 Recommendations based on factor analysis results

Since success factors can be used to enhance the strategy or to promote the performance, the findings in this research can help the practitioners to improve their partnering implementation process. Figure 6.6 illustrates the framework of success factors for partnering in Vietnamese context. The following recommendations are the major practical propositions to achieve better outcomes of partnering application:

- Because dedication is important to a partnering, it should be seriously focused. Dedication is associated with various vital considerations. The creativity should be fostered and encouraged in the partnering team. Building and developing a dedicated team who binding their thinking, acts, and efforts to achieving a successful partnering. All partners should ensure the partnering goals are synchronous; and timely track the achievement and progression to be consistent with the original objectives. Forecast conflict possibly arising due to culture and ensure the good cultural fit in the partnership. Building a working mechanism that is flexible to change. Being fully aware of reduction of total cost is important

instead of separate activity cost. Every member should perceive and commit to continuous improvement that is an organization-wide process of focused and constant innovation. Since high quality product could improve organization's image and brand-name due to customer and counterpart satisfaction, quality criteria should be focused and committed to. At last, partnering process should be urged to early implement to exploit the expertise and knowledge from parties.

- Participants must be sure that they are ready to join the partnership and the partnering is ready to be realized. Ensure that the participation in a partnering receive the company-wide acceptance. Technical expertise essential to project execution is available and adequate. Out of technical expertise, participants should prepare and solve any issues related to cultural fit and communication channels. In partnering, working based on a good interrelationship is a determinant of success and thus all mutually related issues must be well prepared such as mutual trust and mutual vision/goals. Encouraging parties to advance towards the long-term commitment and, consequently, the current partnering will get a better chance of success. After everything is ready, early implementation of partnering process should be promoted.

- In project partnering, coordination is obviously an unavoidable element of the establishment and development process. It must be sure that the number of contact points between parties must be sufficient to timely and adequately share information. Because working in partnering environment demands many particular skills

and practices so the training and education for personnel should be paid attention to. Developing an open questioning attitude in the partnership that is everyone feeling free to question any assumptions made by other parties directed to achieve win-win attitude.

- Participants must develop a teamwork environment in the partnering. Problem should be solved using the joint effort such as using collective decision made by the partnering team members to create alternative solutions. Mutual trust, mutual vision must be obtained between partners because they are the two fundamental issues for teamwork style. It is necessary to get rid of the uncertainties about partnership and thus achieve a successful outcome. Partnering experience should be dignified when selecting partner because past experience could support the current process.

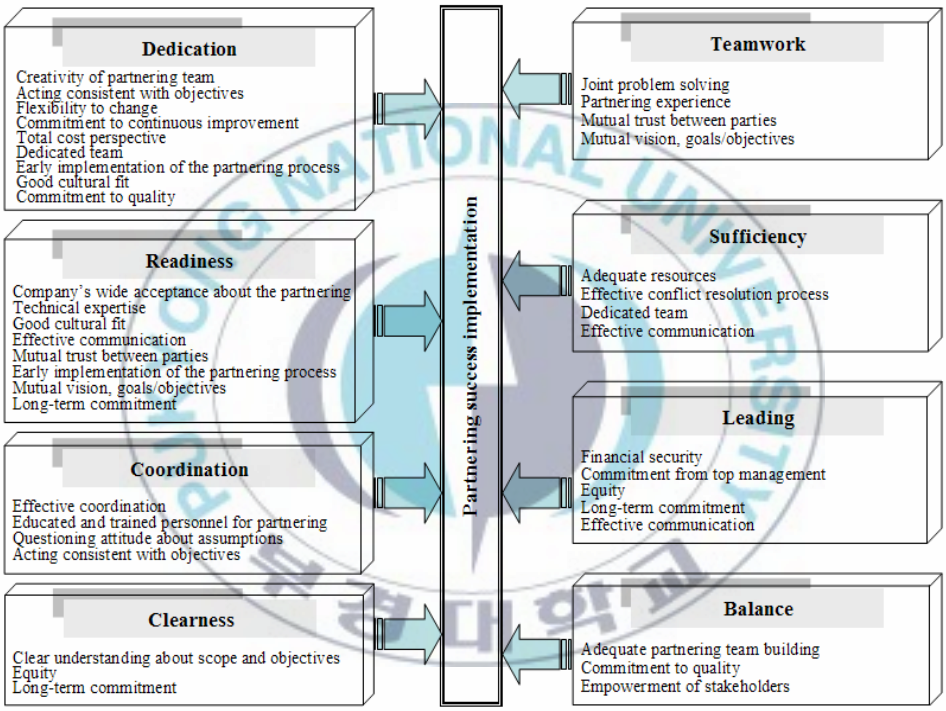
- A partnering should have a sufficiency for execution. First, resources must be adequately supplied. Second, it is necessary to establish a process to solve effectively any conflict arising. This process should focus on early conflict identification through conflict solving. Communication plays a key role in conflict resolution. Third, it is essential to develop timely communication of information and the maintenance of open, direct lines of communication among all project team members (Chen and Chen, 2007). Human being is always the most vital element in all organized entity. Fourth, participants must successfully develop a partnering team dedicated to partnership.

- Leadership is indispensable in any organization. Top managers are the strategy builders. They must secure a healthy financial status for both partnering project and their governing company; and secure the equity between partners when joining a partnership. The commitment of top management will be inspired to employees hence it must be focused. The commitment to current partnering encourages partners to search for further cooperation. Looking for long-term commitment, in turn, encourage partnering team to work eagerly. Communication system must be taken care to prevent the loss of information or delay of transferring information between leader and personnel.

- Balance must be obtained in a partnering. Balance is denoted in terms of adequate team building, quality against other economic targets, and empowerment in partnership. A partnering team should consist of members from all involved parties where these representatives should be key executives and possess the authority to act on behalf of their organizations (Loraine, 1994). Both sides in partnership present continuous improvement to achieve careful works, to guarantee quality, and to last customer satisfaction (Chen and Chen, 2007). And stakeholders must be empowered with the requisite decision making authority for efficient problem solving (Ng et al., 2002).

- Ensure the clearness in the partnership. The scope and objectives statement of parties in the partnership must be unambiguous and explicit to prevent mistrust that could ruin every collaborative entity. All stakeholders' interests are considered in creating mutual goals

and there's a commitment to satisfy each stakeholder's requirements to ensure project satisfaction and success (Ng et al., 2002). Based on current positive aspect, parties should express commitment to maintain the current partnering relationship with other parties (Cheng and Li, 2001).

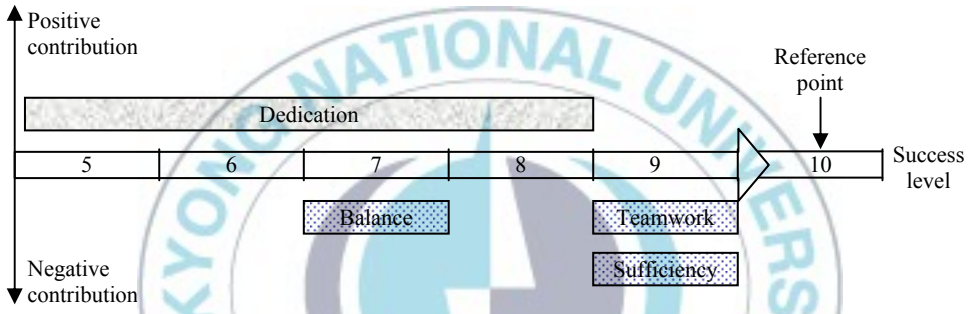


< **Figure 6.6** > Framework of success factors for partnering

6.6.2 Recommendations based on the affection of success factors on success level

Based on the data collected from practical partnering projects in Vietnamese context, the affection of success factor on the level of success is modeled using multinomial logistic regression. The application of logistic

regression also shows the variables which have significant contribution to success level. A reference technique, discriminant analysis, also shows the similar four components significant for present situation of success partnering in Vietnam. The scheme for partnering success in construction industry in current Vietnamese context is presented in Figure 6.7. Some recommendations can be extracted for the current Vietnamese context as presented below.



< Figure 6.7 > The scheme of partnering in construction in current Vietnam context

- In the current context, with partnering projects achieving average and low performance (from 5th to 8th grade), the most important factors should be focused related to dedication. Improve dedication of partners will increase the probability of achieving better performance.

- At the average performance level 7, focusing on improvement of balance in the partnership (team building, empowerment) could decrease the probability of achieving better performance. It should

equally improve all aspects of partnering working style especially dedication.

- At the very good performance level 9, focusing on improvement of teamwork and sufficiency will diminish the chance of further performance improvement to 10. It is obviously that at this level, all factors must work very well; and thus, for the current situation of Vietnamese context, the efforts should be put to maintain the current level other than to achieve absolutely perfect but fabulous level 10.

6.6.3 Recommendations for using logistic regression model

Using the logistic regression model proposed in the study, the probability of achieving each success level can be calculated. The practitioners can make decision about which success level their partnership could be obtained. The maximum probability can be used as the cut-off criterion. It means that the achieved success level is the level which having the highest chance of occurrence.

The participants can also use the procedure of the proposed logistic regression model to improve their partnering process by evaluating the impact of each factor on the probability of success level. Through this evaluation, participants could decide to put more attention to or greater effort on managing significant factors in order to increase the chance of achieving better outcome. The detail procedure of logistic regression model and an example of application are presented in Appendix 1.

6.7 Chapter conclusion

This chapter obtains two principal objectives. The first is to investigate the critical success factors for partnering in construction in Vietnamese perspective. The second is to investigate the relationship between the performances of success factors and level of partnering success using multinomial logistic regression technique. Besides, factor analysis is employed to find the underlying dimensions of success factors and discriminant analysis is conducted to cross validate the classification capability of logistic regression model.

Critical success factors are identified after a questionnaire survey conducted and ranked in terms of foreign and Vietnamese sectors' perceptions. Twenty eight success factors are identified. T-test is conducted to test the difference of mean rating between the two sectors. T-test results show that there are some minor disagreements but insignificant. While Spearman's rank correlation test shows that the ranking orders of foreign and Vietnamese sectors are highly correlated. The top five success factors in Vietnamese context are: *Financial security, Commitment from top management, Mutual trust between parties, Adequate resources,* and *Effective communication*. Furthermore, factor analysis shows that there are eight underlying dimensions that must be adequately considered to improve the partnering performance in Vietnam. The eight dimensions are: *Dedication, Readiness, Coordination, Teamwork, Sufficiency, Leading, Balance,* and *Clearness*. The dimensions cover all aspects of the partnering working environment.

The subjective answers of respondents on the ten-point scale about partnering success level show a positive trend of performance. There is no answer below level 5. The median value of success level is 8 and the mean

value is 7.66. The frequencies of excellent performance (level 9 and 10) are high. These values suggest that the outcome of partnering application in Vietnamese context is fine. The present positive outcomes encourage the practitioners to widely take advantage of this innovative arrangement.

Multinomial logistic regression analysis shows that, in the current context, four components are observed to have significant influence on the success level of construction partnering. The four components are: *dedication, teamwork, sufficiency,* and *balance*. The extent of contribution varies with success level. At low and average performance levels, dedication has the highest positive effect. At the medium level 7, highly focusing on the balance in partnering organization could diminish the chance of further improvement. At the very good performance level 9, any improvement of teamwork or sufficiency could reduce the chance of betterment. The possible explanation is that, at this level, all factors must work very well; and thus, for the current situation of Vietnamese context, the efforts should be put to maintain the current level other than to achieve absolutely perfect but fabulous level 10. A cross-validation technique, namely discriminant analysis, also shows the four similar components significantly influence on the success level of partnering application in current Vietnamese perspective.

The logistic regression model can be used by practitioners to convert qualitative performance of related success factors into quantitative value of chance of partnering success in a specific context. The model can also be used to measure the performance of partnering and to enhance the performance through identifying the impact of significant factors.

CHAPTER 7

CONCLUSION

7.1 General conclusion

The research is to investigate three aspects of partnering implementation in the construction industry in Vietnam through a questionnaire survey. The three aspects are: the incentives, the problems, and the success factors. Problems and success factors are the two parallel aspects of a project in which they mutually exist and impact on partnering performance. Incentives play as the motivators of the partnering application. This study focuses on the two sectors: foreign and Vietnamese sectors. The perceptions of the two sectors about each aspect are investigated and compared. The recommendations for each investigated field are proposed. Discussion is properly presented for every analysis results to make clear the situation of Vietnam.

Problems exist in all processes. During the partnering implementation process, problematic factors could pull down the partnering performance. Successfully identify problems during execution, the affection of these problems could be reduced or weeded out. It is aimed at to mitigate the potential problem of partnering failure. On the opposite hand, the performance of partnering could be enhanced by identifying success factors. Throughout implementation process, success factors should be encouraged for betterment.

At first, the study investigates and introduces what incentives the practitioners are likely to be obtained when applying partnering approach in the Vietnamese construction market. Through clearly understanding about the incentives of partnering concept, it is hoped that partnering arrangement will be propagated to employ its advantages.

The problems and success factors identified in this research could also serve as guidelines for construction practitioners to successfully deploy their future partnership. By mastering the guidelines, participants are potentially more proactive to avoid reinventing the wheel. The unexpected effects of the problems could be eliminated or, at least, reduced. It is also a chance for managers to review their organizations' capability of employing the new concept.

In addition, the success factors are useful lessons for partnering practitioners in Vietnam. Practitioners could use the findings of success factors from this research to enhance their current or future projects strategy. The findings are beneficial to participants by providing helpful information for the achievement of successful partnering. The assessment of probability of partnering outcome via performance measurement of success factors is informative in suggesting tactics in terms of desired outcome.

Moreover, the findings in the research are likely to be a useful guidance for construction practitioners who intend to apply this new procurement type. The research obviously has derived many valuable findings contributing to the global knowledge to perfect the application procedure of the new concept. It is therefore a helpful reference for practitioners in other developing countries or other countries having conditions similar to Vietnam.

7.2 Incentives of partnering application

The major incentives of partnering in Vietnamese construction industry as perceived by foreign and Vietnamese sectors are found out after conducting a questionnaire survey. According to the foreign sector, the most important incentives are 'To learn mutually among participants', 'To improve construction quality', 'To achieve less adversarial relationship', 'To increase understanding amongst parties', and 'To improve design quality'. While the Vietnamese sector ranks 'To increase bidding advantages', 'To improve return on resources', 'To increase customer satisfaction', 'To improve construction quality', and 'To learn mutually among participants' as the top five most important incentives.

Tests of Kendall's coefficient of concordance show that, within a certain sector, all respondents statistically meet the agreement on ranking incentives. In the other word, the practitioners within a certain sector (foreign or Vietnamese) perceive similarly about their incentives when practicing partnering in construction projects in Vietnam. The further analyses also have demonstrated that there is a consensus about the rankings of items between two sectors.

However, there are some disagreements about the mean score rating (degree of importance) between two sectors. This means that the culture of parent organization possibly influence the perception about partnering incentives. Furthermore, the real situations of sectors possibly affect their perception about incentives. The foreign sector is on the entry-mode to the new prosperous market while the local sector pays most attention to economics conditions.

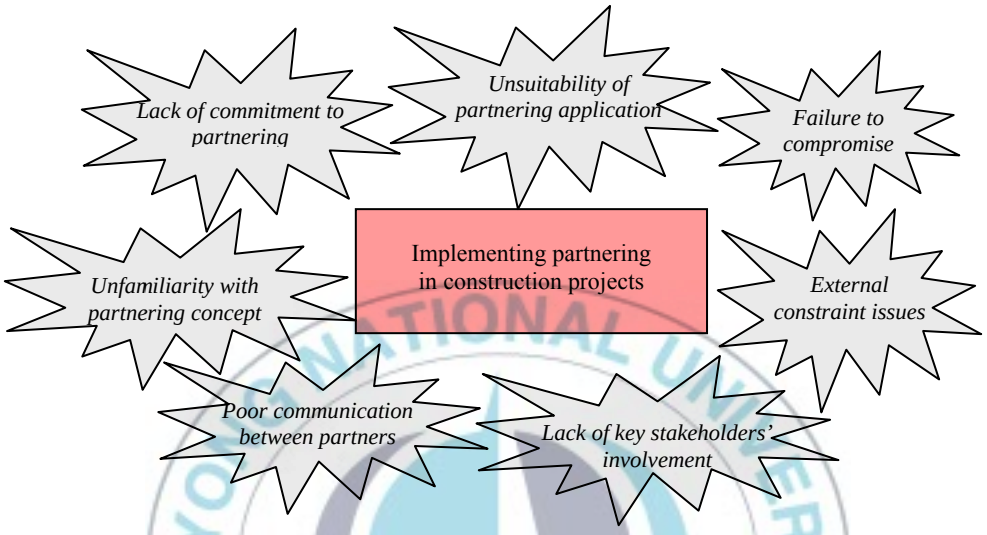
The four perspectives, incentives' groups, are examined. Brand and competition perspective is considered as most important while performance improvement perspective is considered as least essential with respect to two sectors. Learning and growth perspective and financial perspective are the two perspectives having divergent opinions between foreign and local participants. Foreign participants pay more attention to learning and growth than to financial side.

7.3 Problems in implementing partnering in Vietnam

The problematic factors associated with partnering in construction in Vietnam are examined. Twenty problems are identified in terms of foreign and Vietnamese sectors perceptions. These problems are ranked according to mean score value. The list of top five most critical problems according to foreign sector is: 'Partners' attitudes governed by commercial pressure', 'Lack of continuous, open and honest communication', 'Manager's lack of profession knowledge', 'Problems with blueprints and regulations', and 'Partners failed to share information'. In the position of host representative, Vietnamese sector considers 'Dealing with large bureaucratic organization(s)', 'Unsolved arguments (ignoring or allowing arguments rising)', 'Partners failed to share information', 'Partner(s) disagree to compromise', and 'Unfair sharing of risks or rewards' as the top serious problems.

The study indicated that the perceptions of the two groups were not statistically different in both ranking and rating mean scores of issues. It meant that both foreign and Vietnamese sectors faced the similar contexts when practising the partnering arrangement in the Vietnamese construction

market. It is simpler for the participants to take care of a unique list of issues, regardless of their partner's origin.



< **Figure 7.1** > The seven potential destructive impediments for partnering.

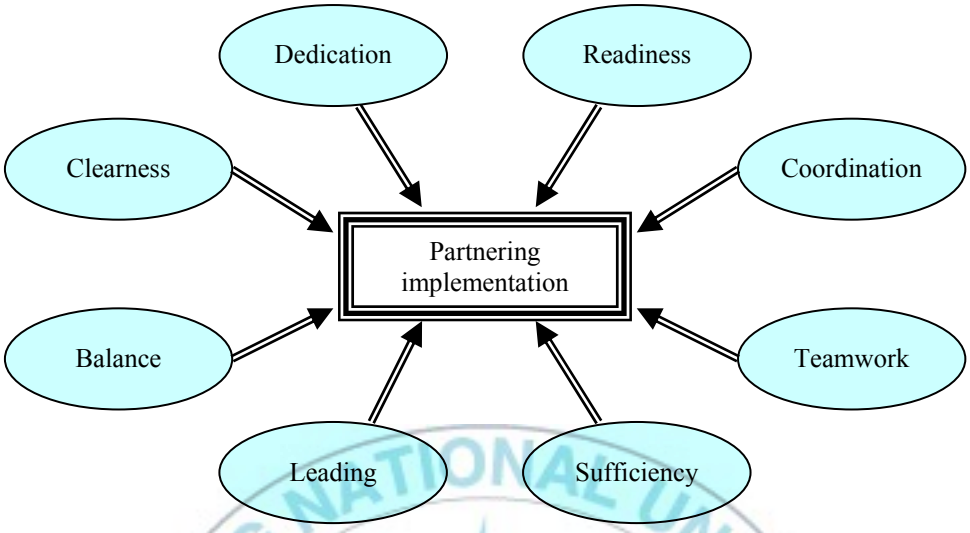
Factor analysis technique pointed out seven underlying dimensions of problems existing in the partnering process. The seven dimensions are: *unsuitability of partnering application; lack of commitment to partnering; unfamiliarity with the partnering concept; poor communication between partners; lack of key stakeholders' involvement; external constraint issues;* and *failure to compromise*. Figure 6.2 shows the seven potential destructive impediments of partnering application in Vietnamese construction projects. Such entities covered a wide range of difficulties when practicing this new concept. It is suggested that more attention should be paid to the training and education tasks for both managers and personnel.

The results could help practitioners in the Vietnamese market to comprehend the problems existing while executing a partnering. Through clear understanding about potential problems, it is hoped that partnering arrangement will be propagated to employ its advantages. By concentrating on the identified potential problems reported in this paper, the professionals are likely to mitigate the effects of these problems on their current or future partnership. It is also a chance for managers to review their organizations' capability of employing the new concept.

7.4 Success factors of partnering implementation in Vietnam

Twenty eight success factors associated with success partnering implementation in Vietnamese context are identified. T-test is conducted to test the difference of mean rating between the two sectors. T-test results show that there are some minor disagreements but insignificant. While Spearman's rank correlation test shows that the ranking orders of foreign and Vietnamese sectors are highly correlated. The top five success factors in Vietnamese context are: *Financial security, Commitment from top management, Mutual trust between parties, Adequate resources,* and *Effective communication*.

Furthermore, factor analysis results show that there are eight underlying dimensions (components) that must be adequately considered to improve the partnering performance in Vietnam. The eight dimensions are: *Dedication, Readiness, Coordination, Teamwork, Sufficiency, Leading, Balance,* and *Clearness*. The dimensions cover all aspects of the partnering working environment. Figure 6.3 presents the eight components of success factors when deploying partnering concept in Vietnam.



< **Figure 7.2** > The eight success components of construction partnering in Vietnam

The affection of success factors on success level of partnering in construction is investigated using multinomial logistic regression. The model generated four components, namely *dedication, teamwork, sufficiency,* and *balance*, having significant influence on the success level. These components are plugged into the logistic model which in turn yields the probability of achieving a variety of levels. The affection of each component varies with success level range. Dedication has positive effect on level from 5 to 8. Balance has negative effect on level 7. While at the very good performance level 9, any improvement of teamwork or sufficiency could reduce the chance of betterment. It is suggested that, for the current situation of Vietnamese context, the efforts should be put to maintain the current level 9 other than to achieve absolutely perfect but fabulous level 10.

A cross-validation technique, namely discriminant analysis, also shows the four similar components significantly influence on the success level of partnering application in current Vietnamese perspective. It is shown that the

classification accuracy of multinomial logistic regression model is comparable to discriminant analysis technique.

7.5 Limitations and future researches

Due to difficulty of long distance and research schedule, this study has several limitations. At first, the sample size is restricted to seventy nine responses (26 foreign and 56 Vietnamese responses) that impossibly represent the population of the partnering application in the construction industry in Vietnam. Second, this study also has not examined the related issues according to the perceptions of parties (owner, contractor, and consultant) in a project. The roles of practitioners in a project will affect their perceptions about partnering implementation. Third, the project type/scope that requires different project financing and suffers different public controversy has not been concerned as well. And fourth, the research uses only data from a questionnaire survey; no case study is analyzed to give practical view about partnering implementation in Vietnamese construction industry. And last, the problems of employing partnering in Vietnam are examined through the degree of agreement of respondents, and thus degree of occurrence and degree of severity of these problems have not inspected yet.

Future researches could focus on overcoming the limitations in this study:

- Extend the sample size so that the sample can adequately represent the partnering application status in Vietnam.
- Examine the perceptions of different project parties such as owners, contractors, consultants about partnering application.

- Examine the partnering related issues in terms of different projects types/characteristics.
- Take into account the degree of occurrence and degree of severity of problems.
- Investigate various case studies to have practical validation of related issues.

Additionally, more researches should pay attention to developing a partnering model and an incentive mechanism for partnering in Vietnam. Other matters such as the role of trust, partner fit, strategic alliancing… should be focused as well. Developing model to measure partnering performance is also an interesting topic.

7.6 Recommendation for advancing partnering concept application

The findings from this study and also from literature show that partnering is a prosperous procurement form that can help to avoid adversarial relationships inherent in construction environment. However, this concept is in an evolutionary phase so that the practitioners could be unfamiliar with it. The application of the concept requires many changes if compared with traditional types. Partnering is more than just a handshake, but rather represents a considerable up-front investment in time and energy toward establishing the foundation for teamwork and institutionalizing agreed upon procedures and provisions for resolving disputes and sustaining collaborative problem-solving (Larson, 1997). The strangeness is likely to lead to

reluctance in the adoption of partnering. At first, the top managers need to be informed in order to help them to be aware of the partnering approach. Many more efforts from academic researchers, practitioners, and State organizations should be consumed to promote the approach. Some of them are denoted hereafter,

- Arranging introductory seminars to present about the partnering concept. The aspects of partnering, habitual changes when applying the concept, achievement of partnering application in the world should be included.

- Arranging seminars or workshops to demonstrate the partnering process. Positive results should be presented to encourage the interest of participants.

- Arranging workshops and fora for practitioners' discussion about practical case studies. This is also a chance for practitioners to mutually interact, discuss experiences, or establish relationship.

- More funds should be supplied to conduct researches related to the field.

- Encouraging and establishing a good relationship between academic researchers and practitioners to bring research into life.

- Last but not least, the State, universities or research centers, construction organizations should take a proactive role in propagating the partnering arrangement.

REFERENCES

1. Aksorn, T. and Hadikusumo, B.H.W. (2008). “Critical success factors influencing safety program performance in Thai construction projects”. Safety Science, 46, 709-727.

2. Asian Development Bank (ADB) (2007). ADB OKs $15M Loan to Aid Poverty Reduction Program in Vietnam. Retrieved at: http://www.adb.org/media/Articles/2007/12204-vietnamese-poverties-reductions/

3. Bayliss, R., Cheung, S.O., Suen, H.C.H., Wong, S.P. (2004). “Effective partnering tools in construction: a case study on MTRC TKE contract 604 in Hong Kong”. International Journal of Project Management, 22, 253-263.

4. Bayramoglu, S. (2001). “Partnering in construction: improvement through integration and collaboration”. Leadership and Management in Engineering, July, 39-43.

5. Beach, R., Webster, M., Campell, K.M. (2005). “An evaluation of partnership development in the construction industry“. International Journal of Project Management. 23, 611-621.

6. Bennett, J. and Peace, S. (2006). Partnering in the construction industry. A code of practice for strategic collaborative working. Butterworth-Heinemann, 30 Corporate Drive, Burlington, MA.

7. Black, C., Akintoye, A., Fitzgerald, E. (2000). “An analysis of success factors and benefits of partnering in construction“. International Journal of Project Management. 18, 423-434.

8. Boynton, A.C. and Zmud, W. (1984). “An assessment of critical success factors”. MIT Sloan Management Review, 25(4):17-27.

9. Brace, I. (2004). Questionnaire design: how to plan, structure and write survey material for effective market research. Kogan Page, London & Sterling, VA. ISBN 0-7494-4181-X.

10. Bresnen, M. and Marshall, N. (2000a). “Motivation, commitment and the use of incentives in partnerships and alliances”. Construction Management and Economics. 18, 587-598.

11. Bresnen, M. and Marshall, N. (2000b). “Partnering in construction: a critical review of issues, problems and dilemmas.” Construction Management and Economics, 18, 229-237.

12. Bresnen, M. and Marshall, N. (2002). “The engineering or evolution of co-operation? A tale of two partnering projects”. International Journal of Project Management, 20, 497-505.

13. Bresnen, M. (2007). “Deconstructing partnering in project-based organization: seven pillars, seven paradoxes and seven deadly sins”. International Journal of Project Management, 25, 365-374.

14. Carrier, J. D. (1992). “Managing and motivating people on a joint venture project”. Journal of Management in Engineering, 8(4), 362-366.

15. Chan, A.P.C., Chan, D.W.M., Ho, K.S.K. (2003a). “Partnering in construction: critical study of problems for implementation”. Journal of Management in Engineering (ASCE), 19(3), 126-135.

16. Chan, A.P.C, Chan, D.W.M, Ho, K.S.K. (2003b). “An empirical study of the benefits of construction partnering in Hong Kong”. Construction Management and Economics. 21, 523-533.

17. Chan, A.P.C., Chan, D.W.M., Chiang, Y.H., Tang, B.S., Chan, E.H.W., Ho, K.S.K. (2004). “Exploring critical success factors for partnering in construction projects”. Journal of Construction Engineering and Management (ASCE), 130(2), 188-198.

18. Chan, A.P.C., Chan, D.W.M., Fan, L.C.N., Lam, P.T.I., Yeung, J.F.Y. (2006). “Partnering for construction excellence – A reality or myth?”. Building and Environment, 41, 1924-1933.

19. Chen, C.J. (2003). “The effects of environment and partner characteristics on the choice of alliance forms”. International Journal of Project Management, 21, 115-124.

20. Chen, W.T. and Chen, T.T. (2007). “Critical success factors for construction partnering in Taiwan”. International journal of Project Management, 25, 475-484.

21. Chen, W.T., Huang, Y.H., Lin, C.L., Mortis, L. (2008). “A framework of critical factors for construction partnerships in Taiwan”. ICC 2008 proceedings, IEEE Communication Society, 5553-5557.

22. Cheng, E.W.L., Li, H., Love, P.E.D. (2000). “Establishment of critical success factors for construction partnering”. Journal of Management in Engineering (ASCE), 16(2), 84-92.

23. Cheng, E.W.L., and Li, H. (2001). “Development of a conceptual model of construction partnering”. Engineering, Construction and Architectural Management, 8(4), 292-303.

24. Cheng, E.W.L., Li, H., Love, P.E.D. (2002). “Construction partnering process and associated critical success factors: quantitative investigation”. Journal of Management in Engineering (ASCE), 18(4), 194-202.

25. Cheng, E.W.L., Li, H., Love, P.E.D., Irani, Z. (2004). “Strategic alliances: a model for establishing long-term commitment to inter-organisational relations in construction”. Building and Environment, 39, 459-468.

26. Cheng, E.W.L. and Li, H. (2004). “Development of a practical model of partnering for construction projects”. Journal of Construction Engineering and Management (ASCE), 130(6), 790-798.

27. Cheng, E.W.L., and Li, H. (2007). “Application of ANP in process models: An example of strategic partnering”. Building and Environment 42, 278-287.

28. Cheung, S.O., Tam, C.M., Ndekugri, I., Harris, F.C. (2000). “Factors affecting clients’ project dispute resolution satisfaction in Hong Kong”. Construction Management and Economics. 18, 281-294.

29. Cheung, S.O., Ng, T.S.T., Wong, S.P, Suen, H.C.H. (2003). “Behavioral aspects in construction partnering”. International Journal of Project Management, 21, 333-343.

30. Cheung, S.O., Suen, H.C.H., Cheung, K.K.W. (2003). “An automated partnering monitoring system – Partnering Temperature Index”. Automation in Construction 12, 331-345.

31. Chua, D. K. H., Kog, Y. C., and Loh, P. K. (1999). “Critical success factors for different project objectives”. Journal of Construction Engineering and Management, ASCE, 125(3), 142-150.

32. Conley, M.A. and Gregory, R.A. (1999). “Partnering on small construction projects”. Journal of Construction Engineering and Management (ASCE), 125(5), 320-324.

33. Crane, T.G., Felder, J.P., Thompson, P.J., Thompson, M.G., Sanders, S.R. (1997). “Partnering process model”. Journal of Management in Engineering (ASCE), 13(3), 57-63.

34. Crane, T.G., Felder, J.P., Thompson, P.J., Thompson, M.G., Sanders, S.R. (1999). “Partnering measures”. Journal of Management in Engineering (ASCE), 15(2), 37-42.

35. Crowley, L.G. and Karim, M.A. (1995) “Conceptual model of partnering”. Journal of Management in Engineering (ASCE) 11(5): 33–9.

36. Dainty, A.R.J., Briscoe, G.H., Millett, S.J. (2001). “Subcontractor perspectives on supply chain alliances”. Construction Management and Economics. 19, 841-848.

37. Diekmann, J.E. and Girard, M.J. (1995). “Are contract disputes predictable?”. Journal of Construction Engineering and Management (ASCE), 121(4), 355-363.

38. Drexler, Jr. J.A. and Larson, E.W. (2000). “Partnering: why project owner-contractor relationships change”. Journal of Construction Engineering and Management (ASCE), 126(4), 293-297.

39. Gardiner, P.D. and Simmons, J.E.L. (1998). “Conflict in small- and medium-sized projects: Case of partnering to the rescue”. Journal of Management in Engineering (ASCE), 14(1), 35-40.

40. Hair, J.F., Black, W.C., Babin, B.J., Anderson, R.E. (2009). Multivariate data analysis (7^{th}). Prentice Hall.

41. Han, S.H., Kim, D.Y., Kim, H.K. (2007). “Predicting Profit Performance for Selecting Candidate International Construction Projects”. Journal of Construction Engineering and Management (ASCE), 133(6), 425-436.

42. Handa, V. and Adas, A. (1996). “Predicting the level of organizational effectiveness: a methodology for the construction firm”. Construction Management and Economics. 14, 341-352.

43. Ho, C., Nguyen, P. M., Shu. M. H. (2007). “Supplier Evaluation and Selection Criteria in the Construction Industry of Taiwan and Vietnam”. Information and Management Sciences, 18(4), 403-426.

44. Hyvari, I. (2006). “Success of projects in different organizational conditions”. Project Management Journal, 37(4), 31-41.

45. Iyer, K.C., Jha, K.N. (2006). “Critical factors affecting schedule performance: evidence from Indian construction projects”. Journal of Construction Engineering and Management (ASCE), 132(8), 871-881.

46. Japanese External Trade Organization (JETO). (2007). “Survey of Japanese-Affiliated Firms in ASEAN and India”.

47. Jefferies, M., Gameson, R., Rowlinson, S. (2002). “Critical success factors of the BOOT procurement system: reflection from the stadium

Australia case study". Engineering, Construction and Architectural Management. 9(4), 352-361.

48. Jha, K.N. and Iyer, K.C. (2007). "Commitment, coordination, competence and the iron triangle". International Journal of Project Management. 25, 527-540.

49. Joaquim, P. M. S. (2007). Applied Statistics Using SPSS, STATISTICA, MATLAB and R. Springer-Verlag Berlin Heidelberg. ISBN 978-3-540-71971-7.

50. Kaluarachchi, Y.D. and Jones, K. (2007). "Monitoring of a strategic partnering process: the Amphion experience". Construction Management and Economics, 25, 1053-1061.

51. Kim, J.C., Kim, D.H., Kim, J.J., Ye, J.S., Lee, H.S. (2000). "Segmenting the Korean housing market using multiple discriminant analysis". Construction Management and Economics, 18, 45-54.

52. Kim, D.Y., Han, S.H., Kim, H.K. (2008). "Discriminant analysis for predicting ranges of cost variance in international construction projects". Journal of Construction Engineering and Management (ASCE), 134(6), 398-410.

53. Koksal, A., and Arditi, D. (2004). "Predicting construction company decline". Journal of Construction Engineering and Management (ASCE), 130(6), 799-807.

54. Koraltan, S.B. and Dikbas, A. (2002). "An assessment of the applicability of partnering in the Turkish construction sector". Construction Management and Economics. 20, 315-321.

55. Lam, E.W.M., Chan, A.P.C., Chan, D.W.M. (2008). “Determinants of successful design-build projects”. Journal of Construction Engineering and Management (ASCE), 134(5), 333-341.

56. Larson, E. (1995). “Project partnering: results of study of 280 construction projects”. Journal of Management in Engineering (ASCE), 11(2), 30-35.

57. Larson, E. (1997). “Partnering on construction projects: a study of the relationship between partnering activities and project success“. IEEE Transaction on Engineering and Management 44(2), 188-195.

58. Lazar, F.D. (1997). “Partnering-new benefits from peering inside the black box”. Journal of Management in Engineering (ASCE). 13(6), 75-83.

59. Le-Hoai, L., Lee, Y.D., Lee, J.Y. (2008). “Delay and Cost Overruns in Vietnam Large Construction Projects: A Comparison with Other Selected Countries“. KSCE Journal of Civil Engineering, 12(6), 367-377.

60. Le-Hoai, L.; Lee, Y.D., Cho, J.W. (2009). “Construction of Time-Cost model for building projects in Vietnam”. Korean Journal of Construction Engineering and Management (KICEM) 10(3), 130-138.

61. Li, H., Cheng, E.W.L., Love, P.E.D., Irani, Z. (2001). “Co-operative benchmarking: a tool for partnering excellence in construction“. International Journal of Project Management. 19, 171-179.

62. Long, D. N. (2003). “Policy analysis for improving performance of a construction project by system dynamics modeling”. Master thesis – AIT Thailand.

63. Long, N.D., Ogunlana, S., Quang, T. and Lam, K.C. (2004). “Large construction projects in developing countries: a case study from Vietnam”. International Journal of Project Management, 22(7), 553–561.

64. Loraine, R.K. (1994). “Project specific partnering”. Engineering, Construction and Architectural Management, 1(1), 5-16.

65. Love, S. (1997). “Subcontractor partnering: I’ll believe it when I see it”. Journal of Management in Engineering (ASCE), 13(5), 29-31.

66. Lowe, D.J., and Parwar, J. (2004). “A logistic regression approach to modelling the contractor’s decision to bid”. Construction Management and Economics, 22, 643-653.

67. Lu, S. and Yan, H. (2007a). A model for evaluating the applicability of partnering in construction. Int. J. Project Manage. 25, 164-170.

68. Lu, S. and Yan, H. (2007b). “An empirical study on incentives of strategic partnering in China: views from construction companies”. International Journal of Project Management, 25, 241-249.

69. Lui, S.S., and Ngo, H. (2004). “The role of trust and contractual safeguards on cooperation in non-equity alliances.” Journal of Management, 30(4), 471-485.

70. Luu, T.V., Kim, S.Y., Cao, H.L. and Park, Y.M. (2008) “Performance measurement of construction firms in developing countries'. Construction Management and Economics, 26(4), 373-386.

71. Mason, J.R. (2007). “The views and experiences of specialist contractors on partnering in the UK”. Construction Management and Economics, 25, 519-527.

72. McKillup, S. (2005). Statistics explained – An introductory guide for life scientists. CAMBRIDGE UNIVERSITY PRESS. The Edinburg Building, Cambridge CB2 2RU, UK.

73. Menches, C.L. and Hanna, A.S. (2006). "Quantitative Measurement of Successful Performance from the Project Manager's Perspective". Journal of Construction Engineering and Management (ASCE), 132(12), 1284-1293.

74. Naoum, S. (2003). "An overview into the concept of partnering". International Journal of Project Management, 21, 71-76.

75. Ng, S.T., Rose, T.M., Mak, M., Chen, S.E. (2002). "Problematic issues associated with project partnering – the contractor perspective". International Journal of Project Management, 20, 437-449.

76. Ngowi, A.B. (2007). "The role of trustworthiness in the formation and governance of construction alliances". Building and Environment, 42, 1828-1835.

77. Nguyen, L.D., Ogunlana, S.O., and Lan, D.T.X. (2004). "A study on project success factors in large construction projects in Vietnam". Journal of Engineering, Construction and Architectural, 11(6), 404-413.

78. Nguyen, T.N.Q., Neck, P.A., Nguyen, T.H. (2008). "The impact of knowledge management infrastructure on organisational competitiveness in a Confucian-socialist market economy". Service Systems and Service Management, 2008 International Conference.

79. Nguyen, T.N.Q., Neck, P.A., Nguyen, T.H. (2009). “The critical role of knowledge management in achieving and sustaining organisational competitive advantage”. International Business Research, 2(3), 3-16.

80. North Carolina State University (NCSU). “Discriminant Function Analysis”. Retrieved at http://faculty.chass.ncsu.edu/garson/PA765/discrim.htm (on 28th-Sep-2009).

81. Nyström, J. (2008). “A quasi-experimental evaluation of partnering”. Construction Management and Economics, 26(5), 531-541.

82. Ozorhon, B., Arditi, D., Dikmen, I., Birgonul, M.T. (2007). “Effect of host country and project conditions in international construction joint ventures”. International Journal of Project Management, 25, 799-806.

83. Ozorhon, B., Arditi, D., Dikmen, I., Birgonul, M.T. (2008a). “Effect of partner fit in international construction joint ventures”. Journal of Management in Engineering (ASCE), 24(1), 12-20.

84. Ozorhon, B., Arditi, D., Dikmen, I., Birgonul, M.T. (2008b). “Implications of culture in the performance of international construction joint ventures”. Journal of Construction Engineering and Management (ASCE), 134(5), 361-370.

85. Packham, G., Thomas, B., Miller, C. (2003). “Partnering in the house building sector: a subcontractor’s view”. International Journal of Project Management, 21, 327-332.

86. Phua, F.T.T. (2004). “Modeling the determinants of multi-firm project success: A grounded exploration of different participant perspectives”. Construction Management and Economics, 22, 451-459.

87. Phua, F.T.T. (2006). “When is construction partnering likely to happen? An empirical examination of the role of institutional norms”. Construction Management and Economics. 24(6), 615-624.

88. Robert, H. (2006). Handbook of univariate and multivariate data analysis and interpretation with SPSS. Chapman & Hall/CRC. Taylor & Francis Group.

89. Rockart, J. F. (1979). “Chief executives define their own data needs”. Harvard Business Review, March-April, 81-92.

90. Rowlinson, S., Cheung, F.Y.K., Simons, R., Rafferty, A. (2006). “Alliancing in Australia-No Litigation contracts: a tautology?”. Journal of Professional Issues in Engineering Education and Practice (ASCE), 132(1), 77-81.

91. Sanvido, V., Grobler, F., Parfitt, K., Guvenis, M., Coyle, M. (1992). “Critical success factors for construction projects”. Journal of Construction Engineering and Management (ASCE), 118(1), 94-111.

92. Sekaran, U. (2003). Research methods for business, A Skill Building Approach, 4th Ed., John Wiley & Sons Inc.

93. Shank, M.E., Boynton, A.C., Zmud, R.W. (1985). “Critical success factor analysis as a methodology for MIS planning”. MIS Quarterly, June.

94. Sharma, S. (1996). Applied multivariate techniques. John Wiley & Sons Inc.

95. Slater, T.S. (1998). “Partnering: Agreeing to agree”. Journal of Management in Engineering (ASCE), 14(6), 48-50.

96. Tang, W., Duffield, C.F., Young, D.M. (2006). “Partnering mechanism in construction: an empirical study on the Chinese construction industry”. Journal of Construction Engineering and Management (ASCE), 132(3), 217-229.

97. Tang, W., Qiang, M., Duffield, C.F., Young, D.M., Lu, Y. (2008). “Incentives in the Chinese construction industry”. Journal of Construction Engineering and Management (ASCE), 134(7), 457-467.

98. Tennyson, R. (2003). The partnering toolbook. London, The international business leaders forum (IBLF) and the Global alliance for improved nutrition (GAIN).

99. Thanh, N.X. and Dapice, D. (2009). “Vietnam's Infrastructure Constraints”. ASH Institute for Democratic Governance and Innovation, John F. Kennedy School of Government

100. Tiong, R.L.K. (1996). “CSFs in competitive tendering and negotiation model for BOT projects”. Journal of Construction Engineering and Management (ASCE), 122(3), 205-211.

101. Toor, S.R. and Ogunlana, S.O. (2008). “Critical COMs of success in large-scale construction projects: Evidence from Thailand construction industry”. International Journal of Project Management, 26, 420-430.

102. University of Nebraska-Lincoln (UNL). “On Multinomial Regression Output Warning interpretation”. Retrieved at: ssp.unl.edu/multinomialregression.html (on 25th, Sep, 2009).

103. Vietnamese General Statistics Office (GSO). Statistical Data (Vietnamese). Retrieved at: http://www.gso.gov.vn/

104. Vietnamese Government (VG). Real situation of Vietnamese entrepreneurs - Statistical data (Vietnamese). Retrieved at: http://www.chinhphu.vn/portal/page?_pageid=33,173446&_dad=portal&_schema=PORTAL

105. Walker, D.H.T., and Johannes, D.S. (2003). "Construction industry joint venture behaviour in Hong Kong—designed for collaborative results?". International Journal of Project Management, 21, 39-49.

106. Wong, C.H. (2004). "Contractor performance prediction model for the United Kingdom construction contractor: study of logistic regression approach". Journal of Construction Engineering and Management (ASCE), 130(5), 691-698.

107. Wong, P.S.P., and Cheung, S.O. (2004). "Trust in construction partnering: views from parties of the partnering dance". International Journal of Project Management, 22, 437-446.

108. Wood, G.D. and Ellis, R.C.T. (2005). "Main contractor experiences of partnering relationships on UK construction projects". Construction Management and Economics". 23, 317-325.

109. Woodric, A.M. (1992). "Partnering: providing effective project control". Journal of Management in Engineering (ASCE), 9(2), 136-141.

110. Wilson, Jr. R.A., Songer, A.D., Diekman, J. (1995). "Partnering: more than a workshop, a catalyst for change". Journal of Management in Engineering (ASCE), 11(5), 40-45.

111. Yeung, J.F.Y., Chan, A.P.C., Chan, D.W.M. and Li, L.K. (2007). "Development of a partnering performance index (PPI) for

construction projects in Hong Kong: a Delphi study". Construction Management and Economics, 25(12), 1219-1237.

112. Yeung, J.F.Y., Chan, A.P.C., Chan, D.W.M. and Li, L.K. (2008). "Establishing quantitative indicators for measuring the partnering performance of construction projects in Hong Kong". Construction Management and Economics, 26(3), 277-301.

113. Yiu, T.W., Cheung, S.O., Mok, F.M. (2006). "Logistic likelihood analysis of mediation outcomes". Journal of Construction Engineering and Management (ASCE), 132(10), 1026-1036.

114. Yu, A.T.W, Shen, Q., Kelly, J. and Hunter, K. (2006). "Investigation of critical success factors in construction project briefing by way of content analysis". Journal of Construction Engineering and Management, 132(11), 1178-1186.

115. Zhang, X. (2005). "Critical success factors for public-private partnerships in infrastructure development". Journal of Construction Engineering and Management (ASCE), 131(1), 3-14.

116. Mind Tools Ltd, 1995-2009. Retrieved at http://www.mindtools.com/ on 5th October,2009.

APPENDIX

APPENDIX 1

INSTRUCTION FOR USING LOGISTIC REGRESSION MODEL

There are four steps when using the logistic regression model. The four steps go thoroughly from assessing the success factors to calculating the probability of achieving a certain success level. This Appendix has presented these four steps and an example of model application.

A.1 The four steps of model

- **Step 1**: The first step is to identify the raw variables used in component score. Answer the related questions presented in Table 5.41.

< **Table A.1** > Answer these questions for estimating partnering success level

Code	How would you rate the degree of contribution of the following factors to your partnering project, according to 5 point scale?	Not significant at all		<==>		Highly significant
		1	2	3	4	5
X1	Mutual trust between parties					
X2	Effective communication					
X3	Adequate resources					
X4	Long-term commitment					
X5	Commitment from top management					
X6	Clear understanding about scope and objectives					
X7	Early implementation of the partnering process					
X8	Commitment to continuous improvement					
X9	Acting consistent with objectives					
X10	Dedicated team					
X11	Flexibility to change					

X12	Commitment to quality					
X13	Total cost perspective					
X14	Good cultural fit					
X15	Company wide acceptance about the partnering					
X16	Technical expertise					
X17	Financial security					
X18	Questioning attitude about assumptions					
X19	Empowerment of stakeholders					
X20	Creativity of partnering team					
X21	Equity					
X22	Mutual vision, goals/objectives					
X23	Effective conflict resolution process					
X24	Educated and trained personnel for partnering					
X25	Effective coordination					
X26	Adequate partnering team building					
X27	Partnering experience					
X28	Joint problem solving					

- **Step 2**: Calculate the four scores in terms of the four following formulas (Eq.A.1 to Eq.A.4):

$$\begin{aligned} Score\ 1 = & -0.032 \times X1 - 0.060 \times X2 + 0.020 \times X3 + 0.045 \times X4 - 0.005 \times X5 \\ & - 0.022 \times X6 + 0.119 \times X7 + 0.256 \times X8 + 0.279 \times X9 + 0.135 \times X10 \\ & + 0.272 \times X11 + 0.028 \times X12 + 0.172 \times X13 + 0.124 \times X14 - 0.006 \times X15 \\ & - 0.089 \times X16 + 0.068 \times X17 - 0.086 \times X18 + 0.059 \times X19 + 0.205 \times X20 \\ & - 0.076 \times X21 - 0.150 \times X22 - 0.040 \times X23 - 0.135 \times X24 - 0.054 \times X25 \\ & - 0.133 \times X26 + 0.044 \times X27 - 0.061 \times X28 \end{aligned} \quad \text{(A.1)}$$

$$\begin{aligned} Score\ 2 = & -0.269 \times X1 - 0.078 \times X2 + 0.020 \times X3 + 0.059 \times X4 + 0.027 \times X5 \\ & - 0.029 \times X6 + 0.148 \times X7 + 0.124 \times X8 - 0.053 \times X9 - 0.065 \times X10 \\ & + 0.008 \times X11 - 0.023 \times X12 - 0.097 \times X13 + 0.116 \times X14 + 0.053 \times X15 \\ & - 0.117 \times X16 - 0.066 \times X17 - 0.030 \times X18 - 0.107 \times X19 - 0.079 \times X20 \\ & + 0.063 \times X21 + 0.166 \times X22 - 0.017 \times X23 + 0.031 \times X24 - 0.065 \times X25 \\ & - 0.013 \times X26 + 0.339 \times X27 + 0.389 \times X28 \end{aligned} \quad \text{(A.2)}$$

$$
\begin{aligned}
Score\,3 = {} & -0.039 \times X1 + 0.157 \times X2 + 0.328 \times X3 - 0.241 \times X4 + 0.067 \times X5 \\
& + 0.037 \times X6 - 0.008 \times X7 + 0.102 \times X8 - 0.112 \times X9 + 0.188 \times X10 \\
& - 0.045 \times X11 + 0.019 \times X12 - 0.144 \times X13 - 0.098 \times X14 - 0.057 \times X15 \\
& + 0.102 \times X16 + 0.001 \times X17 - 0.097 \times X18 - 0.198 \times X19 + 0.064 \times X20 \\
& - 0.135 \times X21 + 0.120 \times X22 + 0.411 \times X23 + 0.007 \times X24 + 0.079 \times X25 \\
& + 0.143 \times X26 - 0.067 \times X27 + 0.023 \times X28
\end{aligned}
\qquad \text{(A.3)}
$$

$$
\begin{aligned}
Score\ 4 = {} & 0.159 \times X1 - 0.029 \times X2 - 0.169 \times X3 - 0.219 \times X4 - 0.043 \times X5 \\
& - 0.048 \times X6 + 0.090 \times X7 - 0.076 \times X8 - 0.193 \times X9 - 0.053 \times X10 \\
& - 0.008 \times X11 + 0.320 \times X12 - 0.050 \times X13 - 0.180 \times X14 - 0.019 \times X15 \\
& - 0.024 \times X16 + 0.021 \times X17 + 0.056 \times X18 + 0.264 \times X19 + 0.032 \times X20 \\
& + 0.107 \times X21 + 0.061 \times X22 + 0.145 \times X23 + 0.056 \times X24 - 0.014 \times X25 \\
& + 0.489 \times X26 + 0.104 \times X27 - 0.108 \times X28
\end{aligned}
\qquad \text{(A.4)}
$$

- **Step 3**: Calculate the logit states by using the following formulas (Eq. A.5 to Eq.A.9):

$$Logit\ state\ 5/10 = -1.171 - 10.312 \times Score\,1 \qquad \text{(A.5)}$$

$$Logit\ state\ 6/10 = -0.849 - 9.997 \times Score\,1 \qquad \text{(A.6)}$$

$$Logit\ state\ 7/10 = 3.062 - 7.114 \times Score\,1 + 1.777 \times Score\,4 \qquad \text{(A.7)}$$

$$Logit\ state\ 8/10 = 3.057 - 3.445 \times Score\,1 \qquad \text{(A.8)}$$

$$Logit\ state\ 9/10 = 0.827 + 1.455 \times Score2 + 2.193 \times Score\,3 \qquad \text{(A.9)}$$

- **Step 4**: Calculate the probability of each level's occurrence by using the following formula (Eq. A.10):

$$p\left[occurence\ of\ level_{i(i\ =5\text{-}10)}\right] = \frac{e^{logit\ \ state\ \ i/10}}{\sum_{k=5}^{10} e^{logit\ \ state\ \ k/10}} \qquad \text{(A.10)}$$

At this time, the probability of achieving each success level is obtained.

The practitioners can make decision about which success level their partnering could be obtained. The maximum probability can be used as the cut-off criterion. It means that the achieved success level is the level which having the highest chance of occurrence.

The participants can also use this procedure to improve their partnering process by evaluating the impact of each factor on the probability of success level. Through this evaluation, participants could decide to put more attention to or greater effort on managing significant factors in order to increase the chance of achieving better outcome.

A.2 An example of model application

In this section, an example is presented to portray the application steps of the model. The chosen data case illustrated in this example is the case number 5 in the testing set. The success level of this case is 7 (observed from survey). The input data for this case is tabulated in Table A.2

< Table A.2 > Input data using in this example

X1	X2	X3	X4	X5
4	4	5	3	4
X6	X7	X8	X9	X10
4	3	3	3	4
X11	X12	X13	X14	X15
3	3	2	2	2
X16	X17	X18	X19	X20
4	4	3	4	2
X21	X22	X23	X24	X25
3	3	4	4	4
X26	X27	X28		
4	3	4		

Using equations from Eq.A.1 to Eq.A.4, the score values can be obtained. The results are tabulated in Table A.3.

< **Table A.3** > Score value

Score	Value
Score 1	-1.3183
Score 2	-0.2596
Score 3	1.1324
Score 4	0.1469

Using equations from Eq.A.5 to Eq.A.9 to calculate logit state values, Table A.4 shows these calculated values. The logit state value for level 10 is obviously 0. Input the logit values into the family of equations coded as Eq.A.10, the probability of level occurrence are produced. Table A.4 also denotes the probability values.

< **Table A.4** > Logit state value and probability

Level 5	Level 6	Level 7	Level 8	Level 9	Level 10
Logit function value					
12.423	12.330	12.701	7.598	2.933	0
Probability of level occurrence					
0.309	0.281	0.408	0.002	0.000	0.000

If the maximum probability criterion is utilized to identify the achieved level, level 7 with the probability of 0.408 is the most likely level to achieve.

APPENDIX 2

QUESTIONNAIRE

Partnering in construction; an investigation of incentives, problems and success factors for Vietnamese context

Partnering is an arrangement between parties (clients; client(s) and contractor(s); or contractor(s) and sub-contractor(s)). Partnering is a concept which provides a framework for establishment of mutual objectives among building team. From the late 1980s, the partnering emerged as a new delivery method which seeks to create a win/win attitude. The goals of this study are to address the critical factors in implementing the partnering relationship in construction industry in Vietnam. Furthermore, the incentives, which have been achieved, should be empirically evaluated through the views of practitioners who experienced in partnering in Vietnam.

Please complete this questionnaire to help in our academic research to identify the critical factors in partnering projects. The questionnaire takes about 15-20 minutes to complete.

If you are happy to help in this study, it would be highly appreciated.

Le Hoai Long

PART 1 Personal information
Please fill in the information (or circle the appropriate choice) for each question
Q1.1 Do you have experience to take part in partnering project(s)? *a) Yes* *b) No* Q1.2 Your role in this partnering project *a) Client* *b) Contractor* *c) Consultant* *d) Developer* Q1.3 Your position in this partnering organization *a) Top manager* *b)Functional manager* *c) Project team* *d) Facilitator/Consultant* *e) Others* Q1.4 Your organization's origin (most appropriate) *a) Vietnam* *b) Foreign, please specify: ……*

Q1.5 Your working experience in construction industry

a) < 5 years b) 5-10 years c) 11-15 years

d) 16-20 years e) > 20 years

PART 2 The success factors in partnering projects

According to your experience, please circle the number that best reflects the degree of significance of the contribution of the following factors in developing your partnering project follow the scale:

"**1**"="not significant" "**2**"="Low" "**3**"="Moderately"

"**4**"="High" "**5**"="Very high"

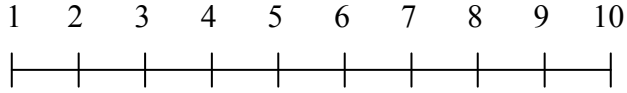
Q2.1	Mutual trust between parties	1	2	3	4	5
Q2.2	Effective communication among all project team members	1	2	3	4	5
Q2.3	Adequate resources supplied from partners to support a successful partnering	1	2	3	4	5
Q2.4	Long-term commitment that is try to maintain the current partnering relationship	1	2	3	4	5
Q2.5	Commitment from top management	1	2	3	4	5
Q2.6	Clear understanding about scope and objectives statement of parties	1	2	3	4	5
Q2.7	Early implementation of the partnering process to use the knowledge, expertise …. of parties	1	2	3	4	5
Q2.8	Commitment to continuous improvement	1	2	3	4	5
Q2.9	Acting consistent with objectives	1	2	3	4	5
Q2.10	Partnering team always fulfills their commitments well and on time	1	2	3	4	5
Q2.11	Flexibility to change of partnering team	1	2	3	4	5
Q2.12	Both sides in partnership present commitment to quality	1	2	3	4	5
Q2.13	The goal of the partnering organization should be to reduce the total cost of the activities instead of individual activity costs	1	2	3	4	5
Q2.14	Good cultural fit	1	2	3	4	5
Q2.15	Wide acceptance from company about the partnering	1	2	3	4	5
Q2.16	Integrating the experienced, professional and	1	2	3	4	5

	skilled technical teams for wrapping up project					
Q2.17	Financial security	1	2	3	4	5
Q2.18	Feeling free to question any assumptions made by other parties directed to achieve win-win attitude	1	2	3	4	5
Q2.19	Stakeholders being empowered with the requisite decision making authority for problem solving	1	2	3	4	5
Q2.20	Creativity of partnering team	1	2	3	4	5
Q2.21	Considering all stakeholders' interests in creating mutual goals and committing to satisfy each stakeholder's requirements	1	2	3	4	5
Q2.22	A set of mutual goals/objectives being developed to satisfy each stakeholder's requirements	1	2	3	4	5
Q2.23	Effective conflict resolution process	1	2	3	4	5
Q2.24	People within the partnering organizations being educated, trained in order to be familiar with partnering	1	2	3	4	5
Q2.25	Effective co-ordination through increasing contact points and sharing of information	1	2	3	4	5
Q2.26	The partnering team consisting of members from all involved parties to act on behalf of their organizations	1	2	3	4	5
Q2.27	Partnering experience from previous participation in partnering events	1	2	3	4	5
Q2.28	Joint problem solving by the partnering team	1	2	3	4	5
Q2.29	……	1	2	3	4	5
Q2.30	……	1	2	3	4	5

PART 3 The level of success of the partnering project

Accompanying with the answers you provided in Part 2, according to your perception, please indicate the degree of success of the partnering in the project which you have experience follow the scale:

From "**1**"="C**ompletely unsuccessful**" To "**10**"= "A**bsolutely successful**"



PART 4 The incentives obtaining from partnering

According to your experience, please indicate the degree of your agreement on the following potential incentives that could be obtained from partnering process with scale:

"**1**"="Strongly disagree" "**2**"="Disagree" "**3**"="Neutral"

"**4**"="Agree" "**5**"="Strongly agree"

Q4.1	Less adversarial relationship	1	2	3	4	5
Q4.2	Increased customer satisfaction	1	2	3	4	5
Q4.3	Increased understanding amongst parties	1	2	3	4	5
Q4.4	Achievement of faster construction time	1	2	3	4	5
Q4.5	Reduction of risk exposure	1	2	3	4	5
Q4.6	Achievement of cost saving	1	2	3	4	5
Q4.7	Improved administration	1	2	3	4	5
Q4.8	Quality improvements	1	2	3	4	5
Q4.9	Improvement of design quality	1	2	3	4	5
Q4.10	Sharing risks more equitably among parties	1	2	3	4	5
Q4.11	Improved return on resources	1	2	3	4	5
Q4.12	Reduction of design cycle	1	2	3	4	5
Q4.13	Increased market share	1	2	3	4	5
Q4.14	Increased bidding advantages	1	2	3	4	5
Q4.15	Reduction of supervision costs	1	2	3	4	5
Q4.16	Improved project programs	1	2	3	4	5
Q4.17	Reduction in rework	1	2	3	4	5
Q4.18	Motivated employees	1	2	3	4	5
Q4.19	Assured financing	1	2	3	4	5
Q4.20	Mutual learning among participants	1	2	3	4	5
Q4.21	Reduction of paper-work	1	2	3	4	5
Q4.22	Improved safety performance	1	2	3	4	5
Q4.23	Achievement of better productivity	1	2	3	4	5
Q4.24	Increased opportunity for innovation	1	2	3	4	5
Q4.25	……..	1	2	3	4	5
Q4.26	……..	1	2	3	4	5

PART 5 The problematic factors in partnering projects

According to your experience, please indicate the degree of your agreement on the following factors that could be problems causing adversarial effects in partnering process, with scale:

"**1**"="Strongly disagree" "**2**"="Disagree" "**3**"="Neutral"

"**4**"="Agree" "**5**"="Strongly agree"

Q5.1	Unsolved arguments (ignorance or allowing arguments raising)	1	2	3	4	5
Q5.2	Partner(s) disagree to compromise	1	2	3	4	5
Q5.3	Lack of authority from owner	1	2	3	4	5
Q5.4	Partners' attitudes conceded by commercial pressure	1	2	3	4	5
Q5.5	Lack of training and guidance in project partnering arrangement	1	2	3	4	5
Q5.6	Flexibility restricted by bidding approach	1	2	3	4	5
Q5.7	Lack of continuous open and honest communication	1	2	3	4	5
Q5.8	Partners' lack of a win-win attitude	1	2	3	4	5
Q5.9	Partners with no commitment of co-operation	1	2	3	4	5
Q5.10	Lack of close relationship in partnership	1	2	3	4	5
Q5.11	Key subcontractors not involved in partnering process	1	2	3	4	5
Q5.12	Design and other consultants not included in partnering process	1	2	3	4	5
Q5.13	Partners unsuitable with specific project	1	2	3	4	5
Q5.14	Dealing with large bureaucratic organizations	1	2	3	4	5
Q5.15	Manager's lack of professional knowledge	1	2	3	4	5
Q5.16	Problems with blueprints and regulations	1	2	3	4	5
Q5.17	Lack of experience with the partnering approach	1	2	3	4	5
Q5.18	Partners failed to build a true relationship of trust	1	2	3	4	5
Q5.19	Partners failed to share information	1	2	3	4	5

Q5.20 Unfair sharing of risks or rewards	1	2	3	4	5
Q5.21 …….	1	2	3	4	5
Q5.22 …….	1	2	3	4	5
Q5.23 …….	1	2	3	4	5
Q5.24 …….	1	2	3	4	5

ꕥ THANK YOU FOR YOUR PARTICIPATION ꕥ

Any information and questionnaire response please contact:
Le Hoai Long,

Ph.D. student, Interdisciplinary program of Construction Engineering and Management,
Pukyong National University (PKNU), Busan, Korea.
Emails: lehoailong@pknu.ac.kr or lehoailong@yahoo.com Telephone: 051. 620. 1450

CURRICULUM VITAE

1. Personal Information

- Name: **Le Hoai Long**
- Sex: Male
- Date of Birth: November, 25th, 1980
- Marital status: Married
- Nationality: Vietnamese
- Email: lehoailong@yahoo.com

2. Education

- 1998 – 2003: Bachelor of Civil Engineering. Department of Civil Engineering, National University of Ho Chi Minh City, University of Technology, Vietnam.
- 2003 – 2005: Master of Science. European Master of Mechanics in Construction (EMMC) program, University of Liege (Belgium) - National University of Ho Chi Minh City, University of Technology, Vietnam.

  Thesis: "Modification of a quarter-point element in calculating fracture mechanics" (Advisor: Prof. Nguyen, Dang Hung, LTAS – University of Liege).
- 2007 – 2010: Doctor of Philosophy. Interdisciplinary Program of Construction Engineering and Management, Division of Civil Engineering, Pukyong National University, South Korea.

Dissertation: “Partnering in Construction: The Views and Experiences of Foreign and Local Participants in Vietnamese Market” (Advisor: Prof: Lee, Young Dai).

3. Achievement during PhD Study

- **Journal**
  - Long Le-Hoai, Young Dai Lee, Jun Yong Lee (2008). “Delay and Cost Overruns in Vietnam Large Construction Projects: A Comparison with Other Selected Countries“. KSCE Journal of Civil Engineering (Springer Link), 12(6), 367-377.
  - Le-Hoai Long; Lee Young Dai, Cho Jeung Wook (2009). “Construction of Time-Cost model for building projects in Vietnam”. Korean Journal of Construction Engineering and Management (KICEM) 10(3), 130-138.
  - Long Le-Hoai and Young Dai Lee (2009). “Time–Cost relationships for building projects in Korea”. Facilities (Emerald Group) 27(13/14), 549-559.
  - Long Le-Hoai and Young Dai Lee (2009). “Performance of Time and Cost in Construction Projects: A Quantitative Analysis from Vietnamese Perspective”. Journal of Construction in Developing Countries. (Revised).
  - Le Hoai Long, Young Dai Lee, Nguyen Anh Tuan (2009) “Estimating time performance for building construction projects in Vietnam”. KSCE Journal of Civil Engineering (Revised).

- Le Hoai Long, Young Dai Lee, Jeong Jul Son (2009) “Problems in Implementing Partnering in the Construction Industry in Vietnam”. KSCE Journal of Civil Engineering (Revised).
- Le Hoai Long, Young Dai Lee, Jeong Jul Son (2009) “Incentives of Partnering Approach in the Construction Industry: Perceptions of Local and Foreign Sectors in the Vietnamese Market”. Korean Journal of Construction Engineering and Management (KICEM) (Revised).
- Le Hoai Long, Young Dai Lee (2009) “Early-stage construction duration estimating for Korea’s building projects” Engineering, Construction and Architectural Management (Submitted and under review).

- **Conference**
  - Le Hoai Long, Young Dai Lee, Luu Truong Van, Nguyen Anh Tuan (2007), “Risk analysis attitudes of Construction firms in Vietnamese market”. *1st International Conference on Modern Design, Construction and Maintenance of Structures*, 10-11 December 2007, Hanoi, Vietnam.
  - Long Le-Hoai, Young Dai Lee, Jun Yong Lee (2007). “Identification of factors affecting time and cost performance in Vietnam construction projects”. Annual KICEM conference, Busan, Korea.
  - Le-Hoai, Long and Lee, Young Dai (2009). “Bromilow’s Time-Cost equation for building projects in Korea”. Annual KSCE conference, Gangwon-Do, Korea.