Master of Science

Effect Analyses of Internal Competency and Market Conditions on the Contractors′ Overseas Diversification Strategy

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Abstract

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With the importance of international construction industry, the market concentration of Korean construction contractors to the Middle East and Asia market have been raised as the main issue of the construction industry. Many previous studies have been researched diversification strategy for the solutions, however, there are still debates whether diversification strategy has positive or negative effects on the performance. In this research, limited consideration of a

complex relationship between diversification strategy and its related factors such as internal competency and market conditions is regarded as the main problem of previous studies. So this research aims to study the relationship diversification strategy and performance of contractors with consideration of internal competency and market conditions complexly. The methodology for this study is mediation analysis and Moderated Multiple Regression (MMR). Hypotheses are constituted three groups - Hypothesis of Direct effects, Hypothesis of Mediation effects, Hypothesis of Moderation effects. The result shows that direct effects and mediation effects between diversification strategy and performance were unclear, whereas moderation effects were identified significantly.

Keywords: Diversification Strategy, Internal Competency, Market conditions, International Construction Industry, Moderated Multiple Regression

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Chapter 1. Introduction

1.1 Research Background

The international construction industry has been challenging area for not only company side, but also domestic economy side since the 1960s (KIEP, 2012). The cumulative international construction revenue of Korean contractors has been approximately 775 billion dollars in 2017 (ICAK, 2017), but international construction expansion has been focused on specific markets. Top 8 contractors have been gone more into the Middle East and Asia than other regions and concentration status of plant market is approximately 78% in 2014 (Sung et al., 2015).

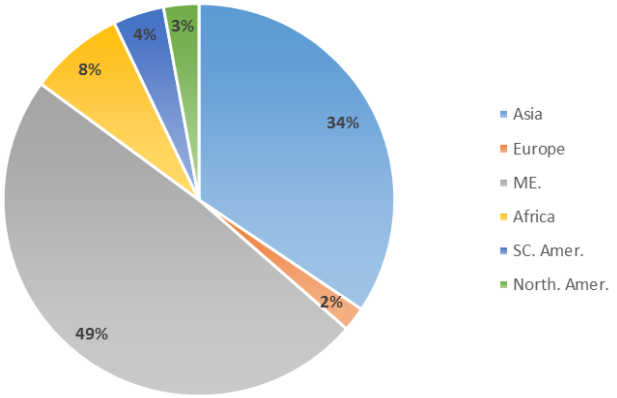

Figure 1.1 International Construction Expansion Ratio of Top 8 Contractors (Annual Report from 8 Contractors, 2006~2016)

It can be the crucial problem for contractors because it is heavily influenced by certain market event(Sung et al., 2015), such as recent low oil price phenomenon occurred during 2015~2017(Kim, 2016). It arouses main oil-producing countries to decrease their construction investment (Kim, 2016) and also affects the international construction revenue of Korean contractors (CERIK, 2017).

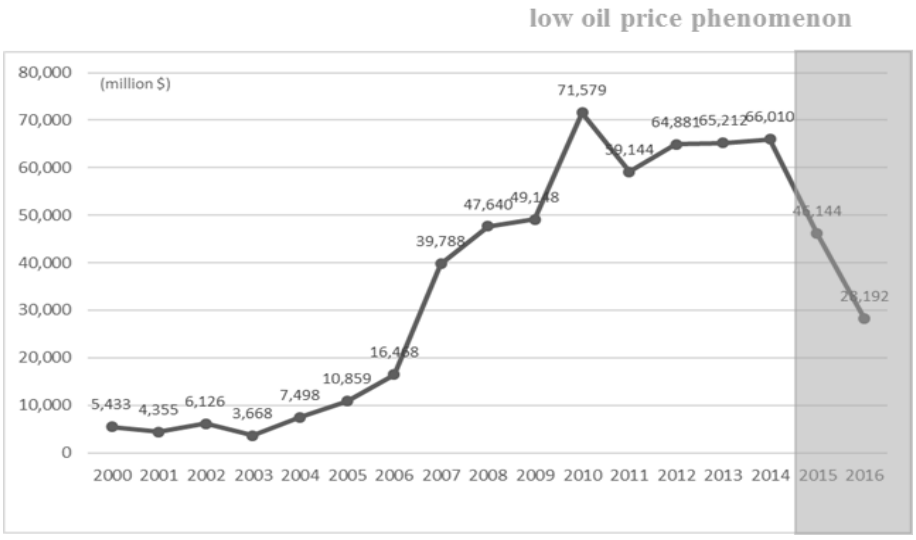

Figure 1.2 Trend of International Construction Revenue (ICAK, 2017)

For this reason, international construction experts have been discussed diversification strategy. Diversification strategy means that the company spreads business area to various market at the same time to reduce the total amount of uncertainty (Jang, 2014). Also with the limitation of growth of company size by increasing the market share or situations which company

hardly maintain its business due to market depression, the company should establish diversification strategy to survive in new business markets (Sung et al., 2015).

However, despite the importance of diversification strategy, it is not recommended to depend on spreading out its business field entirely. International construction markets are very important in terms of competitiveness, but there are dynamic threats such as uncertainty as low oil price phenomenon to reduce contractor's performance (Han et al., 2010). Also, diversification strategy can reduce uncertainty and improve the sustainability of contractors, but specialized abilities of contractors can be lost with exaggerated diversification (Jang, 2014).

Therefore, numerous studies have been analyzed the characteristic of the diversification strategy. Han et al. (2010) analyzed international construction trends and investigated successful contractor's diversification strategy. Kim and Reinschmidt (2011) studied the relationship between risk attitudes and diversification strategies using evolutionary approach simulation. And a large number of researches have studied to decide whether diversification strategy has positive effect on contractor's performances (Jung et al., 2010; Lim et al., 2014; Jang, 2014; Wang and Liu, 2014; Sung et al., 2015; Horta et al., 2016; Sung et al., 2017). However, some researches led to different or nonsignificant relationship between diversification strategy and performance. So, Sung et al. (2017) tried to dissever the situations which influence the relationship between diversification and performance such as periods, company size, main business field and analyzed direct correlation of diversification with sales revenue, profit margin, current ratio. Although the correlation was revealed significantly, the

difference of correlation of different situations was little small to adopt appropriate strategies in different situations.

Meanwhile, according to strategic management field research, the strategic fit between strategy and related factors is known to affect firm's performance (Porter, 1908; Miller, 1992). There are two perspectives on strategic fit research. One is resource-based view which emphasizes the balance between strategy and internal competency. Each company with different competency have different its level of sustainability, competitive advantage (Barney, 1991). Another perspective is strategic contingency theory which states company with the higher fit between market conditions and strategy has more performance than those misfit (Miller and Friesen, 1986). There is no established theory perfectly which theory has more impact on the performance of the company, so it is recommended to consider two perspectives equally.

There are several cases to consider these perspectives deeply. For example, the case of contractor A tried to expanse its business field to Australia mine field in the situation that mining market trend was decreasing. And its competency about mine business was less than building business field which was its main competency. So both external situations and internal competency were not fit for contractor A. The result deteriorated performance of contractor A as shown Figure 1.3. Total financial loss was approximately 20% of total construction cost as other experts expected, and there are several legal conflicts with subcontractors. Therefore research about the international construction expansion strategy considering internal competency and market conditions complexly is necessary.

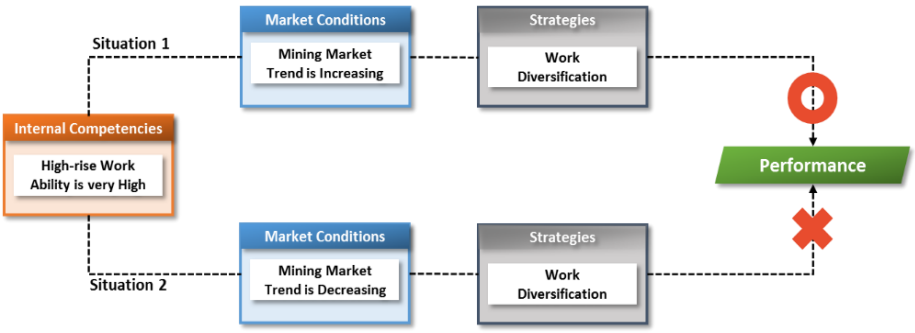

Figure 1.3 Different Result with Opposite Situation

1.2 Problem Statement

The diversification strategy plays an important role to decide whether the construction contractor expanses its business field to ensure its performances such as profitability, sustainability, etc. However, there are pros and cons to adopting them, so contractors have to consider trade-off

Many researches have studied the relationship between diversification strategy and firm's performance. But the simple approach which contemplates the relationship between strategies and performance independently led to nonsignificant results or incompatible conclusions. So contractors have difficulty in adopting appropriate decision makings how much they will expanse or spread their business field to international markets.

In this research, limited consideration of a complex relationship between diversification strategy and its related factors is themain problem of previous studies. Based on strategic contingency theory and resource-based view that emphasizes how suitable the strategy is with internal competency and market conditions, diversification strategy has to be studied similar approaches. However, the relationship between diversification strategy and performance with internal competency and market conditions has been researched independently. So the strategies effect on performance has been evaluated differently or could not produce a detailed proposal to international construction industries.

1.3 Research Objectives

The primary objective of this research is to study the relationship diversification strategy and performance of contractors with consideration of internal competency and market conditions complexly.

The indirect and interaction effect of internal competency and market conditions on the relationship between diversification strategy and performance is the main research topic. And through this empirical research, the author proposes meaningful directions the contractors might have in given situations.

The specific objectives to achieve the primary objective are as follows:

1) Derive the internal competency and market conditions factors related to diversification strategy.
2) Analyze the direct effect of internal competency, market conditions, and diversification strategy on contractor's performance.
3) Analyze the indirect and interaction effect of internal competency, market conditions, and diversification strategy on contractor's performance.

To investigate the indirect and interaction effect, analysis of mediation effect and moderation effect is mainly performed.

1.4 Research Scope

In this research, international construction expansion strategies are defined as company's decision making or direction (Price and Newson, 2003) how much contractors spread or expanse their business area to international markets especially diversification strategy. Internal competency was considered as resources or ability to operate business and market conditions was described the markets conditions. This research considered internal competency and market conditions as not controllable for contractors shortly before the strategic decision had made.

Also, this research studied top 10 Korean contractors cases based on *International Contractors Association of Korea* (ICAK) from 2006 to 2016. They performed international construction project since the 1960s and have decision making problem how much they spread or expanse their business area.

Markets segmentation was performed using two standards - region markets standard of *Construction Intelligence Center* (CIC) and product markets standard of *Engineering News Record* (ENR). Region markets divided into six markets and product markets into nine markets as shown in Table 1.1.

Table 1.1 Markets Segmentation - Region & Product

Region (based on CIC)		Product (based on ENR)		
Asia(1)	Europe(2)	General Building(1)	Manufacturing(2)	Power(3)
Middle East(3)	Africa(4)	Water Supply(4)	Sewer Waste(5)	Industry and Petroleum(6)
South-Central America(5)	North America(6)	Transportation(7)	Hazard Waste(8)	Telecommunication(9)

1.5 Research Process

This research is organized as follows. In chapter 2, preliminary study about international construction expansion strategies, internal competency, and market conditions is conducted using literature review and in-depth interview. and establishes appropriate hypothesis to investigate the primary objectives. Methodologies used in this research review in terms of reasons to apply and the detailed process in chapter 3. Data description and overall application of methodologies to test the hypothesis are described with the test results in chapter 4. And the research concludes discussions with contributions and future research in chapter 5.

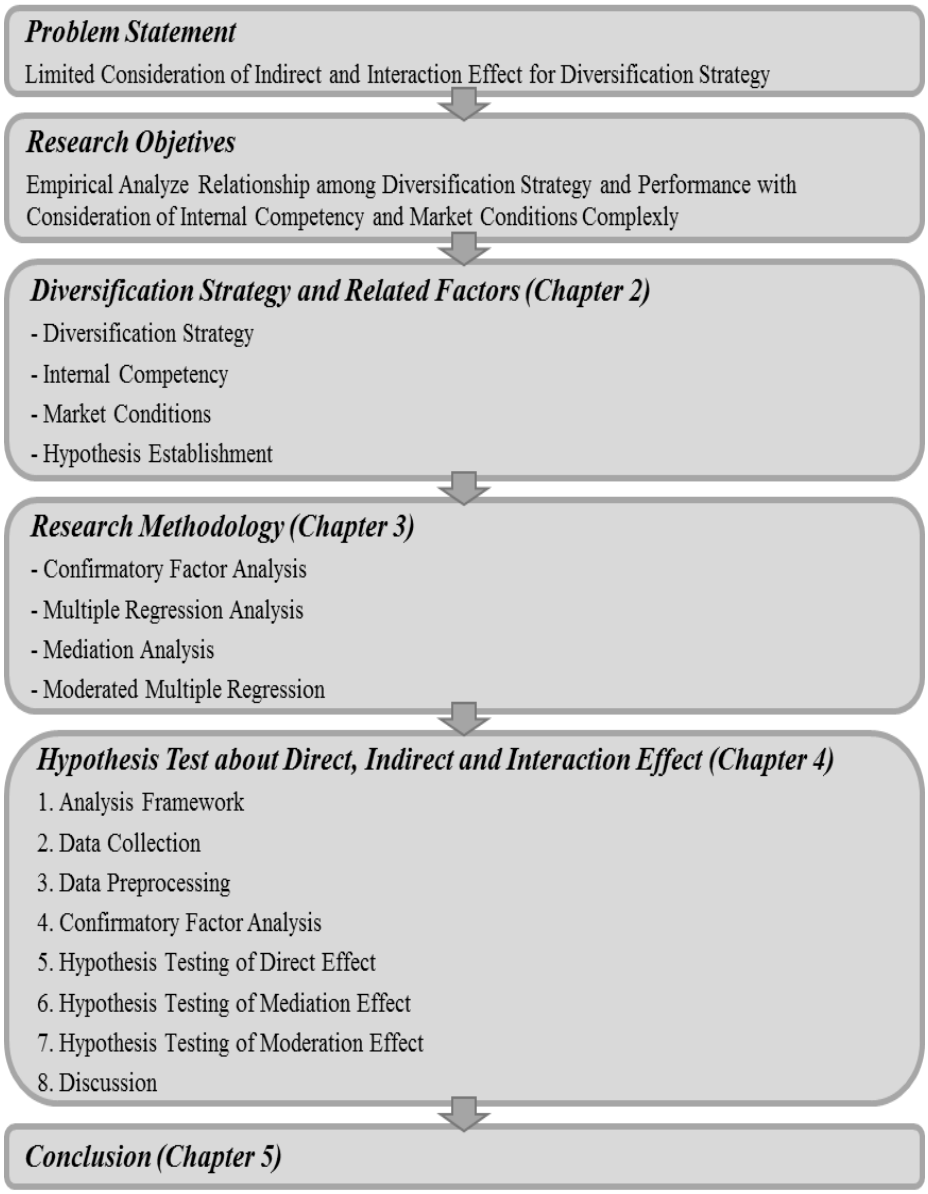

Figure 1.4 Research Process

Chapter 2. Diversification Strategy and Related Factors

2.1 Diversification Strategy

There are lots of various opinion about diversification strategy in academic circles in terms of its definition, classification, and effects on the company (Kim 2010). At the beginning of the diversification research, Ansoft (1965) and Steiner (1969) defined the diversification strategy as any kinds of expansion into the new business field. They stated that the company expanses their business field in the form of regions, goods and services, or the process of original business. Considering the purpose of this research and reference of Kim (2010) and Park (2011), diversification strategy is defined as spreading out its business area at the same period. It is used to reduce risk which business takes over and also used for stability of company's profitability (Kim, 2010; Kim and Reinschmidt, 2011), or to raise efficiency by reducing the transaction cost (Sung et al., 2015).

The company does diversification strategy for many reasons. The basic reason is maximization profits and sustainability of the company by dispersing the risk and maintaining competitive advantage (Montgomery, 1985). Also, Jeon (1996) stated that the company promotes the diversification strategy for securement of market business control, effective distribution of the resources,

minimization of transaction costs, etc. So this research assumes that the construction contractors execute the diversification strategy based on the internal competency which represents the resource of the contractors and the market conditions.

Diversification strategy is classified in various ways. First, Depending on whether diversification has relation with core competency of the company, it is divided into related diversification and unrelated diversification (Kim, 2010). Related diversification strategy means that the company spreads its business area while maintaining the similarity of the previous business field. And unrelated diversification strategy is conducted when the company expanses its business area to new business industries. However, it is difficult for construction companies to proceed unrelated diversification with characteristics of the construction industry (Park, 2011). Also depending on the direction of diversification, it can be divided into horizontal diversification and vertical diversification (Kim, 2010; Sung et al., 2015). Horizontal diversification is more likely to market segmented diversification than vertical diversification which integrates the front and back of value chain to reduce transaction cost (Park, 2011; Sung et al., 2015). So this research focused on related and horizontal diversification strategy as regional diversification and product diversification.

There are four measurements how much the company spread its business area as shown in Table 2.1.

Table 2.1 The Measurement of Diversification Strategy

Name	Author	Contents	Equation
The number of business (NUM)	Sung et al. (2015)	• Intuitive, but size of each business is not considered	$\mathbf{NUM} = \#$
Specialization Index (SR)	-	• Proportion major business revenue from total revenue. • 0<SR<1	$\boldsymbol{SR} = \mathbf{max}(\boldsymbol{P_i})$ ($\boldsymbol{P_i}$ is market share)
Berry-Herfindahl Index (BHI)	Jung et al. (2010); Park (2011); Jang (2014); Lim et al. (2014); Sung et al. (2015); Lee et al. (2016)	• Considering all unit business field by square of market share • 0<BHI<1 • If diversification is dominant, BHI=1 • If Specialization is dominant, BHI=0	$\boldsymbol{BHI} = \mathbf{1} - \sum \boldsymbol{P_i}^2$
Entropy Index (EI)	Kim and Reinschmidt (2011); Sung et al. (2015)	• Considering weight of market share to log. • If diversification is dominant, EI is getting high • If Specialization is dominant, EI=0 • More sensitive than BHI in small market share change	$\mathbf{EI} = \sum \boldsymbol{P_i} \boldsymbol{ln} \frac{\mathbf{1}}{\boldsymbol{P_i}}$

NUM and SR are not commonly used in the literature because they could not be reflected in the size of all unit business field the company conducts. Both BHI and EI can be considered with the size of all unit and its weight. And they increase when the company conducts the diversification strategy. But EI is known for better measurement than BHI in sensitivity with the low change of business (Sung et al., 2015). In this research, Regional Diversification Index (RDI) and Product Diversification Index (PDI) are measured by using entropy index.

There are numerous researches which have been studied the characteristics of diversification. Kim and Reinschmidt (2011) investigated the relationship between risk attitude and market diversification using a simulation model. It resulted in that moderately risk-averse contractors conduct more diversification strategy than the others. And moderately risk-averse contractors are more

successful in their growth than other contractors.

Han et al. (2010) and Park (2011) divided the global contractors into several groups with similar criteria, change of ENR rank. And they performed trends analysis which direction the group of contractors selects. In terms of benchmarking successful contractors, it produced the contributions which the contractors might have with mid-long term strategy. However, the effect on the performance of contractors is difficult to know quantitatively and it is unreasonable to consider ENR rank of contractors as internal competency perfectly.

Jang (2014) and Lee et al. (2016) tried to investigate the relationship between diversification and financial stability, insolvency of contractors using Vector Auto Regression Model (VARM) and impulse response function. The result of Jang (2014) was that business portfolio diversification increases financial stability, however, the result of impulse response function in Lee et al. (2016) was that insolvency might be increased with the response of diversification index which means the incompatible results from each other.

Lim et al. (2014) empirically studied the relationship between work diversification and the firm value measured in Tobin's Q which consider the market value and book value of the firm. The result of this research showed that work diversification and firm value have positive relationships. But considering the rate of variable change, there is not significant relationship.

Jung et al. (2010) studied the effect of international entry strategy on performance measured in the revenue using multiple regression analysis. The research was performed depending on different periods and divided into the static approach and dynamic approach. The result showed that regional

diversification strategy had the positive effect on performance, but product diversification strategy had non significant effect on performance.

Oyewobi (2013) studied whether there is any significant relationship between the diversification strategy and the performance of the South Africa contractors. It measured control variables as the size of the firms, age of the firms, technical capability and firm's capital structure. However, the differences in financial performance between undiversified contractors and diversified contractors were nonsignificant each other.

Horta et al. (2016) investigated the impact of diversification on the financial performance of Portugal and Spanish contractors obtained by Data Envelopment Analysis technique. The outcome of this research was that diversification has a curvilinear relationship with financial performance.

Sung et al. (2015) studied the relationship between diversification strategy and the performance measured in revenue using correlation analysis. After dividing the group of data based on the periods, the ranks, and core business sector, significant relationship was derived. After this research, Sung et al. (2017) tried to the relationship using cluster analysis with diversification-related factors. There was significant positive correlation between regional diversification, but business diversification was not. And the correlation coefficient among different clusters was so small to adopt appropriate strategies in different situations.

Table 2.2 shows the summary of previous researches about diversification strategy.

Table 2.2 The Previous Research about Diversification Strategy

Author	Research Objective	Methodology	Limitation
Han et al. (2010)	Analyzes global construction trends, investigate successful firm's diversification strategies, and benchmark the critical strategies.	Two-step Cluster Analysis	Other factor affecting performance such as competency is considered insufficiently.
Jung et al. (2010)	Analyzes effect of international entry strategy on performance depending on different periods at static approach and dynamic approach.	Multiple Regression Analysis	Interaction between strategies and competencies is considered insuffieciently.
Kim and Reinschmidt (2011)	Investigates the relationship between risk attitude and market diversification strategy using simulation model	Evolutionary Industry Model	Not focused on the relationship between diversification and the performance
Park (2011)	Classifies into up-firms and down-firms and then analyzes their diversification levels, suggests a method of quantifying thoses diversification trends	Regression Analysis & Trend Analysis	Focuses on diversification strategies trends, but simple consideration about performance.
Oyewobi et al. (2013)	investigates the relationship between diversification strategy and performance of the South Africa contractors	t-Test	Other factor affecting performance such as competency is considered insufficiently.
Jang (2014)	Examines the relationship between the degree of business diversification and financial stability.	Vector Error Correlation Model	Other performance such as profitability is not considered, and focuses on financial competency.
Lim et al. (2014)	Examines the relationship between firm value and work diversification strategy of insolvent contruction companies.	Regression Analysis	Not focused on region diversification, and envirionment.
Sung et al. (2015)	Finds correlation between diversification and growth for global contractors in the aspect of period, company size, and core business sector.	Correlation Analysis	Other factor affecting performance such as competency is considered insufficiently.
Horta et al. (2016)	Investigates the impact of diversification on financial performance of Portugal and Spanish contractors obtained by Data Envelopment Analysis technique.	Truncated Regression Analysis	Not focued on the interaction between diversification and environment.
Lee et al. (2016)	Examines the relationship between diversification and insolvency of contractors measured in the expected default frequency(EDF).	Vector Error Correlation Model	Other factor affecting performance such as competency is considered insufficiently.
Sung et al. (2017)	After separate the group of company using cluster analysis, finds correlation between diversification and the performance.	Cluster Analysis & Correlation Analysis	Not easy to adopt appropriate strategies at different situations.

The main limitation of previous studies in diversification strategy is not to consider that there might be numerous factors which affect the performance and have interrelation among each other. So this research focuses on the related factors which are shown in chapter 2.2 and chapter 2.3 and their indirect, interaction effect on the performance.

2.2 Internal Competency related to International Construction

The internal competency of the company was defined as tangible and intangible assets of the company (Isik et al., 2010). Also, Han and Jeong (2013) stated that internal competency is inherent in the organization with uncontrollableness immediately and improves the effectiveness of the other resources. The other researches considered the competitiveness factor of the company as the internal competency (Lu et al., 2008; Jang et al., 2008; Han et al., 2013; Kim et al., 2016). Lu et al. (2008) stated that competitiveness is the ability to produce goods and services that meet the international markets which similar to the definition of internal competency.

On the basis of the resourced-based view, the strategies have been decided from the internal competency. And the strategies which fit with the internal competency increase the performance of the company (Choo et al. 2009). From these points of view and the purpose of this research, internal competency is defined tangible and intangible ability to operate international construction business and regarded as uncontrollable in short-term periods.

In this research, internal competency was divided into four sub-classification. Financial Competency (FC), Technical Competency (TC), Construction Competency (CC), and International Competency (IC) based on literature review. With the literature review and in-depth interview, four internal competencies were determined. Considering collectability and consistency, measurements of internal competency was decided. And through the

Confirmatory Factor Analysis (CFA), the evaluation of validity and reliability of measurement was performed.

2.2.1 Financial Competency

Financial competency indicates the strength of contractors in the market in terms of monetary sustainability (Isik, 2010). Because of the characteristics of construction industry such as huge order-made production industry, the structure, and quality of finance is important especially international construction industry (NICE rating, 2015). Higher financial competency leads contractors to get into the risky business which might have higher returns (Isik, 2010). And also financial competency can raise the credibility and reputation of contractors among the owners or suppliers (Warszawski, 1996).

There are many kinds of financial competency such as acquiring assurance, credit rating, etc. But, with collectability and consistency, the author divided into three financial competencies: Stability, Liquidity, Activity. Stability means the ability of repayment measured commonly in Debt ratio. Liquidity indicates the degree of easy translation from assets to cash in short-term periods generally in a year. It is commonly measured in Current ratio and Quick ratio as described below.

The equations for Debt ratio, Current ratio, and Quick ratio are:

$$\text{Debt ratio (DR)} = {Total\ \ Liabilities}/{Total\ \ Assets}$$

$$\text{Current ratio (CR)} = {Current\ \ Assets}/{Current\ \ Liabilities}$$

$$\text{Quick ratio (QR)} = {Quick\ \ Assets}/{Current\ \ Liabilities}$$

If debt ratio is getting high, the contractor could not repay its liabilities at expiration date. Current ratio and quick ratio measure the ability to repay short-term liabilities by considering short-term investments which could be changed into cash in a year. The contractors have to maintain at least particular level to operate business normally.

Also, activity means that how efficiently the contractor uses its financial resources. It was measured in Business Assessment Value (BAV) estimated in Construction Association of Korea (CAK) as described in below (Enforcement Decree of the Framework ACT on the Construction Industry, 2016), because it implies not only stability and liquidity but also the activity of the contractors consistently.

The equations for Business Assessment Value (BAV) is:

$$\text{BAV} = 0.8 * (Real\ \ Capatial) * (Business\ \ Grade)$$

2.2.2 Technical Competency

There are many research to emphasis the importance of technical competency (Hong et al., 2010; Isik et al., 2010; Lee and Go, 2010; Han and

Jeong, 2013). Isik et al. (2010) stated that technical competency is the extent of technical knowledge available in the company. It is necessary for contractors in terms of more competitiveness than other contractors to perform the high level of construction projects. Han and Jeong (2013) which studied internationalization strategy stated that research and development competency can be the source of competitiveness and become motivation of business market expansion.

This research categorized technical competency as technical investment and technical infrastructure based on previous studies. Technical investment means how much the company invests money to R&D field and effects on technical competency (Han and Jeong, 2013). And technical infrastructure indicated how many the company has the number of experts or equipments to raise the technical competitiveness of the company.

The author measured technical investment in R&D cost ratio and technical infrastructure in the number of experts ratio and equipments which contains machines, vessel, vehicle, etc. And Technic Assessment Value (TAV) estimated in CAK (Enforcement Decree of the Framework ACT on the Construction Industry, 2016) was considered in terms of both sides. TAV is measured in average output value per a person, the number of experts, mutual benefit fund for retirement, and R&D investment during the past three years.

2.2.3 Construction Competency

Construction competency means the ability to perform construction project successfully. Construction industry is basically project-based industry, so the capabilities of each construction projects manager affect the performance of the contractors. There are many research which emphasizes the detailed construction competency such as schedule management, cost management, quality management, safety management, risk management, and so on (Jang et al., 2008; Hong et al., 2010; Isik et al., 2010; Lee and Go, 2010; Triphthi et al., 2017). However, these factors are project-based competencies (Isik et al., 2008), so in terms of company aspects and consistency along the companies, it is necessary to seek the factors which represent construction competency of the contractors.

The author measured the construction competency as Construction Record Assessment Value (CRAV) and Reliability Assessment Value (RAV) estimated in CAK (Enforcement Decree of the Framework ACT on the Construction Industry, 2016). Project-based competencies could not be collected consistently. And the author assumed that records of construction represent construction ability of the contractors which include the capabilities of project managers within same contractor. RAV is measured with whether the contractor is designated as excellent contractors, management periods of special construction area, hazard rate, site environment management, and so on.

By considering CRAV and RAV, not only the experience about detailed construction projects could be obtained, but also the results related to safety

management or quality management could be considered in a consistent way.

2.2.4 International Competency

International competency can be described as network with other international organizations (Han and Jeong, 2013), or the experience to perform business in the international markets. Han and Jeong (2013) emphasized the application of the local experts and branch localization. And Kim and Kim (2013) and Kim et al. (2016) mentioned the importance of experience in international project and knowledge of international markets such as law, policy, and the culture.

Similar to construction competency, it is hard to measure all international competency because of uncollectability and inconsistency. So this research measured international competency as the degree of joint venture which could be measured in data sourced by ICAK and means how much the company expanses its business area with joint venture, and Region International Records Value (RIRV), and Product International Records Value (PIRV) as described in below.

The equations for Region International Records Value (RIRV) and Product International Records Value (PIRV) are:

$$RIRV = \sum_{j=1}^{6} \left(\frac{\sum_{i=1}^{5} (International\ results\ of\ ith\ years\ ago)}{5 * (Amounts\ of\ Contracts)} \right)_j$$

$$PIRV = \sum_{j=1}^{9} \left(\frac{\sum_{i=1}^{5} (International\ results\ of\ ith\ years\ ago)}{5 * (Amounts\ of\ Contracts)} \right)_j$$

Amounts of contracts are related to the present year compared to international results of ith years ago which means the past experiences of the contractors.

Therefore, RIRV and PIRV were defined how much the contractors have the international construction records compared with the amount of orders at the business year. So it means whether the contractors could deal with the international construction projects based on last five years records. Jung et al. (2010) measured these capabilities as the international business periods, but this research measured in the amount of international construction projects contract money that is one of the important factors in construction industry.

Table 2.3 indicates the summary of the previous studies about the internal competency of the international contractors.

Table 2.3 The Previous Studies about Internal Competency

Level 1	Level 2	Jang et al. (2008)	Hong et al. (2010)	Isik et al. (2010)	Lee & Go (2010)	Han & Jeong (2013)	Han et al. (2013)	Kim & Kim (2013)	Jang et al. (2014)	Kim et al. (2016)	Tripathi et al. (2017)
Financial Competency	Stability								√		√
	Liquidity			√					√	√	√
	Activity								√		
Technical Competency	Technical Investment	√			√	√		√			√
	Technical Infrastructure		√	√	√	√		√	√	√	√
Construction Competency	Risk Management		√	√						√	√
	Schedule Management	√	√	√	√		√	√	√		√
	Quality Management	√	√	√	√		√	√	√		√
	Cost Management	√	√	√	√		√	√	√		√
	Safety Management	√	√	√	√		√	√	√		√
	Materials Management	√	√	√	√		√	√	√		√
	Estimation Capability	√	√				√				
	Claims Management		√	√				√		√	
International Competency	International Network					√				√	√
	International Experience					√		√	√	√	√

2.3 Market conditions

The construction industry has different characteristics compared with other industries. First, the final product of construction is immovable and different each other. Secondly, the periods of the construction process are too long to invest continuously. And third unit price of the construction final products is too expensive, so the governments often intervene the overall process of construction projects. For these reasons, construction industry has been influenced by political, social, and economical environments (Samsung Economic Research Institute, 2009).

On the basis of the strategic contingency theory, the strategies of the company could be different depending on the market conditions. Also depending on whether the company establishes appropriate strategy with te market conditions, the performance of the company could be different (Miller and Friesen, 1986).

There are many factors which explain conditions of the market: Market attractiveness, Competitiveness, Uncertainties, Structure, and so on. This research measured in market conditions factors as market attractiveness and market competitiveness.

2.3.1 Market Attractiveness

Market attractiveness could be defined as the average benefit of total companies which enter the market (Business Dictionary, 2017). And market

attractiveness contains economical environment, political environment, industries strength, and cultural environment (Moon, 2008), so without the market attractiveness, it is difficult to explain the market conditions.

Hua and Pin (2000) and Jiang and Liu (2011) investigated forecasting method of construction demand which is regarded as construction market attractiveness. They focused on the forecasting construction industries using time-series analysis with the macroeconomical variables such as national income, value of export, household expenditure, construction producer price index, unemployment rate. However, the relationship between construction demand and the performance of the contractor was not their topics.

Seo et al. (2013) studied the relationship between construction investment as construction market attractiveness and the insolvency of the contractors using VARM model. And Seo et al. (2013) stated that not only the construction investment but also consumption of cement, construction permission area could represent the construction market attractiveness.

Han et al. (2010) and Lam et al. (2016) used construction output as construction market attractiveness. Lam et al. (2016) investigated the construction output forecasting using univariate modeling techniques. And Lam et al. (2016) stated that the construction output could reflect not only the economy moves but also the structural change.

In this research, the change of construction output value was measured for market attractiveness because of consistency among the regional and product market. If the change of construction output value is negative, the market attractiveness could be regarded as the decrease. And if the change of construction output value is positive, it could be regarded as increase.

2.3.2 Market Competitiveness

Park (2011) emphasizes the micro industries structure which indicates composition major company and small and medium-sized business, entry barrier in terms of market competitiveness. Market competitiveness could be defined as the degree of entry barrier or state of composition. If the degree of entry barrier is low, start-up company or the other companies outside of the market can enter the market easily.

There are some measurements regarded as market competitiveness. Pulaj and Kume (2013) researched the market competitiveness of the construction market measured as Concentration Ratio (CR) and Hirschman-Herfindahl Index (HHI). CR is the index which shows market share of the high rank companies in the market (Park, 2011). The term of "high rank" is ambiguous, so many studies express CR as N-firm CR calculated as followed (Park, 2011).

The equation for N-firms Concentration Ratio is:

$$CR_N = \sum_{i}^{N} S_i$$

with these indicators:

$$S_i = Market\ share\ of\ ith\ high\ rank\ company$$

However, N-firm CR has limitation which could not consider overall companies in the same market. And also difference with each company could

not be regarded. So HHI was developed to overcome this limitation and calculated as followed (Park, 2011).

The equation for Hirschman-Herfindahl Index is:

$$HHI = \sum_{i}^{n} (S_i)^2$$

with these indicators:

$$S_i = Market\ \ share\ \ of\ \ ith\ \ high\ \ rank\ \ company$$

N-firm CR focuses on a few major companies, whereas HHI focuses the whole companies which have done business in the market. Table 2.4 indicates the relative meaning of HHI value (Park, 2011).

Table 2.4 Distribution of Hirschman-Herfindahl Index

Characteristics of market competitiveness	Range of HHI	the degree of price competition
Perfect competition	< 0.2	Too high
Monopolistic competition	≅ 0.2	Medium ~ High
Oligopoly	0.2 ~ 0.7	Medium ~ High
Monopoly	> 0.7	Too low

In this research, market competitiveness was measured in the change of HHI. If the change of HHI has negative value, it means the entry barrier of the market decrease and the degree of competition is increasing.

In summary, this research measured the change of market attractiveness and market competitiveness compared to the value a year ago to find whether the value changed in a positive direction or negative direction. And by weighted adding with the amounts of contracts in this year, different situations between each contractor could be considered. Regional Market Attractiveness (RMA), Product Market Attractiveness (PMA), Regional Market Competitiveness (RMC), and Product Market Competitiveness (PMC) could be measured as below.

The equation for Market Attractiveness and Competitiveness are:

$$RMA = \sum_{i=1}^{6} \Delta(Construction\ Output)_i * P_i$$

$$PMA = \sum_{i=1}^{9} \Delta(Construction\ Output)_i * P_i$$

$$RMC = \sum_{i=1}^{6} \Delta(HHI)_i * P_i$$

$$PMC = \sum_{i=1}^{9} \Delta(HHI)_i * P_i$$

with these indicators:

$$\mathrm{P}_i = Business\ \ share\ \ of\ \ product$$

2.4 Hypothesis Establishment

Based on strategic contingency theory and resource-based view, proper strategies with internal competency and market conditions are important for the performance of the company (Zajac et al., 2000; Choo et al., 2009). The company establishes their strategies depending on internal competency and market conditions and it affects how the performance of the company will increase or decrease. So it is necessary to research about how the indirect and interaction effect among diversification strategy, internal competency, and market conditions could affect the performance of the contractors in the international construction industry.

For indirect and interaction effect, the author could suggest two scenarios as described in Fig 2.1, and Fig 2.2

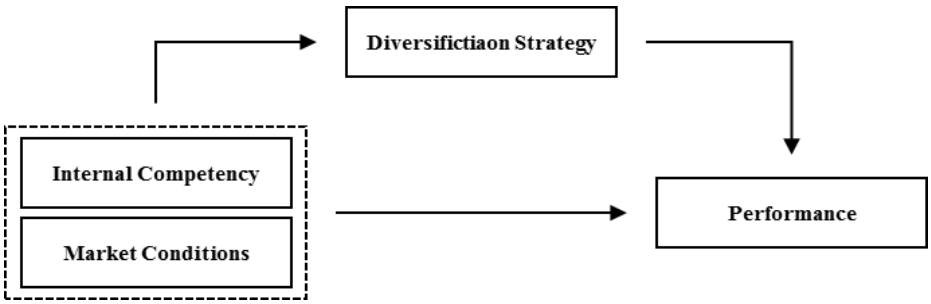

Figure 2.1 Scenario 1 - Indirect effect of Diversification Strategy

The indirect effect could be studied as mediation effect analysis. The contractors establish diversification strategy based on internal competency and market conditions. So as Fig 2.1 scenario 1, not only direct effect of diversification strategy, internal competency, and market conditions on performance, but also indirect effect of diversification strategy could be significant.

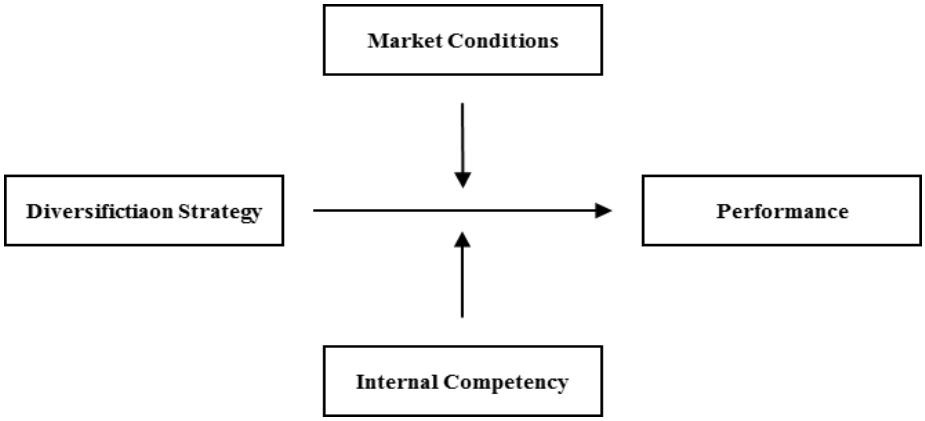

Figure 2.2 Scenario 2 - Interaction effect among Related Factors

Interaction effect could be studied by moderated multiple regression analysis. Fig 2.2 indicates that internal competency and market conditions could effect on the direct relationship between international construction expansion strategy and the performance of the contractors. In this case, internal competency and market conditions are moderator and diversification strategy is independent variable.

Before investigation of indirect and interaction effect, direct effect of

diversification strategy, internal competency, and market conditions has to be researched. This suggests the following hypotheses:

Hypothesis 1: Internal competency affects on the performance of the contractors directly.

Hypothesis 2: Market conditions affects on the performance of the contractors directly.

Hypothesis 3: Diversification strategy affects on the performance of the contractors directly.

After hypotheses test 1~3, hypothesis 4 and 5 about mediation effect establishes as shown Fig 2.1.

Hypothesis 4: There is indirect effect of diversification strategy on the relationship between internal competency and the performance the contractors.

Hypothesis 5: There is indirect effect of diversification strategy on the relationship between market conditions and the performance the contractors.

Lastly, moderation effect among diversification strategy, internal competency, and market conditions could be described as hypothesis 6 and 7.

Hypothesis 6: The direct effect of diversification strategy on the performance is different depending on internal competency.

Hypothesis 7: The direct effect of diversification strategy on the performance is different depending on market conditions.

Table 2.5 represents the summary of the hypotheses and its characteristics.

Table 2.5 Hypotheses Establishment

Hypothesis	Contents	Characteristic
H1	*Internal competency affects on the performance of the contractors directly.*	Direct
H2	*Market conditions affect on the performance of the contractors directly.*	
H3	*Diversification strategy affects on the performance of the contractors directly.*	
H4	*There is indirect effect of diversification strategy on the relationship between internal competency and the performance the contractors.*	Mediation
H5	*There is indirect effect of diversification strategy on the relationship between market conditions and the performance the contractors.*	
H6	*The direct effect of diversification strategy on the performance is different depending on internal competency.*	Moderation
H7	*The direct effect of diversification strategy on the performance is different depending on market conditions.*	

Chapter 3. Research Methodology

The methodology used in this research to achieve research objective is classified four part. Confirmatory Factor Analysis (CFA) was used to investigate the validity and reliability of the internal competency. And Multiple regression analysis was done to know whether the direct effect on the performance exists. Test of mediation effect was performed to check the diversification strategy have mediation effect on the relationship between internal competency and the performance, between market conditions and the performance. Lastly Moderated Multiple Regression (MMR) was conducted to understanding about moderation effect of internal competency and market conditions.

3.1 Confirmatory Factor Analysis (CFA)

Confirmatory Factor Analysis (CFA) is a statistical method to validate and check the reliability the structure of the model with observed variables whereas Exploratory Factor Analysis (EFA) could be used to simplify the observed variables (Diana, 2006). It is measurement model which focuses on the relationship between latent variables and observed variables (Bae, 2011). Generally, before analysis of CFA, it is necessary to have a reliable theory or literature support the structure of the model (Hurley et al., 1997).

A general CFA model is shown in Fig 3.1 and process of CFA is shown in Fig 3.2.

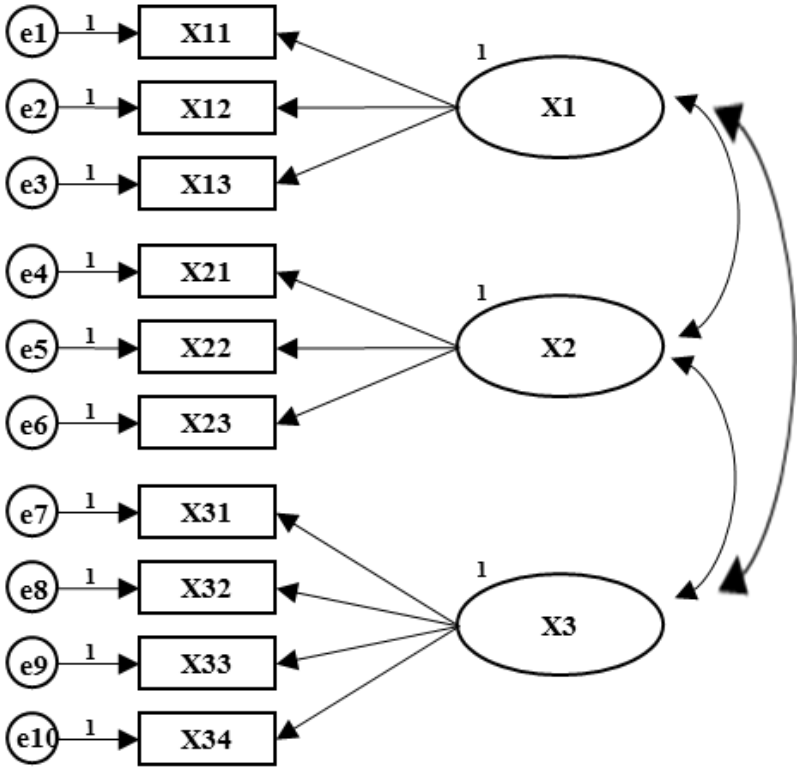

Figure 3.1 General Confirmatory Factor Analysis Model

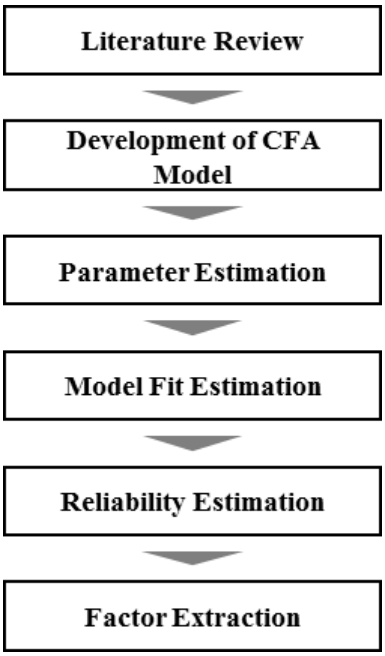

Figure 3.2 Process of CFA (Bae, 2011)

X1, X2, and X3 indicate the latent variable which could not be measured directly such as internal competency in this research. After literature review and developing CFA model, there are three steps to check the validity and reliability.

First, check the parameter estimate whether (1) the sign of the parameter estimate has appropriate value, (2) the amount of parameter estimate is not wrong that excesses the value 1 or standard error is too large, (3) significance of parameter estimate is validated.

Secondly, check the model fit to investigate whether model and data fit each other. There are numerous index to indicate model fit, so this research selects CMIN/DF (normed χ^2), GFI (goodness-of-fit-index), SRMR(standardized root mean square residual) which is used by many

previous studies widely (Bae, 2011).

Thirdly, reliability and validity of the latent variables are checked using Composite Reliability (C.R.) and Average Variance Extracted (AVE) which indicates convergent validity. C.R. and AVE are calculated as follows (Bae, 2011).

The equation for Composite Reliability (C.R.) is:

$$C.R. = (\sum parameter\ \ estimate)^2 \Big/ (\sum parameter\ \ estimate)^2 + \sum error$$

And the equation for Average Variance Extracted (AVE) is:

$$AVE = (\sum parameter\ \ estimate^2) \Big/ (\sum parameter\ \ estimate^2) + \sum error$$

Table 3.1 indicates standard criteria which ensures the model fit, reliability, and validity (Bae, 2011).

Table 3.1 CFA Index Standard Range

Step	Index	Standard Range
Model Fit	CMIN/DF	< 5 (for generous)
	GFI	> 0.9
	SRMR	< 0.08
Reliability and Validity	C.R.	> 0.7
	AVE	> 0.5

3.2 Multiple Regression Analysis

Multiple regression analysis is the method to analyze the cause-and-effect relationship between independent variables which contain more than two and dependent variable (Koo, 2013). Multiple regression analysis has to be performed after logical validation with literature review. Without it, it is difficult to purport the cause-and-effect relationship even if there were significant results (Koo, 2013).

Multiple regression analysis could be described as below, and through least squares approximation, regression coefficient (β_n) could be obtained significantly.

The equation for Multiple regression analysis is:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_n X_n$$

with these indicators:

$$Y = Dependent\ \ variable$$

$$X_i = Independent\ \ variables$$

There are various methods to input the independent variables such as Enter which inputs the independent variables at once and Stepwise which excludes the independent variables to less influence the dependent variables. In this research, the author conducted the former methods to study strictly direct effects on the performance extensively by considering control variables, but suggested the results of the latter method in Appendix A to study relationship

by considering the independent variables which more affect to performance.

Ideal multiple regression analysis has independent variables which have no correlation each other. But in reality, there is correlation each other and it could disturb the results of regression analysis. It is called multicollinearity and increases the variance of regression coefficient unstably. So numerous previous studies measured the degree of multicollinearity as Variance Inflation Factor (VIF) and stated that it is normal conditions with VIF lower than 10 (Lee, 2016).

3.3 Mediation Analysis

When the cause-and-effect relationship between variable A and variable C could be formed by variable B, variable B can be defined mediator and there is mediation effect of variable B (Koo, 2013). There are four steps to prove the mediation effect among three variables as shown in Fig 3.3 (Seo, 2010; Zhao et al. 2010; Koo, 2013).

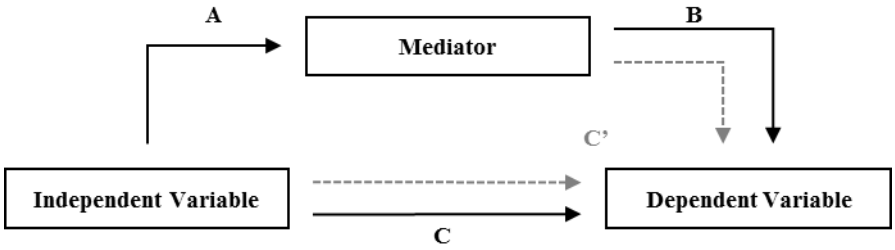

Figure 3.3 Process of Mediation Analysis (Seo, 2010)

First of all, path C which indicates the direct effect of independent variables on dependent variable to be significant using multiple regression analysis as mentioned chapter 3.2.

Secondly, after step 2, the cause-and-effect relationship between independent variable and mediator has to be validated.

And thirdly, the cause-and-effect relationship between mediator and dependent variable has to be validated.

Lastly the regression coefficient of path C' which indicates the total relationship independent variables with mediator and dependent variable has to

be nonsignificant or significantly lower than that of path C. If the regression coefficient of independent variables of path C' is nonsignificant, there is perfect mediation effect. And if the regression coefficient of independent variables of path C' is significantly lower than that of path C, there is partial mediation effect.

The test which validates significantly lower could be performed with parallelism verification t-test or Sobel z-test as following equation (Zhao et al. 2010).

The equation for Sobel z-test is:

$$z = \frac{a \times b}{\sqrt{b^2 {s_a}^2 + a^2 {s_b}^2}}$$

with these indicators:

$$a = Regression\ \ coefficient\ \ of\ \ path\ \ A$$

$$b = Regression\ \ coefficient\ \ of\ \ path\ \ B$$

$$s_a = standard\ \ error\ \ of\ \ path\ \ A$$

$$s_b = standard\ \ error\ \ of\ \ path\ \ B$$

3.4 Moderated Multiple Regression Analysis

Moderator is defined as the third variable which impacts the direction or strength of the relationship between independent variables and dependent variable (Koo, 2013). Baron and Kenny (1986) stated that when the relationship between independent variables and dependent variable is low as expected or many studies have concluded inconsistently each other, moderation effect could exist in the relationship in contrast with the situation in mediation effect. So Koo (2013) stated that it could be fresh research topic to investigate moderation effect with logical validation.

There are numerous method to investigate the moderation effect such as using correlation, regression analysis, and structural equation modeling and so on (Koo, 2013). In this research, moderated multiple regression analysis (MMR) was performed to verify the moderation effect.

Fig 3.4 illustrates MMR diagram. The term "interaction variable" can be derived with multiplication with independent variable and moderator.

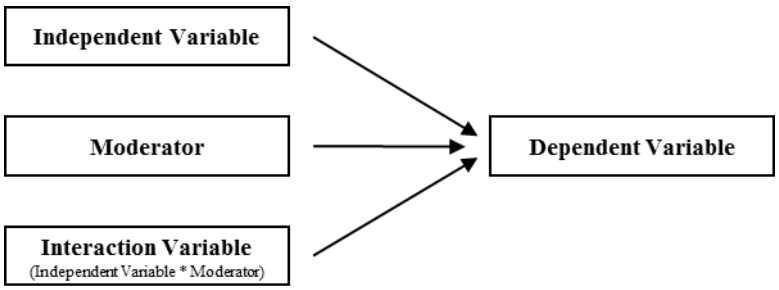

Figure 3.4 Moderated Multiple Regression Analysis (Koo, 2013)

Before the MMR analysis, theoretical support to describe the interaction effect is necessary. MMR process is similar to hierarchical regression analysis. First, the regression analysis between independent variable with moderator and dependent variable. And secondly, with interaction variable, multiple regression analysis is performed. If the F-value of the change R^2 statistics or p-value of the coefficient of the interaction variable term is significant, it is evident that there is moderation effect (Koo, 2013).

After MMR analysis, the range of the moderator should be divided into several groups and another multiple regression analysis is performed to investigate the relationship between independent variables and dependent variable depending on moderator.

In this research, the overall range of moderator such as internal competency and market conditions was divided into two group which is positive groups and negative groups. Positive groups mean that internal competency or market conditions increased compared to a year ago, and negative groups mean that internal competency or market conditions decreased compared to a year ago.

Chapter 4. Hypothesis Test

4.1 Analysis Framework

Analysis Framework is described in Fig 4.1. After literature review in chapter 2 and in-depth interview, measurement variables which represents the latent variables were collected. And data preprocessing was performed in the ways of adjustment of magnitude of contractors by the total assets, CFA, and outlier modification.

Correlation analysis was performed to check the interrelationship among the diversification strategy, internal competency, and market conditions. And Multiple regression analysis was performed to verify the direct effect on the performance.

With the combinations which have direct effect on the performance, mediation analysis was performed. And MMR was performed to investigate whether moderator such as internal competency and market conditions is significant. Lastly, additional multiple regression analysis was performed to investigate how much the moderation effect is valid.

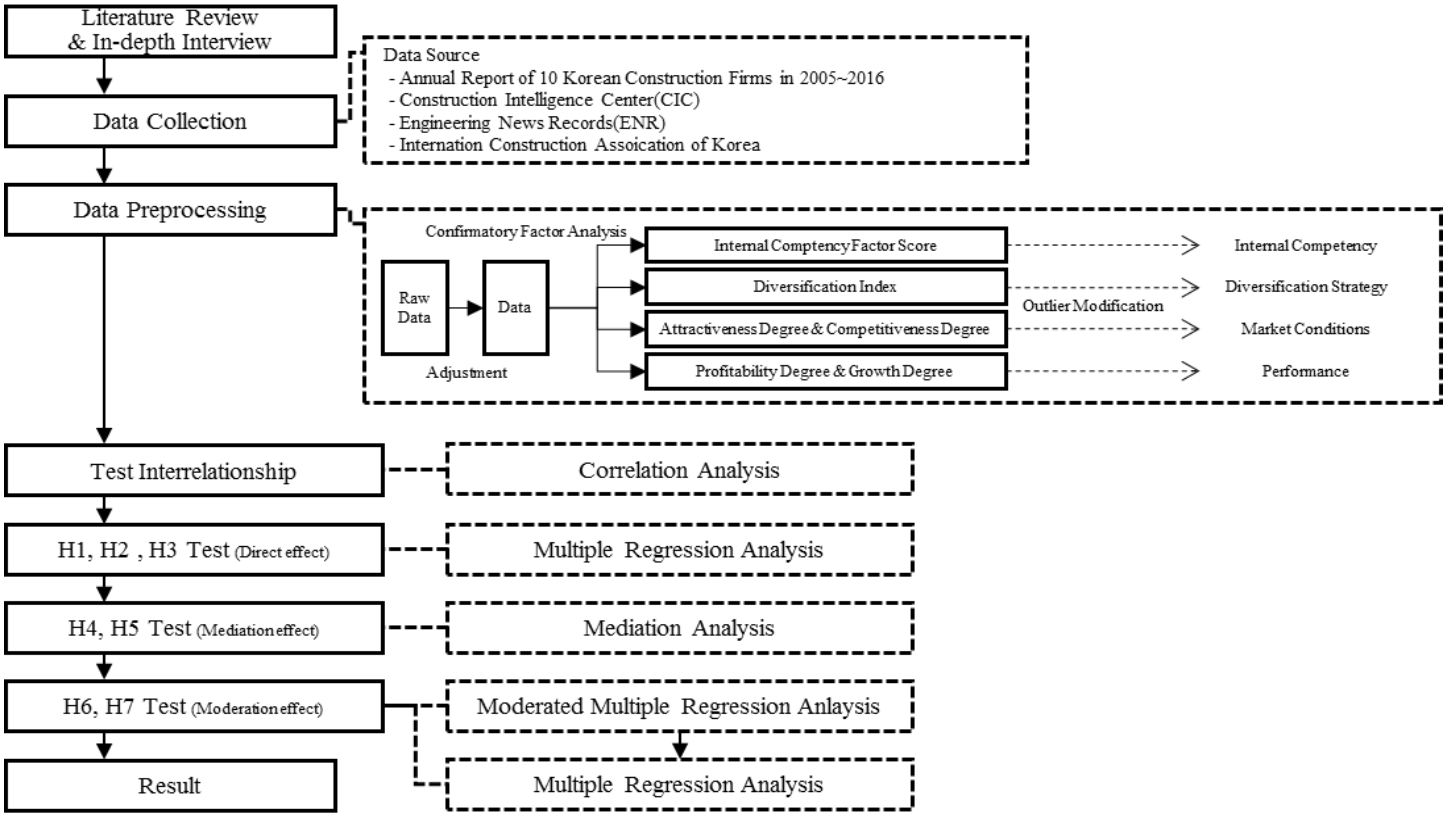

Figure 4.1 Analysis Framework

4.2 Data Collection

As stated in chapter 2, diversification strategy was derived from entropy index equation for the reasons that it is more sensitive than the Berry-Herfindahl index. And market attractiveness was extracted from the construction output value, and market competitiveness as the HHI. Also, financial competency was measured in DR, CR, QR, BAV, and technical competency as RD investment, TAV, the number of expert ratio, the number of equipment. Construction competency was derived from CRAV and RAV, and international competency as JVR, RIRV, and PIRV.

Because of the definition of RIRV and PIRV as described in chapter 2, RIRV and PIRV have two data source as ICAK and the annual report of each contractor. The average of last five years of international construction records was obtained from ICAK and the amount of orders at the business year was obtained from the annual report of each contractors. Inevitably, the amount of orders at the business year of each contractors was limited to large construction projects due to uncollectability.

Data collection was performed for 2005~2016 years, and target contractors were top 10 Korean international contractors based on cumulative amounts of international construction revenue from ICAK. Also, data sources were ICAK, CAK, annual reports of top 10 Korean international contractors, ENR, and CIC.

Table 4.1 indicates the summary of the data characteristics.

Table 4.1 Summary of Data Collection

Level 1	Level 2	Measurement Variable	Expression	Data Source
Internaional Construction Expansion Strategy	Diversification Strategy	RDI (Regional Diversification Index)	$\mathrm{RDI} = \Delta(\sum P_i \ln\frac{1}{P_i})$, $P_i = Business\ share\ of\ region$	Annual Reports
		PDI (Product Diversification Index)	$\mathrm{PDI} = \Delta(\sum P_i \ln\frac{1}{P_i})$, $P_i = Business\ share\ of\ product$	Annual Reports
Market Conditions	Market Attractiveness	RMA (Regional Market Attractiveness)	$RMA = \sum_{i=1}^{6} \Delta(Construction\ Output)_i * P_i$, $P_i = Business\ share\ of\ product$	Annual Reports, CIC, ENR
		PMA (Product Market Attractiveness)	$PMA = \sum_{i=1}^{9} \Delta(Construction\ Output)_i * P_i$, $P_i = Business\ share\ of\ product$	Annual Reports, CIC, ENR
	Market Competitiveness	RMC (Regional Market Competitiveness)	$RMC = \sum_{i=1}^{6} \Delta(HHI)_i * P_i$, $P_i = Business\ share\ of\ product$	Annual Reports, CIC, ENR
		PMC (Product Market Competitiveness)	$PMC = \sum_{i=1}^{9} \Delta(HHI)_i * P_i$, $P_i = Business\ share\ of\ product$	Annual Reports, CIC, ENR
Internal Competency	Financial Competency (FC)	DR (Debt Ratio)	$DR = {}^{Total\ Liabilities}/_{Total\ Assets}$	Annual Reports
		CR (Current Ratio)	$CR = {}^{Current\ Assets}/_{Current\ Liabilities}$	Annual Reports
		QR (Quick Ratio)	$QR = {}^{Quick\ Assets}/_{Current\ Liabilities}$	Annual Reports
		BAV (Business Assessment Value)	$BAV = {}^{Business\ Assessment\ Amounts}/_{Total\ Assets}$	Annual Reports, CAK

Table 4.1 (Continue)

Level 1	Level 2	Measurement Variable	Expression	Data Source
Internal Competecny	Technical Competency (TC)	RD (R&D Investment)	$RD = {R\&D\ Investment\ Amounts}/{Total\ Assets}$	Annual Reports
		EQI (Equipments)	$EQI = {The\ sum\ of\ equipment\ Amounts}/{Total\ Assets}$	Annual Reports
		NEXP (the Number of Experts ratio)	$NEXP = {The\ number\ of\ experts}/{The\ number\ of\ employee}$	Annual Reports, CAK
		TAV (Technical Ability Value)	$TAV = {Technical\ Ability\ Amounts}/{Total\ Assets}$	Annual Reports, CAK
	Construction Competency (CC)	CRAV (Construction Results Assessemtn Value)	$CRAV = {Construction\ Results\ Assessment\ Amounts}/{Total\ Assets}$	Annual Reports, CAK
		RAV (Reliability Assessment Value)	$RAV = {Reliability\ Assessement\ Amounts}/{Total\ Assets}$	Annual Reports, CAK
	International Competency (IC)	JVR (Joint Venture Ratio)	$JVR = {Collaboration}/{(Collaboration + Independent)}$	ICAK
		RIRV (Regional International Results Value)	$RIRV = \sum_{j=1}^{6} \left(\frac{\sum_{i=1}^{5}(international\ results\ of\ ith\ years\ ago)}{5 * (Amounts\ of\ Contracts)}\right)_j$	Annual Reports, ICAK
		PIRV (Product International Results Value)	$PIRV = \sum_{j=1}^{9} \left(\frac{\sum_{i=1}^{5}(international\ results\ of\ ith\ years\ ago)}{5 * (Amounts\ of\ Contracts)}\right)_j$	Annual Reports, ICAK
Performance	Profitability	PROFIT	$PROFIT = \frac{Gross\ profit - Gross\ profit\ a\ year\ ago}{\lvert Gross\ profit\ a\ year\ ago \rvert}$	Annual Reports
	Growth	GROW	$GROW = \frac{Total\ assets - Total\ assets\ a\ year\ ago}{\lvert Total\ assets\ a\ year\ ago \rvert}$	Annual Reports

4.3 Data Preprocessing

After data collection, data preprocessing was performed to analyze suitably. Data preprocessing has three steps as adjustment, CFA, and outlier modification

Data adjustment for BAV, RD, EQI, TAV, CRAV, and RAV was performed with measured variables to divide by total assets of each contractor because of elimination the size effect of the contractors which could obtain pure variables.

The next step is CFA, but CFA is described in chapter 4.4. The last step is outlier modification. Such variables like RIRV and PIRV often have huge value than any other variables which might be considered as impracticable. Also, it is not meaningful to measure the value bigger than one because it already means that the contractor has enough ability to perform the international construction projects contracted this year. And the others outlier was modified with the interquartile method used in many previous studies.

4.4 Confirmatory Factor Analysis

For obtaining the internal competency that is latent variable, CFA was performed using AMOS 25 version. The first results of CFA were not proper in terms of parameter estimate and fit index, so the author used AMOS modification indices and elimination of several measurement variables considering the meaning and relationship among measurement variables. The final result of CFA is shown in Fig 4.2.

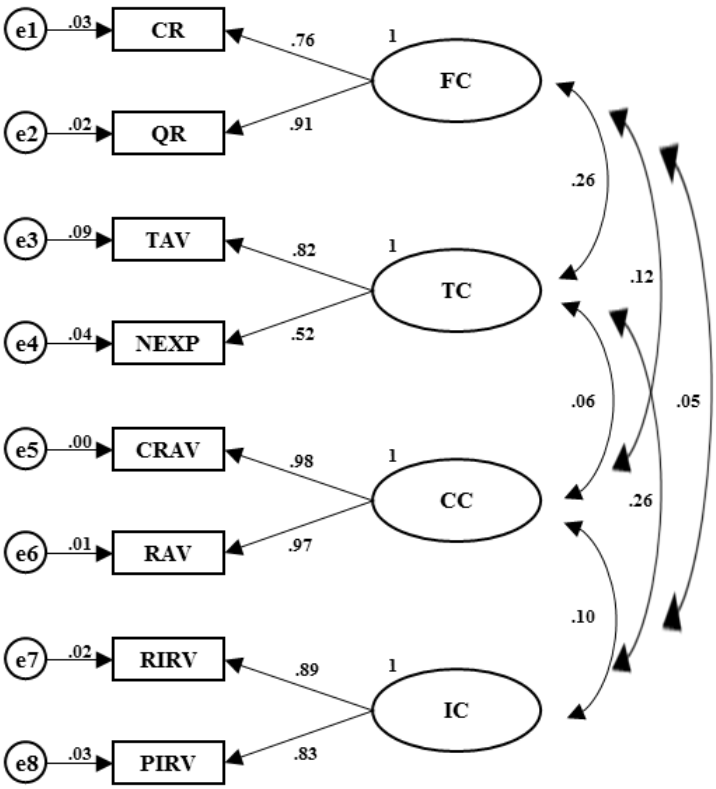

Fig 4.2 The Result of CFA

The standard coefficient was more than 0.6 which is criteria and significant with appropriate sign as shown Table 4.2.

Table 4.2 The Result of Standard Coefficient with CFA

			Regression Weights	Standardized Regression Weights	S.E.	P-value
QR	<---	FC	.293	.914	.051	***
CR	<---	FC	.208	.763	.039	***
NEXP	<---	TC	.120	.524	.020	***
TAV	<---	TC	.425	.815	.044	***
CRAV	<---	CC	.477	.979	14.696	***
RAV	<---	CC	.084	.971	14.480	***
RIRV	<---	IC	.256	.893	6.434	***
PIRV	<---	IC	.234	.826	6.208	***

Even though the standard coefficient of NEXP is less than 0.6, the elimination of the value NEXP is not reasonable considering the importance of the value and the difference that is a little. The model fit and reliability index are shown in Table 4.3.

Table 4.3 The Result of Model Fit, Reliability, and Validity Index

Step	Index	Standard Range	Results	
Model Fit	CMIN/DF	< 5 (for generous)	3.946	
	GFI	> 0.9	0.903	
	SRMR	< 0.08	0.0741	
Reliability and Validity	C.R.	> 0.7	FC	0.983
			TC	0.933
			CC	0.997
			IC	0.986
	AVE	> 0.5	FC	0.967
			TC	0.880
			CC	0.995
			IC	0.972

With these results, internal competency as latent variables could be measured and be tested with other variables by linear combination between factor score weights matrix obtained by AMOS 25 version as shown in Table 4.4 and Z-score of measurements variables.

Table 4.4 Factor Score Weights Matrix of Internal Competency

	CR	QR	NEXP	TAV	CRAV	RAV	RIRV	PIRV
FC	.891	2.292	.083	.123	-.058	-.237	-.007	-.004
TC	.177	.455	-.553	-.815	1.722	7.094	.455	.271
CC	-.008	-.021	.113	.167	1.081	4.453	-.022	-.013
IC	-.003	-.008	.093	.137	-.068	-.281	2.152	1.278

4.5 Hypothesis Test of Direct Effect

Before hypothesis test as multiple regression analysis, correlation analysis was performed to investigate the relationship between independence variables using IBM SPSS 23 as shown Table 4.5.

Table 4.5 The Result of Correlation Analysis

	RDI	PDI	FC	TC	CC	IC	RMA	PMA	RMC	PMC
RDI	1									
PDI	.468***	1								
FC	-.127	.117	1							
TC	.113	-.067	-.060	1						
CC	.165	-.002	-.109	.912***	1					
IC	.146	-.048	-.129	.196**	.092	1				
RMA	.048	.127	.004	.037	-.038	-.227**	1			
PMA	.186	.185	.045	-.096	-.114	-.214**	.579***	1		
RMC	.119	-.005	-.146	.045	.016	-.108	.331***	.338***	1	
PMC	-.066	-.125	-.046	-.216**	-.172	.118	-.327***	.040	-.021	1

*(p< .10), **(p<.05), ***(p<.01)

The correlation between diversification strategy variables is positive value significantly, and each market conditions variables have positive correlation except for the relationship between RMA and PMC. However, the internal competency has nonsignificant correlation except for the relationship between TC and CC, TC and IC. Although the components of internal competency were clustered well separately, the CFA result shows that technical competency is related to construction competency and international competency subordinately.

The results of multiple regression analysis about direct effects are shown in Table 4.6.

Table 4.6 The Results of Multiple Regression Analysis

After n	N	Dependent variables	Adjusted R^2	Independent variables	β (non-standard)	S.E.	β (standard)	p-value	Dependent variables	Adjusted R^2	Independent variables	β (non-standard)	S.E.	β (standard)	p-value	VIF
0	110	PROFIT	0	RDI	.188	.157	.142	.234	GROW	.210	RDI	-.027	.030	-.102	.331	1.499
				PDI	-.236	.178	-.153	.188			PDI	.023	.034	.069	.500	1.431
				FC	.090	.063	.147	.158			FC	.004	.012	.030	.739	1.135
				TC	.116	.134	.230	.387			TC	-.010	.026	-.088	.708	7.517
				CC	-.105	.165	-.165	.526			CC	-.031	.031	-.228	.321	7.212
				IC	-.005	.033	-.016	.885			IC	.002	.006	.025	.797	1.310
				RMA	.559	.831	.093	.502			RMA	.307*	.158	.234*	.056	2.015
				PMA	-.490	.353	-.183	.169			PMA	.012	.067	.021	.858	1.864
				RMC	-.334	.761	-.047	.662			RMC	.410**	.145	.267**	.006	1.229
				PMC	.185	.407	.051	.650			PMC	.047	.077	.060	.547	1.338
1	100	PROFIT_1	.059	RDI	-.186	.183	-.120	.310	GROW_1	.180	RDI	.034	.033	.114	.303	1.457
				PDI	.283	.208	.156	.176			PDI	-.002	.037	-.005	.961	1.379
				FC	-.230***	.076	-.312***	.003			FC	.022	.014	.153	.118	1.131
				TC	.246	.155	.421	.116			TC	-.032	.028	-.289	.246	7.372
				CC	-.301	.191	-.410	.119			CC	.029	.034	.204	.404	7.172
				IC	.017	.039	.049	.659			IC	-.001	.007	-.018	.859	1.295
				RMA	-.887	.979	-.125	.367			RMA	.157	.175	.116	.372	2.005
				PMA	.323	.408	.104	.431			PMA	.141*	.073	.237*	.056	1.810
				RMC	-1.928*	1.062	-.203*	.073			RMC	.110	.190	.060	.565	1.320
				PMC	-.209	.465	-.051	.654			PMC	-.223***	.083	-.282***	.009	1.334

*(p< .10), **(p<.05), ***(p<.01)

Table 4.6 (Continue)

After n	N	Dependent variables	Adjusted R^2	Independent variables	β (non-standard)	S.E.	β (standard)	p-value	Dependent variables	Adjusted R^2	Independent variables	β (non-standard)	S.E.	β (standard)	p-value	VIF
2	90	PROFIT_2	0	RDI	-.054	.221	-.031	.809	GROW_2	.225	RDI	-.031	.032	-.112	.327	1.483
				PDI	-.068	.250	-.035	.785			PDI	.028	.036	.089	.432	1.430
				FC	-.062	.092	-.079	.500			FC	.002	.013	.012	.905	1.186
				TC	.201	.185	.329	.278			TC	-.003	.026	-.029	.913	8.050
				CC	-.085	.226	-.113	.707			CC	.015	.032	.125	.635	7.918
				IC	-.080*	.046	-.205*	.086			IC	-.016**	.007	-.253**	.017	1.226
				RMA	-1.463	1.116	-.189	.194			RMA	.119	.159	.094	.458	1.829
				PMA	.520	.557	.119	.353			PMA	.069	.079	.098	.386	1.443
				RMC	.957	1.271	.086	.454			RMC	.329*	.181	.182*	.073	1.150
				PMC	.099	.526	.023	.851			PMC	-.185**	.075	-.268**	.016	1.354
5	60	PROFIT_5	0	RDI	.563	2.041	.052	.784	GROW_5	0	RDI	-.162	.169	-.177	.342	1.945
				PDI	1.682	2.218	.142	.452			PDI	.183	.183	.183	.324	1.930
				FC	-.348	.837	-.069	.680			FC	-.176	.069	-.414	.014	1.522
				TC	.812	1.631	.201	.621			TC	-.002	.135	-.005	.990	8.985
				CC	-.461	1.886	-.091	.808			CC	.008	.156	.018	.960	7.697
				IC	-.828*	.467	-.287*	.083			IC	-.031	.039	-.126	.431	1.449
				RMA	9.558	8.571	.206	.270			RMA	.011	.709	.003	.987	1.875
				PMA	-9.156*	5.396	-.333*	.096			PMA	.008	.446	.004	.985	2.116
				RMC	-3.190	11.669	-.045	.786			RMC	-1.080	.965	-.179	.268	1.467
				PMC	3.908	4.276	.160	.365			PMC	-.215	.354	-.104	.546	1.678

*(p< .10), **(p<.05), ***(p<.01)

Direct effect was performed by comparing this year performance, one year after, two years after, and five years after to investigate the effect depending on the time.

For investigating the multicollinearity of the multiple regression analysis, Variation Index Factor (VIF) was measured. And many previous studies stated that independent variables with VIF under value 10 could be regarded as non-multicollinearity (Lee, 2016). The results show that every VIF coefficients are less than value 10, so there are no multicollinearity problems.

According to results, diversification strategy without the result of this year has no direct effect on the performance of the contractors as expected which the results of previous studies mentioned. So moderation effect should be investigated.

Direct effects of the internal competency are not confirmed significantly except for financial competency and international competency. Especially, the direct effects of the financial competency and international competency have negative direction significantly as not expected. However, compared with the results of stepwise methods which have several positive directions, meaning of the results in Table 4.6 become weak because of control variables. In other words, there might be complex effects among the diversification strategy, internal competency, and market conditions, so moderation analysis is needed.

Market attractiveness has positive effect on the performance in terms of growth in short-term periods significantly, but has negative effect on performance in terms of profitability of the contractors in long-term periods.

4.6 Hypothesis Test of Mediation Effect

Before investigating the mediation effect, the multiple regression analysis of each independent variable such as only diversification strategy, only internal competency, and market conditions has to be analyzed. Because multiple regression analysis of chapter 4.5 indicated the relationship of the path C' as stated in chapter 3.3. So, the direct effects of path B and C have to be analyzed as shown in Table 4.7 and Table 4.8.

Table 4.7 The Results of Multiple Regression of Path C

After n	N	Dependent variables	Adjusted R^2	Independent variables	β (non-standard)	S.E.	β (standard)	p-value	Dependent variables	Adjusted R^2	Independent variables	β (non-standard)	S.E.	β (standard)	p-value	VIF
0	110	PROFIT	0	FC	.072	.062	.116	.253	GROW	.218	FC	.006	.012	.047	.597	1.090
				TC	.132	.131	.261	.317			TC	-.009	.025	-.087	.703	7.146
				CC	-.110	.161	-.173	.495			CC	-.033	.030	-.243	.274	6.822
				IC	.001	.032	.002	.987			IC	.001	.006	.008	.931	1.248
				RMA	.437	.826	.072	.598			RMA	.324**	.156	.248**	.041	1.990
				PMA	-.461	.343	-.172	.182			PMA	.003	.065	.004	.969	1.748
				RMC	-.213	.757	-.030	.779			RMC	.393***	.143	.256***	.007	1.214
				PMC	.203	.401	.056	.614			PMC	.049	.076	.063	.517	1.300
1	100	PROFIT_1	.059	FC	-.208***	.075	-.282***	.007	GROW_1	.186	FC	.021	.013	.146	.126	1.085
				TC	.222	.151	.379	.147			TC	-.036	.027	-.324	.181	7.051
				CC	-.287	.187	-.392	.127			CC	.036	.033	.255	.284	6.822
				IC	.015	.038	.041	.705			IC	.001	.007	.007	.941	1.231
				RMA	-.788	.975	-.111	.421			RMA	.142	.174	.105	.415	1.990
				PMA	.298	.396	.096	.453			PMA	.161**	.071	.270**	.025	1.707
				RMC	-1.950*	1.062	-.206*	.070			RMC	.116	.190	.064	.542	1.319
				PMC	-.250	.460	-.061	.588			PMC	-.233**	.082	-.296***	.005	1.312

*(p< .10), **(p<.05), ***(p<.01)

Table 4.7 (Continue)

After n	N	Dependent variables	Adjusted R^2	Independent variables	β (non-standard)	S.E.	β (standard)	p-value	Dependent variables	Adjusted R^2	Independent variables	β (non-standard)	S.E.	β (standard)	p-value	VIF
2	90	PROFIT_2	.014	FC	-.065	.088	-.082	.459	GROW_2	.233	FC	.005	.013	.038	.694	1.103
				TC	.218	.179	.357	.226			TC	-.005	.026	-.049	.850	7.708
				CC	-.108	.218	-.143	.622			CC	.015	.031	.125	.625	7.581
				IC	-.085*	.044	-.219*	.055			IC	-.017***	.006	-.271***	.008	1.138
				RMA	-1.445	1.102	-.186	.193			RMA	.128	.158	.101	.420	1.823
				PMA	.469	.538	.108	.386			PMA	.077	.077	.108	.324	1.375
				RMC	.940	1.255	.084	.456			RMC	.340*	.180	.187*	.063	1.144
				PMC	.139	.514	.033	.787			PMC	-.188**	.074	-.272**	.013	1.318
5	60	PROFIT_5	0	FC	-.117	.734	-.023	.874	GROW_5	0	FC	-.140**	.061	-.330**	.026	1.196
				TC	.041	1.401	.010	.977			TC	-.023	.116	-.068	.843	6.768
				CC	.254	1.705	.050	.882			CC	.019	.142	.044	.895	6.432
				IC	-.648	.409	-.225	.119			IC	-.035	.034	-.142	.314	1.135
				RMA	8.739	8.390	.188	.303			RMA	.066	.697	.017	.925	1.836
				PMA	-6.605	4.497	-.240	.148			PMA	-.010	.374	-.004	.980	1.501
				RMC	-4.553	11.101	-.064	.683			RMC	-.861	.923	-.143	.355	1.357
				PMC	2.356	3.901	.096	.548			PMC	-.241	.324	-.117	.460	1.427

***(p< .10), **(p<.05), ***(p<.01)**

Table 4.8 The Results of Multiple Regression of Path B

After n	N	Independent variables	Dependent variables	β	p-value	Dependent variables	β	p-value
0	110	RDI	PROFIT	.009	.924	GROW	-.074	.441
		PDI	PROFIT	-.113	.241	GROW	.055	.570
1	100	RDI	PROFIT_1	-.024	.813	GROW_1	.155	.123
		PDI	PROFIT_1	.042	.675	GROW_1	.160	.111
2	90	RDI	PROFIT_2	-.047	.658	GROW_2	-.155	.282
		PDI	PROFIT_2	-.075	.481	GROW_2	.099	.355
5	60	RDI	PROFIT_5	-.076	.565	GROW_5	-.022	.867
		PDI	PROFIT_5	-.003	.984	GROW_5	.011	.936

***(p< .10), **(p< .05), ***(p< .01)**

The results of multiple regression of path B shown in Table 4.8 have nonsignificant direct effects. Therefore, the third stage of mediation analysis described in chapter 3.3 could not be verified. In other words, the fact that there might be the mediation effect among diversification strategy, internal competency, and market conditions could not found significantly.

4.7 Hypothesis Test of Moderation Effect

In contrast with the test for mediation effect, it is not necessary whether the direct effect of independent variables on dependent variables is significant with moderation effect.

To investigating existence of the moderation effect, MMR analysis was performed based on Fig 2.2 and the following results as Table 4.9 show the existence of the moderation effect. The detailed results of MMR analysis are contained Appendix B.

Table 4.9 The Existence of the Interaction Effect

After n	Dependent Variable	Interaction Variables	Dependent Variable	Interaction Variables
0	PROFIT	TC*PDI, CC*PDI, IC*PDI,	GROW	FC*PDI, TC*PDI, PMA*RDI, RMC*RDI
1	PROFIT_1	IC*RDI, PMA*RDI, RMC*RDI, PMA*PDI, RMC*PDI	GROW_1	TC*RDI, CC*RDI, IC*RDI, TC*PDI, CC*PDI, IC*PDI,
2	PROFIT_2	PMC*RDI, RMC*PDI	GROW_2	FC*RDI, TC*RDI, PMA*RDI
3	PROFIT_5	IC*RDI	GROW_5	

The results indicate that internal competency generally interacts with diversification strategy significantly, but market conditions interacts with diversification strategy in terms of only several factors except for regional market attractiveness.

After MMR analysis, significant internal competency and market conditions which could be moderator were divided into two groups whether the value is more or less than value zero. The different results between increase variable and decrease variable are shown in Table 4.10.

Table 4.10 The Results after Separation of the Moderator

After n	Dependent variable	Independent variable	Moderator	Criteria	N	β	p-value
0	PROFIT	PDI	TC	Increase	60	-.455**	.018
				Decrease	50	.187	.414
		PDI	CC	Increase	60	-.400**	.039
				Decrease	50	.204	.370
		PDI	IC	Increase	62	-.447**	.036
				Decrease	48	.144	.468
1	PROFIT_1	RDI	TC	Increase	53	-.211	.384
				Decrease	47	.230	.264
		RDI	PMA	Increase	59	-.433**	.019
				Decrease	37	.596**	.044
		RDI	RMC	Increase	33	-.225	.328
				Decrease	67	.088	.664
		PDI	PMA	Increase	59	-.178	.411
				Decrease	37	.756*	.052
		PDI	RMC	Increase	33	-.188	.506
				Decrease	67	.241	.295
2	PROFIT_2	RDI	PMC	Increase	45	.085	.795
				Decrease	41	-.081	.711
		PDI	RMC	Increase	33	.081	.825
				Decrease	53	-.197	.472
5	PROFIT_5	RDI	IC	Increase	32	-1.043	.672
				Decrease	28	-.502	.714

Table 4.10 (Continue)

After n	Dependent variable	Independent variable	Moderator	Criteria	N	β	p-value
0	GROW	RDI	PMA	Increase	59	-.032	.439
				Decrease	46	-.052	.210
		RDI	RMC	Increase	36	-.112**	.025
				Decrease	69	.012	.714
		PDI	FC	Increase	54	.052	.202
				Decrease	56	-.024	.634
		PDI	TC	Increase	60	-.011	.776
				Decrease	50	.061	.214
1	GROW_1	RDI	TC	Increase	53	-.024	.556
				Decrease	47	.136***	.002
		RDI	CC	Increase	53	.020	.626
				Decrease	47	.092**	.047
		RDI	IC	Increase	56	-.015	.685
				Decrease	44	.129***	.007
		PDI	TC	Increase	53	-.038	.431
				Decrease	47	.166***	.001
		PDI	CC	Increase	53	.002	.958
				Decrease	47	.136**	.012
		PDI	IC	Increase	56	-.019	.671
				Decrease	44	.138***	.010
2	GROW_2	RDI	FC	Increase	47	-.085**	.029
				Decrease	43	.032	.488
		RDI	TC	Increase	47	-.085*	.065
				Decrease	43	.030	.451
		RDI	PMA	Increase	59	-.055	.149
				Decrease	27	-.007	.891

After separation, the significant result was derived more than direct effect of the diversification strategy. For example, product diversification strategy has negative effect on the profitability in the situation that technical competency, construction competency, and international competency are increasing. And even though the results were nonsignificant, diversification strategy has

positive effect on the profitability in the situation that the internal competency was decreasing. Market conditions has the same effect as internal competency except for profitability two years after.

Performance in terms of growth of the contractors was effected by the internal competency in a similar way compared to profitability. Financial competency worked as a negative moderator significantly with increasing situation as not shown in the profitability.

Except for the regional market competitiveness on the effect of the regional diversification strategy, market conditions was not meaningful moderator. Generally, the results were shown that if the one direction has significant moderation effect, the other direction was reverse moderation effect on the relationship between diversification strategy and the performance of the contractors.

4.8 Discussion

Through the conducted analysis, there are four things to discuss in this chapter. First thing is about the results of the confirmatory factor analysis, and the second thing is about the direct effect on the performance. The third thing is about the mediation effect on the performance. And the last thing to discuss is moderation effect of the internal competency and market conditions.

1) Thorugh the literature review and in-depth interview, justification to classify the internal competency and to select measurement variables was retained. And confirmatory factor analysis was performed to measure the internal competency that is not obtained easily with consistency among the contractors. The results of CFA were reasonable to adopt in terms of reliability and validity of the model. However, it is difficult problem to select between consistency and accuracy of each contractor's internal competency in terms of trade-off situation. So it is needed further study to investigate the internal competency of the contractor with both consistency and accuracy.
2) Direct effects of the diversification strategy, internal competency, and market conditions were shown nonsignificant or incompatible results. First of all, direct effect of diversification strategy was nonsignificant both enter method and stepwise method. It supports the results of literature review which mentioned in chapter 1.2 problem statement. The results of internal competency showed that internal competency

has negative direct effect on the performance both enter method and stepwise method except for technical competency as not expected. Market attractiveness has positive direct effect on the performance in terms of growth. Therefore, the author conclued with the above results and literature review that diversification strategy and internal competency have complex relationship, so the direct effect of them on the performance could not be founded as market conditions could.

3) By analyzing the cause-effect relationship of path B and C as shown Fig 3.1, first and second steps of mediation analysis were performed. However, diversification strategy has no direct effect on the performance which described as path B, the author could not found the mediation effect among the diversification strategy, internal competency, and market conditions.

4) Generally, if the internal competency was increasing, the diversification strategy has negative effect on the performance. It means that if the internal competency of the contractor was increasing compared to the value of a year ago, it is better to select specialization strategy than diversification strategy. This tendency appeared in the result of the profitability of this year and the growth after a year. And it appeared more strongly with relationship between diversification strategy and profitability than the relationship between diversification strategy and growth of contractors. Despite the result of MMR analysis of market conditions which related to existence moderation effect, market conditions acted moderator less than internal competency.

Chapter 5. Conclusion

5.1 Summary

This research proposes mediation and moderation effects framework of internal competency and market conditions for diversification strategy of Korean contractors. Data was collected from ICAK, CAK, CIC, ENR, and annual reports of top 10 Korean contractors from 2005 to 2016. And the market segmentation was based on CIC and ENR.

By testing hypothesis of direct effect of diversification using multiple regression analysis, mediation analysis, and moderated multiple regression analysis, not only prove the problem statement of the previous studies, but also the necessity of this research was ensured.

Through mediation analysis and moderated multiple regression, existence of mediation and moderation was tested. Also, the strength and the direction of the moderation was studied.

As a result, direct effect and mediation effect could not be found. However, existence of the moderation effect was founded significantly among several internal competency and market conditions.

5.2 Limitations

Data collection was performed from 2005 to 2016 which relatively small compared to the history of international construction industry of Korea. And the research aimed to top 10 Korean contractors, so it could not suggest the contribution to medium-small size contractors.

The internal competency studied in this research could not represent situations of each contractor perfectly due to uncollectability and inconsistency. So detailed competency such as risk management, estimation management skills, etc. could not be considered.

With the existence of moderation effect significantly, the author suggests only two separated groups depending on whether the value is more or less than value 10. If the number of separation is more than three, there might be more meaningful results.

5.3 Contributions and Further Study

This research has academical contribution in terms of connection of strategic management field and construction management field. By adapting basic theory of strategic management field such as strategic contingency theory and resource-based view, complex relationship among diversification strategy, internal competency, and market conditions were investigated.

Also, it is considered that the results about the moderation effect are useful to Korean contractors in various situations. With diagnosis about internal competency and prospect of the markets, the contractor could establish the appropriate diversification strategy.

With the limitation of this research, the author proposes two directions for further study. First, this research is longitudinal section research by analyzing independent variables and dependent variable with several year differences. However, cross-sectional research about the complex relationship between diversification strategy and related factors is also needed such as different contractors of different countries. It might suggest the more useful solutions to Korean contractor to be more competitive in global construction markets.

And further study could focus on the relationship between the diversification strategy and internal competency. As mentioned in chapter 5.2, risk management, estimation management skills, etc. is important competency, but was not considered in this research due to uncollectability and inconsistency. With other data collection methods such as questionnaire, these competencies could be measured, but it should be collected with the certain consistency.

Bibliography

Ban, H. J. (2008). The impact on internal resources of firm on internationalization strategy focused on resourced-based view. *Korea Trade Research,* 33(2), 357-380.

Baron, R. M. and Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, Strategic, and Statistical considerations. *J.Person.Social.Psyc.,* 51(6), 1173-1182.

Byun, I. W. and Kim, Y. S. (2012). An analysis of core competence of pre-construction service of the making inroads into oversea construction market. *Korean Journal of Construction Engineering and Management,* 13(2), 80-90.

Chen, P. H., Ong, C. F., and Hsu, S. C., (2016). The linkages between internationalization and environmental strategies of multinational construction firms. *Journal of Cleaner Production,* 116, 207-216

Cho, K. S., Lee, S. H., and Kim, J. J. (2013). Influence of overseas construction business on construction companies financial stability. *Korean Journal of Construction Engineering and Management,* 14(1), 43-51.

Choo, S. Y., Yu, S. M., and Limb, S. J. (2009). A study on the effects of the fit among environment, strategy and competence on firm performance. *Journal of Strategic Management,* 12(1), 101-126.

Diana, D. S. (2006). Exploratory or confirmatory factor analysis. *Statistics and Data Analysis,* 1-17.

Han, I. S. (2002). Moderated multiple regression and statistical power problems. *J.Labor.Manage.,* 13, 143-161.

Han, J. G., Park, H. P., and Jang, H. S. (2013). A study on development of the competitive evaluation model in oversea construction industry. *Korean Journal of Construction Engineering and Management,* 14(2), 12-21.

Han, S. S., Kim, D. Y., Jang, H. S., and Choi, S. I. (2010). Strategies for contractors to sustain growth in the global construction market. *Habitat International*. 34, 1-10

Han, S. S. and Jeong, Y. S. (2013). A study on the effects of internal capability, export assistance and global network on rapid globalization. *Korea Trade Research,* 38(1), 173-197.

Hong, S. H., Kim, E. M., and Lee, D. W. (2010). A study on relationship between business strategies and core competency in construction company. *Journal of Korean Society of Civil Engineering,* 30(6), 641-654.

Hortal, I. M., Kapelko, M., Lansink, A. O., and Camanho, A. S. (2016). The impact of internationalization and diversification construction industry performance. *International Journal of Strategic Property Management,* 20(2), 172-183.

Hua, G. B. and Pin, T. H. (2000). Forecasting construction industry demand, price and productivity in Singapore: the Box-Jenkins approach. *Const.Manage.Economics,* 18(5), 607-618.

Hurley, A. E., Scandura, T. A., Schriesheim, C. A., Brannick, M. T., Seers, A., Vandenberg, R. J., and Williams, L. J. (1997). Exploratory and confirmatory factor analysis: Guidelines, issues, and alternatives. *Journal of Organizational Behavior,* 18(6), 667-683.

Hyun, J. S., Choi, S. I., and Jang, H. S. (2005). A correlation between innovatives and performance in the Korean construction firms. *J.Architectural.Kor.,* 21(8), 155-164.

Isik, Z., Arditi, D., Dikmen, I., and Birgonul, M. T. (2010). Impact of resources and strategies on construction company performance. *J.Manage.Eng.,* 26(1), 9-18.

Jang, H. S., Lee, B. N., Choi, S. I., and Koo, B. S. (2008). Competency assessment of Korean construction firms on international plant projects. *Korean Journal of Construction Engineering and Management,* 9(4), 173-181.

Jang, S. W. (2014). Influence of the business portfolio diversification on construction companies' financial stability. *Korean Journal of Construction Engineering and Management,* 15(6), 105-112

Jang, W. S., Yang, H. B., and Han, S. H. (2014). Development of evaluation system for overseas business capability of construction firms. *Journal of the Korean Society of Civil Engineers,* 34(3), 977-987.

Jeon, I. W. (1996). Empirical study on the determinants of diversification in Korea big business groups. Kukje Kyungje Yongo, 2(2), 69-89.

Jiang, H. and Liu, C. (2011). Forecasting construction demand: a vector error correction model with dummy variables. *Const.Manage.Economics,* 29(9), 969-979.

Jung, W. Y., Han, S. H., Jang, W. S., and Koo, B. S. (2010). Empirical assessment of international entry strategy for large construction companies. *Korean Journal of Construction Engineering and Management,* 11(1), 59-69.

Jung, W. Y., Han, S. H., Koo, B. S., and Jang, W. S. (2012). Which strategies are more effective for international contractors during boom and recession periods. *J.Manage.Eng.,* 28(3), 281-290.

Jung, W. Y., Han, S. H., and Lee, K. W. (2012). Country portfolio solutions for global market uncertainties. *J.Manage.Eng.,* 28(4), 372-381.

Jung, W. Y., Han, S. H., Park, H. D., and Kim, D. Y. (2010). Empirical Assessment of Internationalization strategies for small and medium construction companies. *J.Constr.Manage.Eng.,* 136(12), 1306-1316.

Kim, H. J. and Reinschmidt, K. F. (2011). Association of risk attitude with market diversification in the construction business. *J.Manage.Eng.,* 27(2), 66-74.

Kim, H. N. (2016). The impacts of changes in the oil price on construction investments of oil producing countries. *Asia-pacific Journal of Multimedia Services Convergent with Art, Humanities, and Sociology,* 6(12), 459-468.

Kim, S. B. and Kim, Y. B. (2013). Quantification of a global construction core competencies for Korean construction/engineering firms. *Journal of the Korean Society of Civil Engineers,* 33(6), 2541-2549.

Lam, K. C. and Oshodi, O. S. (2016). Using univariate models for construction output forecasting: Comparing artificial intelligence and economic techniques. *J.Manage.Eng,,* 32(6), 1-11.

Lee, J. G. (2016). R Program Recipes for Multi-Variate Analysis & Data Mining. Bullsbook.

Lee, H. C. and Go, S. S. (2010). A study on the evaluation index for the effectiveness of business management strategy in construction industry. *Journal of the Architectural Institute of Korea,* 26(4), 133-141.

Lee, S. H., Tae, S. H., Yoo, S. K., and Shin, S. W. (2016). Impact of business portfolio diversification on construction company insolvency in Korea. *J.Manage.Eng.,* 32(3), 05016003-1~9.

Lim, J. S., Yoo, S. K., Kim, J. H., and Kim, J. J. (2014). Study on the impact of construction company work diversification on firm value - focusing on insolvent companies. *Journal of the Architectural Institute of Korea,* 30(3), 123-130.

Lu, W., Shen, L., and Yam, M. C. H. (2008). Critical success factors for competitiveness of contractors: China study. 134(12), 972-982.

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

Miller, D. and Friesen, P. H. (1986). Porter's (1980) generic strategies and performance: An empirical examination with American data. *Organization Studies,* 7(1), 37-55.

Moon, C. K. (2008). Export market attractiveness analyses of the heavy electric equipment industry. *International Commerce and Information Review,* 10(4), 227-298.

Moon, S. K., Lee, J. S., Lee, Y. S., and Kim, J. J. (2009). An analysis on construction business variation trend based on construction industry structure. *J.Architectural.Kor.,* 25(6), 171-178.

Montgomery, C. A. (1985). Product-Market diversification and market power. Academy of Management Journal, 28(4), 789-798.

Oyewobi, L. O. (2014). Competitiveness of construction organisations in South Africa. Construction Research Congress 2014, 2063-2073.

Park, H. S. (2011). Analysis methodology for diversification trends of construction firms. Master's Thesis, *Seoul National University, Korea.*

Price, A. D. F. and Newson, E. (2003). Strategic management: Consideration of paradoxes, processes, and associated concepts as applied to construction. *J.Manage.Eng.,* 19(4), 183-192.

Pulaj, E. and Kume, V. (2013). Measuring market concentration of construction industry. Vlora region evidence. *European Scientific J.,* 9(32), 121-136.

Seo, J. B., Lee, S. H., and Kim, J. J. (2013). Analysis of correlation between construction business and insolvency of construction company. *J.Kor.Const.Manage.,* 14(3), 3-11.

Seo, Y. S. (2010). Testing mediator and moderator effects in counseling psychology research: Conceptual distinction and statistical considerations. *The Korean Journal of Counseling and Psychotherapy,* 22(4), 1147-1168.

Suhr, D. D. (2006). Exploratory or confirmatory factor analysis. *Statistics and Data Analysis,* 1-17.

Sung, Y. K., Lee, J. H., Yi, J. S., and Son, J. W. (2017). Establishment of growth strategies for international construction firms by exploring diversification-related determinants and their effects. *J.Manage.Eng.,* 33(5), 04017018-1~13.

Sung, Y. K., Yi. J. S., and Choi, S. I. (2015). A study of correlation for diversification and growth of global contractors - focusing on international diversification and international revenue. *Journal of the Architectural Institute of Korea,* 31(6), 67-74.

Tripathi, K. K. and Jha, K. K. (2018). Determining success factors for a construction organization: A structural equation modeling approach. *J.Manage.Eng.,* 34(1), 04017050-1~15.

Warszawski, A. (1996). Strategic planning in construction companies. *Journal of Construction Engineering and Management,* 122(2), 133-140.

Zajac, E. J., Kraatz, M. S., and Bresser, R. K. F. (2000). Modeling the dynamics of strategic fit: A normative approach to strategic change. *Strategic Management Journal,* 21(4), 429-453.

Zhao, X., Lynch, J. G., and Chen, Q. (2010). Reconsidering baron and kenny: Myths and truths about mediation analysis. *J.Consumer,* 37. 197-206.

Appendix A

Appendix A The result of Stepwise Multiple Regression Analysis

After n	N	Dependent variables	Adjusted R^2	Independent variables	β (non-standard)	S.E.	β (standard)	p-value	VIF
0	110	PROFIT	.021	RDI	.177	.147	.133	.230	1.358
				PDI	-.258	.169	-.168	.131	1.348
				FC	.096	.060	.157	.112	1.062
				PMA	-.373	.260	-.139	.154	1.052
0	110	GROW	.248	CC	-.047***	.011	-.339***	.000	1.002
				RMA	.290**	.115	.221**	.013	1.125
				RMC	.391***	.135	.255***	.005	1.124
1	100	PROFIT_1	.091	PDI	.199	.177	.110	.265	1.041
				FC	-.216***	.072	-.294***	.004	1.054
				TC	.248*	.138	.423*	.076	6.074
				CC	-.312*	.173	-.426*	.076	6.104
				RMC	-2.115**	.917	-.223**	.023	1.016
1	100	GROW_1	.204	RDI	.036	.028	.120	.203	1.087
				FC	.019	.013	.138	.133	1.031
				TC	-.011	.010	-.102	.279	1.083
				RMA	.157	.164	.115	.342	1.806
				PMA	.154**	.070	.258**	.030	1.688
				PMC	-.221***	.081	-.279***	.008	1.298
2	90	PROFIT_2	.043	TC	.138**	.065	.226**	.036	1.042
				IC	-.078*	.041	-.201*	.062	1.053
				RMA	-1.213	.926	-.156	.194	1.328
				PMA	.560	.513	.129	.278	1.286
2	90	GROW_2	.258	IC	-.018***	.006	-.278***	.003	1.028
				PMA	.098	.066	.138	.141	1.039
				RMC	.381**	.169	.210**	.026	1.037
				PMC	-.222***	.064	-.322***	.001	1.022
5	60	PROFIT_5	.038	IC	-.678**	.371	-.235**	.073	1.019
				PMA	-4.387	3.549	-.159	.221	1.019
5	60	GROW_5	.060	FC	-.140**	.057	-.329**	.018	1.132
				IC	-.038	.031	-.158	.222	1.031
				RMC	-.828	.805	-.137	.308	1.118

***(p< .10), **(p<.05), ***(p<.01)**

Appendix B

Appendix B The Results of Moderate Multiple Regression Analysis

After n	N	Dependent variable	Interactive variable	Independent variables	Input variables	R^2	p-value of ΔF	Dependent variable	Interactive variable	Independent variables	Input variables	R^2	p-value of ΔF
0	110	PROFIT	RDI*FC	RDI, FC	RDI, FC	.013	-	GROW	RDI*FC	RDI, FC	RDI, FC	.006	-
					RDI, FC, RDI*FC	.014	.873				RDI, FC, RDI*FC	.022	.193
			RDI*TC	RDI, TC	RDI, TC	.010	-		RDI*TC	RDI, TC	RDI, TC	.093	-
					RDI, TC, RDI*TC	.027	.180				RDI, TC, RDI*TC	.098	.480
			RDI*CC	RDI, CC	RDI, CC	.003	-		RDI*CC	RDI, CC	RDI, CC	.118	-
					RDI, CC, RDI*CC	.010	.393				RDI, CC, RDI*CC	.122	.463
			RDI*IC	RDI, IC	RDI, IC	.003	-		RDI*IC	RDI, IC	RDI, IC	.016	-
					RDI, IC, RDI*IC	.003	.862				RDI, IC, RDI*IC	.027	.287
			PDI*FC	PDI, FC	PDI, FC	.029	-		PDI*FC	PDI, FC	PDI, FC	.004	-
					PDI, FC, PDI*FC	.031	.629				PDI, FC, PDI*FC	.036	062*
			PDI*TC	PDI, TC	PDI, TC	.022	-		PDI*TC	PDI, TC	PDI, TC	.093	-
					PDI, TC, PDI*TC	.069	.022**				PDI, TC, PDI*TC	.119	.082*
			PDI*CC	PDI, CC	PDI, CC	.016	-		PDI*CC	PDI, CC	PDI, CC	.121	-
					PDI, CC, PDI*CC	.045	.075*				PDI, CC, PDI*CC	.133	.226
			PDI*IC	PDI, IC	PDI, IC	.015	-		PDI*IC	PDI, IC	PDI, IC	.016	-
					PDI, IC, PDI*IC	.060	.027**				PDI, IC, PDI*IC	.016	.752
1	100	PROFIT_1	RDI*FC	RDI, FC	RDI, FC	.060	-	GROW_1	RDI*FC	RDI, FC	RDI, FC	.051	-
					RDI, FC, RDI*FC	.074	.242				RDI, FC, RDI*FC	.052	.710
			RDI*TC	RDI, TC	RDI, TC	.002	-		RDI*TC	RDI, TC	RDI, TC	.029	-
					RDI, TC, RDI*TC	.006	.526				RDI, TC, RDI*TC	.106	.005***
			RDI*CC	RDI, CC	RDI, CC	.001	-		RDI*CC	RDI, CC	RDI, CC	.029	-
					RDI, CC, RDI*CC	.001	.961				RDI, CC, RDI*CC	.077	.027**
			RDI*IC	RDI, IC	RDI, IC	.023	-		RDI*IC	RDI, IC	RDI, IC	.061	-
					RDI, IC, RDI*IC	.074	.023**				RDI, IC, RDI*IC	.088	.095*
			PDI*FC	PDI, FC	PDI, FC	.063	-		PDI*FC	PDI, FC	PDI, FC	.042	-
					PDI, FC, PDI*FC	.065	.635				PDI, FC, PDI*FC	.068	.104
			PDI*TC	PDI, TC	PDI, TC	.003	-		PDI*TC	PDI, TC	PDI, TC	.027	-
					PDI, TC, PDI*TC	.010	.420				PDI, TC, PDI*TC	.102	.006***
			PDI*CC	PDI, CC	PDI, CC	.002	-		PDI*CC	PDI, CC	PDI, CC	.027	-
					PDI, CC, PDI*CC	.005	.571				PDI, CC, PDI*CC	.084	.017**
			PDI*IC	PDI, IC	PDI, IC	.022	-		PDI*IC	PDI, IC	PDI, IC	.053	-
					PDI, IC, PDI*IC	.039	.201				PDI, IC, PDI*IC	.102	.024**

*(p< .10), **(p<.05), ***(p<.01)

Appendix B (Continue)

After n	N	Dependent variable	Interactive variable	Independent variables	Input variables	R^2	p-value of ΔF	Dependent variable	Interactive variable	Independent variables	Input variables	R^2	p-value of ΔF
2	90	PROFIT_2	RDI*FC	RDI, FC	RDI, FC	.010	-	GROW_2	RDI*FC	RDI, FC	RDI, FC	.013	-
					RDI, FC, RDI*FC	.021	.322				RDI, FC, RDI*FC	.073	.021**
			RDI*TC	RDI, TC	RDI, TC	.038	-		RDI*TC	RDI, TC	RDI, TC	.029	-
					RDI, TC, RDI*TC	.088	.032**				RDI, TC, RDI*TC	.079	.033**
			RDI*CC	RDI, CC	RDI, CC	.037	-		RDI*CC	RDI, CC	RDI, CC	.029	-
					RDI, CC, RDI*CC	.072	.074*				RDI, CC, RDI*CC	.053	.146
			RDI*IC	RDI, IC	RDI, IC	.023	-		RDI*IC	RDI, IC	RDI, IC	.121	-
					RDI, IC, RDI*IC	.031	.413				RDI, IC, RDI*IC	.124	.590
			PDI*FC	PDI, FC	PDI, FC	.011	-		PDI*FC	PDI, FC	PDI, FC	.010	-
					PDI, FC, PDI*FC	.014	.567				PDI, FC, PDI*FC	.012	.654
			PDI*TC	PDI, TC	PDI, TC	.037	-		PDI*TC	PDI, TC	PDI, TC	.021	-
					PDI, TC, PDI*TC	.064	.114				PDI, TC, PDI*TC	.040	.204
			PDI*CC	PDI, CC	PDI, CC	.036	-		PDI*CC	PDI, CC	PDI, CC	.020	-
					PDI, CC, PDI*CC	.053	.216				PDI, CC, PDI*CC	.029	.377
			PDI*IC	PDI, IC	PDI, IC	.028	-		PDI*IC	PDI, IC	PDI, IC	.134	-
					PDI, IC, PDI*IC	.031	.607				PDI, IC, PDI*IC	.134	.951
5	60	PROFIT_5	RDI*FC	RDI, FC	RDI, FC	.006	-	GROW_5	RDI*FC	RDI, FC	RDI, FC	.075	-
					RDI, FC, RDI*FC	.045	.137				RDI, FC, RDI*FC	.075	.922
			RDI*TC	RDI, TC	RDI, TC	.006	-		RDI*TC	RDI, TC	RDI, TC	.000	-
					RDI, TC, RDI*TC	.007	.852				RDI, TC, RDI*TC	.000	.983
			RDI*CC	RDI, CC	RDI, CC	.008	-		RDI*CC	RDI, CC	RDI, CC	.002	-
					RDI, CC, RDI*CC	.011	.705				RDI, CC, RDI*CC	.002	.948
			RDI*IC	RDI, IC	RDI, IC	.046	-		RDI*IC	RDI, IC	RDI, IC	.011	-
					RDI, IC, RDI*IC	.112	.045**				RDI, IC, RDI*IC	.021	.465
			PDI*FC	PDI, FC	PDI, FC	.001	-		PDI*FC	PDI, FC	PDI, FC	.077	-
					PDI, FC, PDI*FC	.013	.410				PDI, FC, PDI*FC	.095	.290
			PDI*TC	PDI, TC	PDI, TC	.001	-		PDI*TC	PDI, TC	PDI, TC	.000	-
					PDI, TC, PDI*TC	.029	.204				PDI, TC, PDI*TC	.001	.838
			PDI*CC	PDI, CC	PDI, CC	.002	-		PDI*CC	PDI, CC	PDI, CC	.002	-
					PDI, CC, PDI*CC	.023	.276				PDI, CC, PDI*CC	.003	.793
			PDI*IC	PDI, IC	PDI, IC	.046	-		PDI*IC	PDI, IC	PDI, IC	.012	-
					PDI, IC, PDI*IC	.086	.123				PDI, IC, PDI*IC	.015	.664

***(p< .10), **(p<.05), ***(p<.01)**

Appendix B (Continue)

After n	N	Dependent variable	Interactive variable	Independent variables	Input variables	R^2	p-value of ΔF	Dependent variable	Interactive variable	Independent variables	Input variables	R^2	p-value of ΔF
0	110	PROFIT	RDI*RMA	RDI, RMA	RDI, RMA	.002	-	GROW	RDI*RMA	RDI, RMA	RDI, RMA	.110	-
					RDI, RMA, RDI*RMA	.002	.935				RDI, RMA, RDI*RMA	.110	.773
			RDI*PMA	RDI, PMA	RDI, PMA	.020	-		RDI*PMA	RDI, PMA	RDI, PMA	.091	-
					RDI, PMA, RDI*PMA	.021	.932				RDI, PMA, RDI*PMA	.116	.086*
			RDI*RMC	RDI, RMC	RDI, RMC	.006	-		RDI*RMC	RDI, RMC	RDI, RMC	.117	-
					RDI, RMC, RDI*RMC	.027	.131				RDI, RMC, RDI*RMC	.145	.067*
			RDI*PMC	RDI, PMC	RDI, PMC	.000	-		RDI*PMC	RDI, PMC	RDI, PMC	.006	-
					RDI, PMC, RDI*PMC	.000	.846				RDI, PMC, RDI*PMC	.014	.376
			PDI*RMA	PDI, RMA	PDI, RMA	.013	-		PDI*RMA	PDI, RMA	PDI, RMA	.102	-
					PDI, RMA, PDI*RMA	.020	.386				PDI, RMA, PDI*RMA	.102	.906
			PDI*PMA	PDI, PMA	PDI, PMA	.027	-		PDI*PMA	PDI, PMA	PDI, PMA	.075	-
					PDI, PMA, PDI*PMA	.028	.729				PDI, PMA, PDI*PMA	.079	.465
			PDI*RMC	PDI, RMC	PDI, RMC	.018	-		PDI*RMC	PDI, RMC	PDI, RMC	.107	-
					PDI, RMC, PDI*RMC	.019	.759				PDI, RMC, PDI*RMC	.108	.836
			PDI*PMC	PDI, PMC	PDI, PMC	.013	-		PDI*PMC	PDI, PMC	PDI, PMC	.005	-
					PDI, PMC, PDI*PMC	.014	.793				PDI, PMC, PDI*PMC	.018	.244
1	100	PROFIT_1	RDI*RMA	RDI, RMA	RDI, RMA	.008	-	GROW_1	RDI*RMA	RDI, RMA	RDI, RMA	.138	-
					RDI, RMA, RDI*RMA	.010	.637				RDI, RMA, RDI*RMA	.142	.480
			RDI*PMA	RDI, PMA	RDI, PMA	.003	-		RDI*PMA	RDI, PMA	RDI, PMA	.123	-
					RDI, PMA, RDI*PMA	.078	.007***				RDI, PMA, RDI*PMA	.129	.444
			RDI*RMC	RDI, RMC	RDI, RMC	.035	-		RDI*RMC	RDI, RMC	RDI, RMC	.059	-
					RDI, RMC, RDI*RMC	.084	.026**				RDI, RMC, RDI*RMC	.068	.336
			RDI*PMC	RDI, PMC	RDI, PMC	.001	-		RDI*PMC	RDI, PMC	RDI, PMC	.106	-
					RDI, PMC, RDI*PMC	.001	.883				RDI, PMC, RDI*PMC	.106	.866
			PDI*RMA	PDI, RMA	PDI, RMA	.010	-		PDI*RMA	PDI, RMA	PDI, RMA	.134	-
					PDI, RMA, PDI*RMA	.012	.684				PDI, RMA, PDI*RMA	.157	.112
			PDI*PMA	PDI, PMA	PDI, PMA	.006	-		PDI*PMA	PDI, PMA	PDI, PMA	.126	-
					PDI, PMA, PDI*PMA	.042	.059*				PDI, PMA, PDI*PMA	.130	.535
			PDI*RMC	PDI, RMC	PDI, RMC	.037	-		PDI*RMC	PDI, RMC	PDI, RMC	.062	-
					PDI, RMC, PDI*RMC	.090	.020**				PDI, RMC, PDI*RMC	.063	.861
			PDI*PMC	PDI, PMC	PDI, PMC	.002	-		PDI*PMC	PDI, PMC	PDI, PMC	.102	-
					PDI, PMC, PDI*PMC	.002	.991				PDI, PMC, PDI*PMC	.104	.682

***(p< .10), **(p<.05), ***(p<.01)**

Appendix B (Continue)

After n	N	Dependent variable	Interactive variable	Independent variables	Input variables	R^2	p-value of ΔF	Dependent variable	Interactive variable	Independent variables	Input variables	R^2	p-value of ΔF
2	90	PROFIT_2	RDI*RMA	RDI, RMA	RDI, RMA	.005	-	GROW_2	RDI*RMA	RDI, RMA	RDI, RMA	.125	-
					RDI, RMA, RDI*RMA	.010	.494				RDI, RMA, RDI*RMA	.134	.339
			RDI*PMA	RDI, PMA	RDI, PMA	.006	-		RDI*PMA	RDI, PMA	RDI, PMA	.045	-
					RDI, PMA, RDI*PMA	.035	.109				RDI, PMA, RDI*PMA	.129	.005***
			RDI*RMC	RDI, RMC	RDI, RMC	.011	-		RDI*RMC	RDI, RMC	RDI, RMC	.082	-
					RDI, RMC, RDI*RMC	.033	.164				RDI, RMC, RDI*RMC	.108	.120
			RDI*PMC	RDI, PMC	RDI, PMC	.003	-		RDI*PMC	RDI, PMC	RDI, PMC	.144	-
					RDI, PMC, RDI*PMC	.069	.016**				RDI, PMC, RDI*PMC	.165	.142
			PDI*RMA	PDI, RMA	PDI, RMA	.007	-		PDI*RMA	PDI, RMA	PDI, RMA	.121	-
					PDI, RMA, PDI*RMA	.008	.842				PDI, RMA, PDI*RMA	.122	.685
			PDI*PMA	PDI, PMA	PDI, PMA	.011	-		PDI*PMA	PDI, PMA	PDI, PMA	.036	-
					PDI, PMA, PDI*PMA	.020	.386				PDI, PMA, PDI*PMA	.036	.861
			PDI*RMC	PDI, RMC	PDI, RMC	.015	-		PDI*RMC	PDI, RMC	PDI, RMC	.078	-
					PDI, RMC, PDI*RMC	.052	.073*				PDI, RMC, PDI*RMC	.079	.776
			PDI*PMC	PDI, PMC	PDI, PMC	.006	-		PDI*PMC	PDI, PMC	PDI, PMC	.130	-
					PDI, PMC, PDI*PMC	.028	.169				PDI, PMC, PDI*PMC	.131	.709
5	60	PROFIT_5	RDI*RMA	RDI, RMA	RDI, RMA	.009	-	GROW_5	RDI*RMA	RDI, RMA	RDI, RMA	.003	-
					RDI, RMA, RDI*RMA	.012	.690				RDI, RMA, RDI*RMA	.006	.693
			RDI*PMA	RDI, PMA	RDI, PMA	.018	-		RDI*PMA	RDI, PMA	RDI, PMA	.001	-
					RDI, PMA, RDI*PMA	.018	.953				RDI, PMA, RDI*PMA	.001	.970
			RDI*RMC	RDI, RMC	RDI, RMC	.010	-		RDI*RMC	RDI, RMC	RDI, RMC	.001	-
					RDI, RMC, RDI*RMC	.012	.716				RDI, RMC, RDI*RMC	.001	.970
			RDI*PMC	RDI, PMC	RDI, PMC	.006	-		RDI*PMC	RDI, PMC	RDI, PMC	.011	-
					RDI, PMC, RDI*PMC	.015	.484				RDI, PMC, RDI*PMC	.011	.981
			PDI*RMA	PDI, RMA	PDI, RMA	.004	-		PDI*RMA	PDI, RMA	PDI, RMA	.002	-
					PDI, RMA, PDI*RMA	.005	.821				PDI, RMA, PDI*RMA	.006	.638
			PDI*PMA	PDI, PMA	PDI, PMA	.017	-		PDI*PMA	PDI, PMA	PDI, PMA	.000	-
					PDI, PMA, PDI*PMA	.026	.486				PDI, PMA, PDI*PMA	.002	.720
			PDI*RMC	PDI, RMC	PDI, RMC	.003	-		PDI*RMC	PDI, RMC	PDI, RMC	.001	-
					PDI, RMC, PDI*RMC	.003	.898				PDI, RMC, PDI*RMC	.001	.981
			PDI*PMC	PDI, PMC	PDI, PMC	.000	-		PDI*PMC	PDI, PMC	PDI, PMC	.010	-
					PDI, PMC, PDI*PMC	.008	.502				PDI, PMC, PDI*PMC	.014	.664

*(p< .10), **(p<.05), ***(p<.01)

초 록

해외건설산업의 중요성은 지난 40여년동안 국민경제적과 기업적 측면에서 강조되고 있지만, 특정 시장에만 진출한다는 한계점을 지니고 있다. 이런 현상은 해당 시장의 경기상황을 특히 많이 받는다는 점에서 많은 전문가들에게 문제점으로 지적되고 있었다. 이를 위해 다수의 선행연구는 다각화 전략을 해외건설시장 집중현상의 해결책으로 제시를 하고 있었지만, 다각화 전략이 기업 성과에 좋은 영향을 미치는지에 대한 논의는 아직까지 해결되지 않고 있다. 이에 대해 본 연구는 선행연구의 기업내부역량과 시장외부환경을 복합적으로 고려하지 못한 것을 주요 문제제기로 삼아, 기업내부역량과 시장외부환경, 그리고 다각화 전략이 기업 성과에 미치는 영향을 매개효과와 조절효과 관점에서 분석하였다. 연구 절차는 (1) 직접적 인과관계 분석, (2) 매개효과 분석, 그리고 (3) 조절효과 분석 순으로 다중회귀분석과 조절회귀분석을 통해 실시하였다. 분석 결과 다각화 전략의 기업 성과에 대한 직접적 인과관계는 선행연구의 맥락과 비슷하게 도출되지 않았으며, 매개효과 또한 검증할 수 없었다. 하지만 조절효과를 분석한 결과 기업내부역량과 시장외부환경에 따라 다각화 전략이 다르게 영향을 미친다는 것을 유의미하게 검증할 수 있었다. 특히 기업내부역량이 증가할 때 다각화 전략이 기업 성과에 부(-)의 효과를 미친다는 사실은 국내 건설기업의 해외건설 진출 의사결정에 도움이 되리라 사료된다. 본 연구는 전략적 상황이론과 자원준거이론에 기초하여 다각화 전략에 관한 선행연구의 한계점을 극복하고자 하였다. 이를

통해, 각기 다른 상황에서 국내건설기업으로 하여금 적합한 다각화 전략을 수립하는데 도움이 되기를 기대한다.

주요어: 다각화 전략, 기업내부역량, 시장외부환경, 해외건설산업, 조절회귀분석

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