

A System for Evaluating the Overseas Business Capability of Small & Medium Construction Companies

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Abstract: Because of the recession of the Korean construction market, many construction companies are expediting overseas business. Despite the rapid growth of international markets, the polarization of profit with SMCCs (Small and Medium Construction Companies) and large construction companies in the international construction market has become more serious. This problem causes competition to provide the lowest prices, which makes the future of overseas business for the SMCCs uncertain. Thus, the SMCCs require a reasonable capability evaluation system for overseas business. However, the existing evaluation methods focus on large construction companies. To address this problem, this study proposes a system to evaluate the overseas business capabilities. The 27 indicators to evaluate the overseas business capabilities are derived from a literature review and are verified through expert interviews. The indicators are classified into 4 large categories, and a questionnaire-based survey of 50 Korean SMCCs is conducted to analyze the correlation between overseas business capability and the indicators. The system expects to provide the effect of the indicators on the overseas business capability and the chance to evaluate the capability for overseas business.

Keywords: International Construction, Small and Medium Construction, Overseas Business Capability, Capability Evaluation

I. INTRODUCTION

A. Introduction

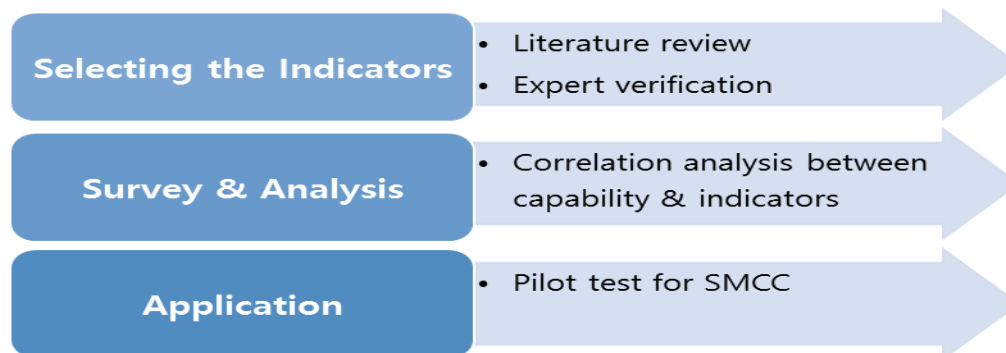
In recent years, Korean construction companies have advanced to the international construction market because of the recession of the domestic construction market. Since the mid-2000s, Korean construction companies have shown remarkable growth. The growth in international construction contracts reached a record 71 billion dollars and continuously increases. However, SMCCs have difficulty in advancing to the international construction market, because the SMCCs lack the necessary financial and technical capabilities. Although 90% of the companies that have advanced to the international construction market are SMCCs, the portion of international contracts among the total contracts is only 5% and has shown a declining trend in recent years. With this problem, the SMCC is caught in a vicious circle such

as the competition of the lowest.

Until now, without a system to evaluate the overseas business capacity, the go/no-go decision has been issued by the owner of the SMCC. The owner determines the go/no-go decision based on only his instinct instead of a systematic analysis. Thus, when the SMCCs fail in an overseas construction project, they do not know the cause of failure. To obtain long-term and stable access to the international market, win contracts and expand the market, the SMCC must evaluate its capability to advance into the international market.

This study aims to develop a system that evaluates the overseas business capability in terms of the SMCC. The research process of this study is shown in Figure 1. First, the capability indicators, which are the criteria of evaluation performance of the firms, were derived from the literature review. Second, using the indicators, a questionnaire was composed from the components of the overseas business capability to advance into the

FIGURE 1. RESEARCH PROCESS



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international market. Using this questionnaire, a survey was implemented for 50 SMCCs. We derived the correlation between the effects of the indicators and the competitiveness, and the results were considered as the weights of indicators using a correlation analysis. The capability total score was calculated, where the indicator scores applied the weights, and this system enables the firms to evaluate their companies. Finally, an application is conducted with an SMCC to verify the method.

B. Literature review

To derive the indicators to evaluate the capability of companies, most previous studies derived the indicators from the literature review or expert interviews. Studies to evaluate the capability of companies have been conducted in various academic fields.

In business administration, Porter (1979) suggests 5 external industrial environments that determine the success or failure of a company. However, in the resource-based theory, the capacity of a company results from the internal resources of the company. This theory is developed into the core competence theory (Prahalad et al., 1990), which defines the core competencies as the internal capacities to create a competitive advantage for the company.

In research evaluating the capability of construction companies, most studies derive the performance evaluation index (Ng et al., 2002; Chan et al., 2004). Takim et al (2002), Chan et al (2003) and Radujkovic et al (2010) suggested the indicators for a successful construction project. Studies to evaluate construction companies are also conducted in domestic academia. Kim (2006) analyzed the problems in the current construction capability assessment system, and Jung (2010) analyzed the performance of Korean construction companies. Jang et al (2014) developed a system to evaluate overseas business capability.

Although there are previous studies to evaluate the capability of a company, most studies focus on large companies. Therefore, from the literature review, we can derive the indicators to evaluate the construction companies and select an indicator to specialize in SMCCs through the expert interviews.

II. RESEARCH PROCESS

A. Indicator Selection

Based on previous evaluation systems for construction companies and the related literature, the required capabilities to perform international construction were selected and classified among similar characteristics. The sequence is as follows. First, overlapping indicators should be integrated, and the indicators that can estimate the potential for a company were added. Second, 51 indicators were derived and classified into 8 categories considering the technique, experience, manpower, and

finance. Next, 3 experts verified these indicators and derived the core indicators for SMCCs. Because the preliminary derived indicators are generally the required capability for international construction, many indicators were deleted. Finally, 27 indicators were derived and classified into 4 large categories and 8 small categories.

The technique indicators comprise criteria that measure the construction performance ability, such as construction period compliance, conflict management, and cost reduction. The experience indicators measure business experience, such as owner satisfaction and bidding success ratio. These indicators describe the overseas project performance and market potential. The manpower indicators are composed of criteria regarding manpower professionalism and organization growth of the company, such as technical manpower and employee productivity. The finance indicators measure the stability of finance, such as the ratio of equity and net income on total asset.

TABLE I. SELECTED INDICATORS

Large Categories	Small Categories	Indicators
Construction Specialized Technical Strength	Construction Technical Strength	Construction Period Compliance
		Construction Cost Compliance
	Project Management	Business Processing Efficiency
		Conflict Management
		Safety
		Site Management
		Construction Ability
Cost Reduction		
Overseas Project Experience	Overseas Project Performance	Equipment Delivery
	Market Potential	Business Relation
		Owner Satisfaction
		Overseas Business Growth
		Indirect Cost Ratio
Bidding Success Ratio		
Overseas Project Manpower	Manpower Professionalism	Technical Manpower
		Estimation Manpower
		Labor Delivery
	Organization Growth	Manpower Promotion Level
		Employee Productivity
Length of Service of Employee		
Stability of Finance	Stability	Current Ratio
		Ratio of Equity
		Debt Ratio
	Company Growth Potential	Business Profit Ratio
		Net Income on Total Asset
		Growth Rate of Turnover
Growth Rate of Profit		

B. Analysis of the Indicators

With derived 27 indicators, a questionnaire was developed to understand the recognition of overseas construction business and analyze the correlation between the indicators and the overseas business capability. The questionnaire has two parts: overall effect of the indicators on the capability and competitiveness of the companies, which is measured on a five-point Likert scale.

Fifty SMCC companies were selected for the survey. The survey respondents have more than 10 years of professional overseas construction experience. From the survey, we analyzed the correlation between the indicators and the overseas business capability. First, a correlation analysis of the overseas business capability with 4 large categories was conducted. The result shows that the construction specialized technical strength and overseas project experience have the largest weight (0.32). The result of the correlation analysis with 8 small categories shows that project management has an overwhelmingly large weight (0.38), which indicates that a general SMCC that advances to overseas business emphasizes its construction technique and project management. The overseas business capability scores were calculated based on the weighted summation of indicator scores.

TABLE II. INDICATOR

Large Categories	Weight(1)	Small Categories	Weight(2)
Construction Specialized Technical Strength	0.32	Construction Technical Strength	0.12
		Project Management	0.38
Overseas Project Experience	0.32	Overseas Project Performance	0.05
		Market Potential	0.04
Overseas Project Manpower	0.19	Manpower Professionalism	0.12
		Organization Growth	0.07
Stability of Finance	0.17	Stability	0.09
		Company Growth Potential	0.13

Next, the score for the overseas business capability of the top 10 companies is calculated based on the survey data and the competitiveness of other companies in the survey. The score was calculated using the above method. Table III shows the capability score of the top 10 companies. In the result, the overseas project experience has the highest score, and the construction specialized technical strength has the second highest score. In other words, experience is most emphasized in overseas

business, and technology is also evaluated as significant. The stability of finance generally has a low score, which shows that the SMCCs must focus on strengthening their experience and technology, although stability of finance is notably important for large construction companies. This result can be referred to determine the level of capability.

TABLE III. SCORES OF THE TOP 10 COMPANIES

Large Categories	Weight	Small Categories	Weight
Construction Specialized Technical Strength	72.21	Construction Technical Strength	81.30
		Project Management	71.07
Overseas Project Experience	76.06	Overseas Project Performance	82.40
		Market Potential	68.14
Overseas Project Manpower	67.03	Manpower Professionalism	72.63
		Organization Growth	68.23
Stability of Finance	57.56	Stability	66.01
		Company Growth Potential	63.33
Overseas Business Capability		66.31	

C. Application to an example

To verify the applicability of the developed system, a pilot test was conducted by applying the system to an SMCC. In the applied data, the company advanced to overseas business and performed well. The result for overseas business capability in the pilot test is 68, which indicates that this company has a level of capability that is comparable to those of the top 10 companies. Hence, the SMCCs can understand their capability regarding overseas business, and the owner of an SMCC can make the Go/No-Go decision for overseas business.

FIGURE 2. APPLICATION OF EXAMPLE



III. CONCLUSION

This study aims to understand the capacity for overseas business among SMCCs. We proposed a system to evaluate the capacity. The indicators for evaluation were derived from a literature review and classified into 4 categories. The experts verified the indicators, and data were collected using a survey for analysis. The weights of the indicators were produced using a correlation analysis between the indicators of an overseas business capability and the competitiveness score of 51 domestic SMCCs. Based on these data, we developed the system to evaluate the capability.

Using this system, SMCCs can determine a go/no-go decision to advance to the international markets by evaluating their capability, although the methodology is simple and addresses a notably general overseas business type. In future research, the business type can be more thoroughly classified. Furthermore, the critical bad indicators and a method to improve the capability can be developed.

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REFERENCES

- [1] Gunhan, S., & Arditi, D. (2005). Factors affecting international construction. *Journal of construction engineering and management*, 131(3), 273-282.
- [2] Han, S. H., & Diekmann, J. E. (2001). Approaches for making risk-based go/no-go decision for international projects. *Journal of Construction Engineering and Management*, 127(4), 300-308.
- [3] Han, S. H., Diekmann, J. E., & Ock, J. H. (2005). Contractor's risk attitudes in the selection of international construction projects. *Journal of Construction Engineering and Management*, 131(3), 283-292.
- [4] Han, S. H., Sun, S. M., & Ryu, H. D. (2003). Analysis of Critical Factors on the Causes of Profitability in International Construction Projects. *Journal of Korea Society of Civil Engineers*, 23(2D), 235-247.
- [5] Jang, Y. J., Park, M. S., Lee, H. S. (2005). Development of a web-based performance management system using benchmarking for small and medium-sized construction companies. *Korea Institute of Construction Engineering and Management*, 867-870.
- [6] Jang, W. S., Yang, H. B., & Han, S. H. (2014). Development of Evaluation System for Overseas Business Capability of Construction Firms. *Journal of Korea Society of Civil Engineers*, 977-987.
- [7] Jung, W., Han, S. H., Park, H., & Kim, D. Y. (2010). Empirical assessment of internationalization strategies for small and medium construction companies. *Journal of construction engineering and management*, 136(12), 1306-1316.
- [8] Kim, D. Y., Han, S. H., Kim, H., & Park, H. (2009). Structuring the prediction model of project performance for international construction projects: A comparative analysis. *Expert Systems with Applications*, 36(2), 1961-1971.
- [9] Kim, S. (2006). Analysis of problems and its improvement for construction capability assessment system. *Construction Economy*. Korea Research Institute for Human Settlements. 47. 28-35
- [10] Ko, Y. I. (2000). On the Corporate Bankruptcy Prediction Model using the Credit Analysis of Small and Medium Companies, CHOSUN UNIVERSITY, Master's thesis, 2000.
- [11] Lee, J. K. (2015). A "win-win" project performance in the international construction focusing on subcontractor perspective. YONSEI UNIVERSITY, Master's thesis. 2015.
- [12] Porter, M. E. (1979). How competitive forces shape strategy. *Harvard Business Review*, 90(2), 137-145.
- [13] Prahalad, C. K. and Hamel, G. (1990). The core competencies of the corporation. *Harvard Business Review*. 90(3), 79-91
- [14] Radujkovic, M., Vukovanovic, M., Dunovic, I. B. (2010). Application of key performance indicators in South-Eastern European construction. *Journal of Civil Engineering and Management*. 16(4). 521-530