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Major Strategies on Building Production Innovation Influencing Competitive and Growth Strategies in Construction Companies

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ABSTRACT

This study aims to identify the impact of two factors –growth and competitive strategies- on a set of strategies for building production innovation. A questionnaire survey was conducted to collect data from construction professionals, who were asked to rate the importance level of predicted innovation strategies on some corporate strategy combinations. Multiple analysis of variance (MANOVA) was employed to see the main and interaction effects of corporate strategies on building innovation strategies. The results indicate that growth strategies such as entering in a new a market or new project types has a greater effect on innovation strategies than competitive strategies such as cost leadership or differentiation strategies. However, the interaction effect of competitive and growth strategies together have been found to be much bigger than the effect of competitive strategies alone. The descriptive statistics of innovation strategies for different competitive and growth strategy types has also been analyzed in the study.

Keywords:Competitive strategy, growth strategy, innovation, construction company, MANOVA

1. INTRODUCTION

Construction management studies generally focus on problems related to the project rather than those related to corporate issues therefore there is a lack of studies on corporate strategies. As Kale and Arditi [1] have emphasized, many of the published works are largely descriptive in nature and rely on anecdotal evidence. Understanding of the competitive strategy of construction firms has stagnated within recent years, with little in the way of new insights since the contributions of Lansley [2] and Hillebrandt et al. [3]. More empirical findings are required to renovate the existing conceptual strategic models and strategic management theories in construction management literature. In this context, this study aims to find some empirical evidence that will contribute to the strategic management literature in construction at the corporate level.

In the construction industry globalization and the knowledge-based economy have affected world market conditions and have caused significant changes. Especially the customers' demands have moved toward a greater emphasis on innovative solutions in both the service processes and building production processes. Struggling to compete in the world market, construction companies have to use corporate strategies, that is, long-range plans, methods and approaches adopted to reach the company's goals and to gain competitive advantage. There are various management levels of strategies in construction companies. At the corporate level of the firm, senior managers develop a corporate strategy that is companywide and is concerned with creating competitive advantage [4]. On the other hand at the functional level there are strategies on innovation, organization, marketing and processes etc. Seadan et al. [5] noted that in recent years innovation strategies have become more important to gain competitive advantage and they are related with corporate strategies. It is clear that strategies on different organizational levels affect

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each other. In this context the research question examined in this study addresses the impact of two factors–growth and competitive strategies at the corporate level- on a set of building production innovation strategies at the functional level. So this paper seeks to find out how the innovation strategies change if the type of competitive strategy or growth strategy changes.

The potential benefit of this research is to compose a framework for relationship between corporate strategies and innovation strategies. The findings are interpreted to provide valuable information for construction managers when they consider how to improve their competitiveness related to innovation capabilities in construction companies.

2. THEORETICAL BACKGROUND

2.1. Strategies in construction companies

Strategy is a contested concept [6]. The generic literature on strategy is characterized by a diverse range of competing theories and alternative perspectives. Traditional models of the competitive strategy of construction firms have tended to focus on exogenous factors. In contrast, the resource-based view of strategic management emphasizes the importance of endogenous factors (Green et al., 2007;[6]) like innovative capabilities of the company or strategic management issues, etc. In recent years, in the construction management literature there have been many publications on corporate strategy, strategic planning and management (Abdul-Aziz, [7]; Warszawski, [8]; Chinowsky and Meredith, [9]; Langford and Male, [4]; Kale and Arditi, [1]).

More recently, Seaden et al. [5] examine the relationship between strategies and innovative practices and find that most listed business strategies are positively related to innovative practices. So this research aims to identify the effects of corporate strategies on innovation strategies.

2.1.1. Corporate Strategies

As mentioned before in companies there are several levels of management. Corporate strategy is the highest of these levels in the sense that it is the broadest and the most comprehensive. It gives direction to corporate values such as corporate culture, corporate goals, and corporate missions and visions. And it mainly concerns competition issues. In this study two corporate strategies have been selected for research: growth strategies and competitive strategies, which are the most common ones in construction management literature.

Growth strategies deal with the expansion and growth of existing assets and improving productivity while developing the position of the company in the market. Growth strategies are in general desirable for managers because they create a positive image of the company in the eyes of the stakeholders. Growth of corporations come about in two different ways: quantative or qualitative growth. Any kind of growth involves one of two changes: changes in the existing business description (adding new products and services, entering new markets, alliances etc.) or changes in the speed and efficiency of activities (a rise in production capacity, changes in marketing activities, etc.). Caves [22] identified four basic ways to expand internationally, from the lowest to the highest risk: (1) exporting; (2) licensing and franchising; (3) strategic alliances; and (4) wholly owned foreign subsidiaries. And Ling et al. [23], in their research about business strategies of construction companies, mainly focused on the last two growth strategies because of their coherence with construction business. Based on such research results, this study examines four main types of growth strategies in construction companies: (1)Entry to markets in new regions; (2) Providing services of new type projects; (3) Entry to a new business area; (4) Acquisition or alliances. While entry to markets in new regions are growth attempts mostly in the form of joint ventures requiring the firm to adapt to new business processes, providing services of new type projects such as from housing production to infrastructure projects requires differentiation of operational resources. On the other hand a construction firm can also grow by entering a completely new and mostly complementary business area such as material industry. Finally, acquisitions or alliances bring firms with different skills, knowledge bases, and organizational cultures together, and also create unique learning and innovation opportunities for the firms.

Porter's three generic competitive strategies have been widely used in the management field. Porter (1980) suggests that "...there are three potentially successful generic strategic approaches to outperforming other firms in an industry: overall cost leadership, differentiation and focus".

The *cost leadership strategy* originated from the concept of “experience curve”, which was popular in the 1970s. When implementing a cost leadership strategy, a firm's main objective is to become the lowest cost producer in its industry [10]. Based on the analysis of industry structure, a firm needs to exploit all sources of cost advantage in its industry. Thompson and Stricklend [11] noted that companies may obtain cost leadership in two ways: (1) activities creating value and improving internal rate of return, (2) elimination of some insignificant cost parameters. Cost leadership enables a firm to achieve an above- average performance in its industry.

Differentiation strategy is to create a product or service which is unique in an industry [10]. The unique attributes of the product or service should provide superior values to the customers. Since the product or service is unique in one or more dimensions, the price elasticity of demand will be reduced and customers tend to be brand loyal. There are different ways for differentiation. "Differentiation can be based on the product itself, the delivery system by which it is sold, the marketing approach, and a broad range of other factors... a differentiator, therefore, must always seek ways of differentiating that lead to a price premium greater than the cost of differentiating... the logic of the differentiation strategy requires that a firm choose

attributes in which to differentiate itself that are different from its rivals" (Porter, [13]). Furthermore Zhao, Shen, and Zuo [12] discussed the differentiation concept in construction companies in the form of cost differentiation and resource differentiation.

The *focus strategy* is to select a few target markets for competition. This strategy enables a company to better meet the needs of the target market than its competitors who compete more broadly [10]. It is important to select the appropriate target market to implement this strategy. Porter describes *focus strategy* as segment structural attractiveness, which is a necessary condition since some segments in an industry are much less profitable than others... most industries have a variety of segments, and each one that involves a different buyer need or a different optimal production or delivery system is a candidate for a focus strategy [13]. Mixed competitive strategies are actually a combination of Porter's three main competitive strategies like cost leadership with differentiation capabilities or differentiation within effect of focus strategies.

2.2. Innovation Strategies

Innovation strategies can be described as R&D investments, organizational learning and use of new technologies in operations and organizational processes. The concept of innovation concept in construction industry has been studied by many researchers (Tatum, [14]; Slaughter, [15]; Nam and Tatum, [16]; Lampel et al., [17]; Bernstein, [18]; Seaden and Manseau, [19]). Research on innovation in construction has demonstrated that innovation strategies are especially important for the long term success of the company, but construction companies do not tend to put such strategies in to practice. Bossink [20] has emphasized that concept of innovation has a great impact on competitive strategies, which strengthens the assumption of this research.

In the scope of this research, innovation strategies of construction companies are considered to be mostly related to the use of new technologies in building production processes. For this research three building production innovation strategies that are the most common innovation strategies in building production processes have been examined (Figure 1): (1)Strategies on innovation of design and material; (2) Innovation strategies in equipment utilization; (3)Innovation strategies in production organization (like prefabrication, etc.). Strategies on innovation of design and material involve innovations in architectural design processes whereas innovation strategies in equipment utilization and in production organization deal with construction site production techniques.

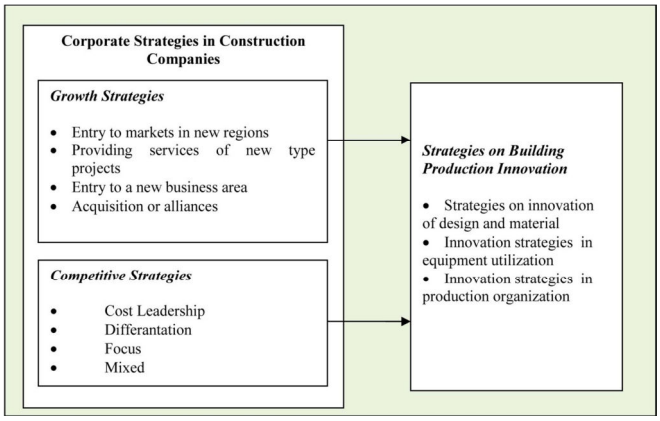

Figure 1. Research Framework

Research framework was designed with all these predicted variables under main factors (growth and competitive strategies and strategies on building production innovation) so the research construct has been developed (Figure 1) though the previous research.

3. METHODOLGY

3.1. Survey Design

The survey questionnaire was designed to identify the importance level of innovation strategies that construction companies use to compete in the international construction market. The survey consists of two sections: general information about the firm and the survey respondents part and the importance ratings of innovation strategies for different types of corporate strategic combinations.

The first section was intended to obtain general demographic information about the firm such as type of services, employee number and the nature of the clients and also information about respondents such as specialization area, education level and age. The latter part was aimed to identify the importance level of innovation strategies for the predicted types of growth strategies and competitive strategies. The survey was a six-point Likert Scale from "not important at all" to "critically important". The respondents were asked to rate the importance of predicted innovation strategy on different competitive and growth strategy combinations. From the responses, the importance mean scores of innovation strategies for different growth strategy types can be obtained, and also the group differences in importance level of innovation strategies for competitive and growth strategies can be predicted;

therefore the strategy type which is the most affected by innovation strategies also can be determined.

3.2. Data analysis and results

Multiple analysis of variance (MANOVA) was used to see the main and interaction effects of categorical variables on multiple dependent interval variables. MANOVA uses one or more categorical independents as predictors and it provides a means for determining the extent to which groups of respondents (formed by their characteristics on the nonparametric independent variables) differ in terms of the dependent measures (Hair, et al., [21]). In this study competitive and growth strategies in construction companies, each one with four categories, are the categorical independent variables as predictors and the innovation strategies are dependent measures with Likert scale (rated from 1 to 6). So groups formed by categorical independent variables were compared on group differences in a set of interval dependent variables. The independent variables which differentiate a set of dependent variables the most were also identified.

3.3. Sampling and Data collection

The respondents of the survey were selected from construction professionals working for construction companies operating internationally and listed 2010 ENR Top Global 225 Contractor List. "The competitive strategies and innovation strategies in construction companies survey" was sent via mail, e-mail and also delivered by hand between the days August 2011-December 2011. A total of 82 surveys were received from contacted construction managers. According to the questionnaire responsible description data of the questionnaire study, 47% of the participants of the questionnaire are in the range of 26-39 years of age, while 45.8% are in the range of 40-59. 79% of the responders have international experience; they are senior and middle level managers of the Turkish companies in 2009 ENR Top Global 225 Contractor 2009 list (ENR- 2009). 51% of the specialists are engineers and 20.5% are architects. The education level of the participants is 51.8% undergraduate and 31.6% graduate and higher level.

Hotelling's Trace tries to assess the statistical significance of the difference on the means of two or more variables (Hair, et al., [21]). The impact of the two independent variables can be compared by examining the observed power (Table 1). We can see from the table that the observed power of growth strategies (0,754) is much bigger that of competitive strategies (0,266) on innovation strategies. Observed power is the probability of identifying a treatment effect when it actually exists in the sample and it is determined as a function of the statistical significance level (α) (Hair, et al., [21]). When compared to either independent variable, the interaction effect of two corporate strategies on building production innovation is greater than the effect of competitive strategies alone but not greater than the effect of growth strategies. According to the MANOVA results it can be said that differences among innovation strategies are effective on growth strategies in construction companies.

Table 1. Multivariate Tests for Group Differences in Innovation Strategies

Effect		Value	F	Hypothesis df	Error df	Sig.(α)	Partial Eta Squared	Observed Power[b]
Competitive Strategies (CS)	Hotelling's Trace	,063	,466	9,000	195,000	,896	,021	,226
Growth Strategies (GS)	Hotelling's Trace	,217	1,689	9,000	195,000	,094	,072	,764
CS* GS	Hotelling's Trace	,237	1,115	15,000	195,000	,345	,079	,703

Table 2. Tests Of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Eta Squared	Noncent. Parameter	Observed Power[b]
Competitive Strategies (CS)	Strategies on innovation of design and metarial	1,505	3	,502	,584	,627	,026	1,753	,165
	Innovation strategies in equipment utilization	,624	3	,208	,228	,877	,010	,684	,091
	Innovation strategies in production organization	,001	3	,000	,000	1,000	,000	,001	,050
Growth Strategies (GS)	Strategies on innovation of design and metarial	5,375	3	1,792	2,087	,110	,088	6,262	,510
	Innovation strategies in equipment utilization	5,631	3	1,877	2,058	,114	,087	6,174	,504
	Innovation strategies in production organization	9,672	3	3,224	3,455	,021	,138	10,366	,750
CS* GS	Strategies on innovation of design and metarial	6,895	5	1,379	1,607	,171	,110	8,033	,526
	Innovation strategies in equipment utilization	4,588	5	,918	1,006	,421	,072	5,031	,336
	Innovation strategies in production organization	4,319	5	,864	,926	,470	,066	4,629	,310

a. R Squared = ,347 (Adjusted R Squared = ,226), b. Computed using alpha = ,05, c. R Squared = ,258 (Adjusted R Squared = ,121), d. R Squared = ,331 (Adjusted R Squared = ,208) Note: Innovation strategies were rated from 1 to 6 (1=not important at all and 6=critically important).

"Tests of between-subjects effects" give us information about the impact of growth and competitive strategies in comparable form for each innovation strategy (Table 2). The effect sizes (eta squared) for growth strategies are relatively greater than competitive strategies and the interaction effect. The effect size is a standardized measure of group differences used in the calculation of statistical power. Calculated as the difference in group means divided by the standard deviation. The effect size and power is inversely related to the alpha (α) - statistical significance level- so increasing alpha reduces the chances of accepting differences as significant. Especially the effect size of growth strategies on innovation in production organization strategy is the biggest one (eta squared=0,138) whereas the effect of competitive strategies on innovation in production organization strategies is the smallest one (eta squared=, 0).

Table 3. Mean Scores Of Innovation Strategies For Competitive Strategy Types

Dependent Variable	Competitive Strategies			95% Confidence Interval	
		Mean (μ)	Std. Error	Lower Bound	Upper Bound
Strategies on innovation of design and metarial	Cost Leadership	5,021[a,b]	,393	4,236	5,806
	Differantation	4,352[a,b]	,452	3,449	5,255
	Focus	4,777[a,b]	,508	3,763	5,791
	Mixed	4,658[a]	,302	4,055	5,260
Innovation strategies in equipment utilization	Cost Leadership	4,996[a,b]	,405	4,187	5,805
	Differantation	4,636[a,b]	,466	3,705	5,567
	Focus	4,480[a,b]	,523	3,435	5,525
	Mixed	4,269[a]	,311	3,648	4,890
Innovation strategies in production organization (like prefabrication)	Cost Leadership	4,838[a,b]	,410	4,019	5,657
	Differantation	4,824[a,b]	,471	3,883	5,766
	Focus	4,482[a,b]	,529	3,425	5,539
	Mixed	4,320[a]	,314	3,692	4,948

Considering the analysis of mean scores of innovation strategies for different competitive strategy types, it can be suggested that the most significant relation is between the "strategies on innovation of design and material" and "cost leadership" strategies. It can be assumed that to have cost leadership the most important factor is to apply innovative solutions in design and material use (Table 3). Furthermore, the weakest mean score for "innovation strategies in equipment utilization" is for competitive strategy type "mixed" (μ=4,269) whereas "innovation in equipment utilization" is more important for cost leadership than other competitive strategy types (μ=4,838).

Table 4. Mean Scores of Innovation Strategies For Growth Strategy Types

Dependent Variable	Growth Strategies			95% Confidence Interval	
		Mean (μ)	Std. Error	Lower Bound	Upper Bound
Strategies on innovation of design and metarial	Entry to markets in new regions	4,685[a]	,160	4,366	5,004
	Providing services of new type projects	4,902[a]	,390	4,123	5,681
	Entry to a new business area	3,469[a,b]	,540	2,390	4,548
	Acquisition or alliances	4,829[a,b]	,544	3,744	5,915
Innovation strategies in equipment utilization	Entry to markets in new regions	4,793[a]	,165	4,464	5,122
	Providing services of new type projects	4,524[a]	,402	3,721	5,327
	Entry to a new business area	3,121[a,b]	,557	2,009	4,234
	Acquisition or alliances	4,847[a,b]	,560	3,728	5,966
Innovation strategies in production organization (like prefabrication)	Entry to markets in new regions	4,528[a]	,166	4,195	4,860
	Providing services of new type projects	4,438[a]	,407	3,626	5,250
	Entry to a new business area	2,773[a,b]	,563	1,648	3,898
	Acquisition or alliances	5,532[a,b]	,567	4,400	6,664

Note: Innovation strategies were rated from 1 to 6 (1=not important at all and 6=critically important).
a. Based on modified population marginal mean.

According to the analysis of mean scores of innovation strategies for different growth strategy types, it can be suggested that different innovation strategies stand out with different importance levels for different types of growth strategies. We can read from Table 4 that the mean score of "innovation in design and material" is lower (μ=3,469) if the type of growth strategy is to "enter a new business area" and higher (μ=4,829) if the growth strategy type is "providing services of new types of projects" (see Table 4). Furthermore, the weakest mean score for "innovation strategies in equipment utilization" is for growth strategy type "entry to a new business area" (μ=3.121) whereas "innovation in equipment utilization" is the more important for acquisition or alliances rather than other growth strategy types (μ=4,847). In addition to these results it can be assumed that if a construction company grows through acquisition or alliances it would have to make some innovations on building production organization.

4. CONCLUDING REMARKS

Strategic management is an essential activity of senior managers in construction companies as in any other business firm. It actually deals with gaining competitive advantage and increasing the survival capacity of the company in the market. As Seaden et al. [5] mentioned there is a relationship between corporate strategies and innovative practices, and the most listed business strategies are positively related to innovative practices. This paper aims to observe how the importance level of building innovation strategies differs when the type of growth strategy or competitive strategy changes. The most significant finding of this study is that the effect of growth strategies on innovation strategies is bigger than that of competitive strategies and also bigger than the interaction effect of two corporate strategies. Another important result of this study is the identification of importance levels of innovation strategies with mean scores across the different competitive and growth strategy types. "Strategies on innovation of design and material" is the most important innovation strategy

when the competitive strategy is cost leadership whereas "innovation strategies in production organization" is the most important strategy when the growth strategy is acquisition or alliances.

In the global conjuncture, innovation should be considered as an important strategy of the construction industry to gain competitive advantage. The findings of this research provide some very interesting insights in to the concepts of strategic management and innovation for construction professionals to create competitive advantage and increase growth rates among their competitors in the international construction sector.

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