

# Hybrid strategic groups in construction

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The aim of strategic group analysis is to question the existence of clusters of firms that implement a similar strategic perspective and performance implications of strategic group membership. Strategic group analysis is usually carried out by conducting statistical cluster analysis in which a company is assigned to a single strategic group. However, all the companies within the same group do not usually adhere to the strategic group recipe at the same degree. Hybrid firms develop their own strategic posture by blending strategic recipes of multiple groups. The objective of this research is to explore the existence of hybrid firms in the Turkish construction industry by using self-organizing maps and fuzzy clustering methods. Three pure and two hybrid strategic groups are found to exist in the Turkish construction industry. There exist significant differences between the performances of companies in different strategic groups. However, the relative performance of firms in pure and hybrid strategic groups cannot be generalized. Firms in pure strategic groups may show higher performance than firms in hybrid strategic groups as the companies that adhere to a strategic group's recipe tightly may outperform the companies that are 'stuck in the middle'. In contrast, firms in hybrid groups that employ the best strategies and develop significant capabilities associated with more than one strategic group may outperform the firms that are strictly connected with a low-performing strategic group.

*Keywords:* Cluster analysis, competitive advantage, performance evaluation, strategy.

## Introduction

According to Porter (1979), a strategic group is a group of firms in an industry conducting their business by following the same or similar strategy along a set of strategic dimensions such as technological leadership, product quality, pricing policies, distribution channels and customer services. It is expected that firms within a strategic group are more similar to each other compared with firms placed in other groups of the same industry (Thomas and Venkatraman, 1988). The aim of the strategic group analysis is to cluster the firms within an industry according to their similarities with respect to a set of strategic dimensions and to investigate the relationship between firm performance and strategic group membership. The traditional strategic group analysis is usually conducted by using statistical cluster analysis which provides 'hard clusters', in which a company is assigned to a single group and all the companies within the same strategic

group adhere to the strategic group recipe at the same degree.

The theoretical underpinning of strategic group concept and reliability of strategic group analysis are criticized by various researchers. Barney and Hoskisson (1990) argued that strategic groups are artefacts of the methodologies used to generate them and advised the abandonment of the strategic group level analysis. Dranove *et al.* (1998) stated that strategic grouping of firms does not provide a substitute for firm-level analysis since it may lead to information loss and noise. In addition, there exist contradictory conclusions about the reliability of the relationship between strategic groups and performance of firms. To overcome these criticisms, different strategic group structures considering heterogeneity within a strategic group are proposed in the literature. For instance, Peteraf and Shanley (1997) introduced the strategic group identity concept based on the theory of organizational identity (Albert and Whetten, 1985), in order to explain the reasons of

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strategic heterogeneity within the same strategic group. Reger and Huff (1993) proposed that strategic groups are composed of three categories of firms, namely core, secondary and transient firms. Core firms tightly adhere to the strategic groups to which they belong; secondary firms are aligned loosely with the strategic group and adopted specific strategies of a strategic group less consistently than the core firms. Transient firms are likely to change their strategic position from one strategic group to another. McNamara *et al.* (2003) extended this theory by introducing the 'solitary firm' concept and identified solitary firms which are strategically unique. Finally, DeSarbo and Grewal (2008) introduced the notion of 'hybrid strategic groups'. They proposed that hybrid firms develop their own unique strategic posture by blending strategic recipes of multiple strategic groups. Unlike secondary firms that are aligned loosely with only one pure strategic group, hybrid firms are aligned loosely with multiple strategic groups.

As 'hybrid strategic group' is a new concept in the strategic management literature, the applicability of the hybrid strategic group concept to different industries has not been questioned widely in the literature. Therefore, there exist two objectives of this research. First is to question the existence of 'hybrid strategic groups' within the Turkish construction industry by using self-organizing maps (SOMs) and fuzzy C-means (FCM) methods. The second objective is to question the performance implications of 'hybrid strategic groups'. In the forthcoming section, the challenges of the strategic group analysis will be discussed.

### Challenges of strategic group analysis

One of the major criticisms related to the strategic group analysis is the utilization of statistical cluster analysis since the cluster analysis may impose clusters even when they do not exist (Hatten and Hatten, 1987; Barney and Hoskisson, 1990). The groups identified by statistical cluster analysis can vary dramatically if there are alterations in the variable set. It relies heavily on researchers' judgement and does not offer a test statistic that supports results (Ketchen and Shook, 1996). These concerns led some researchers to conduct strategic group studies by using alternative methods. The identification of strategic groups based on the cognitive perspective of industry professionals has gained prominence during the past years (Hodgkinson, 1997). In contrast, different clustering algorithms, such as SOM (Serrano-Cinca, 1998; Curry *et al.*, 2001; Budayan *et al.*, 2007), FCM (Hsu, 2000), simulation techniques (Fox *et al.*, 1997) and genetic algorithms (Lee *et al.*, 2002), are proposed to be used for identifying a strategic

group structure. Especially, SOM can be an alternative method to statistical cluster analysis since no clusters are identified when there are no obvious clustering relations in the original space; thus, unreasonable arbitrary classification can be avoided (Zhang and Li, 1993).

Although using alternative clustering methods instead of statistical cluster analysis can eliminate some challenges, the determined strategic groups can still vary with the alterations in the variable set. Therefore, choosing an appropriate theoretical framework and developing a reliable set of strategic dimensions are essential (Fiegenbaum *et al.*, 1987). Yet, there is no consensus on these dimensions. Caves and Porter (1977) suggested that strategic dimensions used in a conceptual model should reflect 'mobility barriers', which are structural factors that prevent ease of movement between market positions and protect firms' strategies against imitation and competition. McGee and Thomas (1986) mentioned three types of mobility barriers, namely market-related strategies, industry supply characteristics and firm characteristics. Porter (1980) defined two strategic dimensions that may be used for strategic grouping: mode and scope of competition. Mode of competition refers to a firm's decisions on how to achieve competitive advantage, whereas scope of competition refers to a firm's decisions on the breadth of its operations. In contrast, Tang and Thomas (1992) explained the formation of strategic groups based on spatial competition. According to the view of spatial competition, the reason for the strategic group formation is the relocation cost; therefore, it is advised that the fundamental relocation costs caused by mobility barriers should be examined. Since late 1980s, there has been a surge of interest in the role of resources and capabilities of a firm as the basis for strategy and primary determinants of profitability, which is considered under the 'resource-based view'. Rumelt (1984) argued that resources such as skills, knowledge and capabilities should be used as strategic dimensions rather than strategies which tend to be loosely defined and proposed isolating mechanism phenomena instead of mobility barriers. In the same line of thinking, Mascarenhas and Aaker (1989) concluded that mobility barriers should be determined by considering firms' assets and skills (who you are) rather than firms' activities (what you do). Cool and Schendel (1987) contend that firm-level characteristics and market factors should be considered among mobility barriers. Industry-specific variables are proposed to be used as strategic dimensions. Mehra and Floyd (1998) proposed a model of strategic group formation based on the resource-based view and industrial organization view of intra-industry heterogeneity. They concluded that strategic dimensions should reflect market positions

and inimitable resources. Although there are many different perspectives on classification schemes across scholars, few advised the usage of a single best typology, which reinforces the notion that strategic groups are a conceptualization of researchers.

Another criticism of strategic group analysis is that the relative position of firms in the same strategic group is usually neglected, and strategic groups are assumed to be homogeneous. Reger and Huff (1993) argued that strategic group analysis can be useful only if the strategic group structure is re-conceptualized by considering the degree of group membership and overlapping between different strategic groups. The possible heterogeneity of strategies pursued by firms within the same strategic group is mentioned by various researchers (Ketchen *et al.*, 1993; McNamara *et al.*, 2003), but there has been limited research on this issue. As mentioned before, a study related to heterogeneity within a strategic group was conducted by Reger and Huff (1993). Ketchen *et al.* (1993) presented supportive findings to the assertion of Reger and Huff (1993) in their study regarding the strategic groups of hospitals. Existence of core, secondary and transient firms in strategic groups was demonstrated in other industries such as commercial banking industry (Wry *et al.*, 2006), worldwide airline industry (Boyd, 2004) and house building industry (González-Moreno and Sáez-Martínez, 2008). Strategic group analysis should include the relative position of firms within the same strategic group as well as solitary and hybrid firms in order to derive reliable conclusions about performance implications of strategic groups, which is discussed in the next section.

### Strategic groups and performance

One of the important implications of strategic group analysis is the performance assessment of firms in different strategic groups. However, there exist contradictory views about the reliability of strategic group analysis for explaining the performance difference between firms. Some authors argue that between-group variations in performance are greater than within-group variations (Hatten and Hatten, 1987; Fiegenbaum and Thomas, 1990) since the mobility barriers prevent the imitation of successful strategies and intense competition from the firms located outside the group. This leads to a favourable competitive environment and systematic advantages over other firms (Zúñiga-Vicente *et al.*, 2004). Members achieve tacit collusion more easily in order to establish protection from the rest of the industry and conserve their superior performance (Caves and Porter, 1977). Furthermore, members of a strategic group can have common suppliers and customers.

This leads to the repeated contact through these parties, which facilitates communication and coordination (Peteraf, 1993). Consequently, the rivalry between the groups is expected to be greater than that of within-group competition.

There also exist studies which show significant performance differences between the members of the same group (Cool and Schendel, 1988; Claver *et al.*, 2003; McNamara *et al.*, 2003). Some of the authors such as Cool and Schendel (1988), Lewis and Thomas (1990) and Houthoofd and Heene (1997) argue that the firm level should be considered as the most important unit in performance variance analysis. Reed and DeFillippi (1990) mentioned that companies belonging to the same strategic group cannot realize similar returns since the isolating mechanisms prevent companies from imitating a high performance firm even with full knowledge of their strategic choices with respect to scope and resource deployment. It is argued that the intra-group rivalry can be higher than the between-group rivalry. Lawless and Anderson (1996) mentioned that the most intense competition exists between the companies placed in the same strategic group as firms have similar resources and strategies. Moreover, effective collusion is difficult to establish and maintain due to the difficulties in coordination, cost differences, different levels of benefits from collusion among strategic group members (Kwoka and Ravenscraft, 1986) and firm-level differences (Schmalensee, 1987). Also, the established collusion in a group can be easily broken down, and then in the strategic groups well protected by mobility barriers, members of the group may become major competitors (Cool and Dierickx, 1993). According to the resource-based view, the homogeneity of resources in a group can lead to intense rivalry since firms with similar resources are more likely to contest each other's market positions (Hatten and Hatten, 1987) and they have to compete for the available resources required to conduct formulated strategies.

Although there exist inconsistent results regarding the correlation between strategic groups and firm performance, Short *et al.* (2003) argued that strategic group analysis helps understand the determinants of performance. Fox *et al.* (1997) compared the contribution of the strategic group membership with the variance of firm performance, considering the firm and industry levels by using a random-effects model. Consequently, they found out that the strategic group level should not be ignored since this level explains substantial variance (approximately 40%) in performance. Short *et al.* (2007) tried to determine the contribution of the strategic group level effects to the performance variance. They concluded that strategic group membership contributes significantly to the performance. Also,

according to the meta-analysis performed by Ketchen *et al.* (1997), group membership can be used to predict the performance of firms. Consequently, strategic group analysis has the potential to provide significant information related to performance variances in an industry. Strategic group membership is also important since strategic groups can be used as a reference in assessing a firm's reputation (Wry *et al.*, 2006). For instance, Ferguson *et al.* (2000) determined significant reputation differences between the strategic groups in US property/casualty insurers. Consequently, the strategic group analysis can increase understanding of the structure of an industry, strategic perspectives and mobility barriers.

In contrast, there exist limited number of studies which investigate the intra-group performance difference as well as discussions on its reasons and consequences. Reger and Huff (1993) reported the relation between the positioning of firms in the same strategic group and performance. They argued that core firms can outperform secondary firms, whereas secondary firms can achieve better performance in the long run by differentiating themselves. McNamara *et al.* (2003) reported that secondary strategic groups outperform core and solitary strategic groups. Peteraf and Shanley (1997) mentioned about the positive and negative consequences of strong association with a group. According to them, the companies which are strongly associated with a strategic group are more aware of mutual benefits; therefore, they can act collectively and exchange information among member firms. These lead to collective actions and efficiency. On the contrary, they also proposed that these companies are more resistant to change due to top managers' habits, common resources and set of routines. In addition, they are more sensitive to attacks from outside the group due to their 'myopic view of the industry'. Different findings about various industries show that strategic group membership and position within the same strategic group may have different performance implications in different competitive environments. More research is needed to investigate strategic group effects concerning different market conditions.

### **Strategic group analysis in the construction industry**

Although strategic group analysis has been carried out in different industries, the existing work in the construction management literature is limited to mainly three studies, namely works of Kale and Arditi (2002), Claver *et al.* (2003) and Dikmen *et al.* (2009). Kale and Arditi (2002) used one of the most influential

generic typologies: Porter's (1980) generic competitive positioning typology to determine strategic groups of US construction firms by using K-means clustering analysis. As a result, based on the responses from 107 firms, four clusters were identified. Statistically significant performance differences were found between the clusters. Claver *et al.* (2003) tried to determine the strategic groups of Spanish house-building firms by utilizing Ward's method to determine the number of clusters as an input of K-means clustering analysis. Using the data regarding 88 housing contractors and defining variables that are based on Porter's generic strategies, researchers identified four strategic groups. However, empirical findings demonstrate that no significant differences exist between the performances of firms that belong to different groups. The common point of these two studies is the utilization of traditional statistical clustering methods, which can be used only for building distinct self-contained clusters and ignoring the within-group positioning of firms. In Dikmen *et al.*'s (2009) study, strategic group analysis for Turkish construction industry was conducted using a conceptual framework developed by Price and Newson (2003) and using traditional clustering analysis. Three strategic groups were identified, and significant performance differences were found between the obtained strategic groups. Furthermore, results of various clustering techniques, namely statistical cluster analysis, SOMs and FCM clustering, were reported to demonstrate the benefits of using alternative techniques to reveal the hybrid strategic group structure (Budayan *et al.*, 2009). In this study, as acknowledged by various researchers (Thomas and Venkatraman, 1988; Reger and Huff, 1993; Dranove *et al.*, 1998), boundaries of strategic groups were found as fuzzy, and heterogeneity of the group structure was demonstrated (Budayan *et al.*, 2009).

In the current paper, the existence of hybrid strategic groups in the Turkish construction industry will be questioned. The conceptual model used for this purpose, research methodology, data analysis and results are given in the below sections.

### **Conceptual model used for strategic grouping**

One of the challenges of strategic group analysis is to identify strategic variables to be used for clustering the firms as there is no generally accepted scheme for defining strategic dimensions (Thomas and Venkatraman, 1988). Therefore, strategic group analysis requires choosing or developing a conceptual framework in which strategic dimensions are defined, according to the competitive conditions prevailing in an industry.



Price and Newson's (2003) framework is chosen because it encompasses not only the strategic choice/position but also determinants of strategic position and how the strategic decisions are made in a company. It is believed that all the dimensions of strategic position should be incorporated into the analysis as different strategic variables may lead to performance difference and create mobility barriers between strategic groups. The three dimensions of strategy that can be recognized in every strategic decision-making problem, namely strategy process, strategy content and strategy context (Price and Newson, 2003), are explained below.

### Strategy process

Strategy process is defined as the 'manner in which strategies come about' and is concerned with the how, who and when of strategy (Price and Newson, 2003). The traditional strategy process can be considered in three stages, the strategy analysis stage, the strategy formulation stage and the strategy implementation stage. In the analysis stage, the analysis conducts SWOT (strengths, weaknesses, opportunities and threats) analysis to evaluate the efficiency and effectiveness of the organizations' current programmes and processes to reach its strategic goals. In the formulation stage, the available strategic options are determined and evaluated to choose the most appropriate strategy to the organization. Lastly, in the implementation stage, the selected strategies are translated into organizational actions which are then carried out. The traditional strategy process split into a number of sequential phases is drawn heavy criticism from the authors since they believe that in reality there exist no such identifiable stages (de Wit and Meyer, 2010), in which all the events and forces that will affect the future of the company are predicted. Quinn (1980) argued that there is no way to predict all of them. Therefore, the strategies should be formed incrementally and continuously with no precise beginning or end. Consequently, strategic planning styles are considered as one of the indicators of the strategy process in a company. In addition, Dikmen and Birgönlü (2004) found statistically significant differences between the competitiveness of Turkish companies that are grouped under different categories with respect to their strategic decision-making characteristics. Therefore, decision-making styles are determined as other indicators of the strategy process in a company. Consequently, two strategic variables have been defined in this research: existence of a systematic strategic planning process and centralization of decision-making.

### Strategy content

Strategy content is described as the product of the strategy process and is what of strategy (Price and Newson, 2003). Price and Newson (2003) mentioned Porter's (1980) generic competitive positioning in the determination of the strategic content. According to Porter (1980), companies should decide on the mode and scope of competition throughout the strategy formulation process. Mode of competition refers to the decisions of firms on methods to achieve competitive advantage. Basically, there are two competition modes: cost leadership and quality differentiation. The cost leadership approach implies that companies charge a lower price for standard services/products relative to their competitors. In contrast, companies adopting quality differentiation strategy try to offer a unique product by increasing the quality; however, it does not mean that cost issues are not considered.

Companies may have a focus strategy or a diversification strategy which determines their competitive scope. A focused strategy implies concentrating on an industry and develops their strategies by considering this industry with excluding the other industries; a diversification strategy implies undertaking works in several different industries unrelated to each other. Companies should make strategic choices about the markets they serve and types of projects they undertake, which is about drawing the boundaries of an organization. In this research, two strategic variables are identified to group the companies with respect to their competitive scope: market-level and project-level diversification. Also, these are evaluated by two dimensions: type of client and type of project.

### Strategy context

Strategy context is defined as the set of conditions which determines how, who, when and what of strategy and strategy context is concerned with the where of strategy (Price and Newson, 2003). de Wit and Meyer (2010) considered the strategy context by focusing on three aspects, namely organizational context, industry context and international context. Organizational context deals with the question of whether the organizations can determine the strategy process and strategy content followed. According to the resource-based view, firms can be viewed as a collection of resources and capabilities that can be used to achieve and sustain competitive advantage. Under the title of strategy context, tangible (such as human and financial resources) and intangible resources (such as experience, company image and relations) of companies as well as their capabilities are considered (such as managerial and technical capabilities). There exist differences on

**Table 1** Variables used during strategic group analysis

Variable	Measure	Type
Modes of competition	Category 1: cost leadership (0) Category 2: quality leadership (1)	Nominal
Diversification strategy	Category 1: only construction/ construction-related sectors (0) Category 2: diversified in sectors unrelated to construction (1)	Nominal
Internationalization (ratio of international workload to total workload)	Internationalization ratio	Numeric
Type of projects (project type that has the highest percentage in total number of projects)	Category 1: infrastructure Category 2: housing + building Category 3: industrial	Nominal
Type of client (client type that has the highest percentage in total number of projects)	Category 1: government (1) Category 2: private sector (0)	Nominal
Strategic planning	Category 1: systematic and regular strategic planning (1) Category 2: no systematic approach for strategic planning (0)	Nominal
Strategic decision-making	Category 1: democratic and collaborative environment (1) Category 2: autocratic approach (0)	Nominal
Relations with clients	Subjective rating using 1–5 scale	Ordinal
Human resources	Subjective rating using 1–5 scale	Ordinal
Managerial capability	Subjective rating using 1–5 scale	Ordinal
Technical capability	Subjective rating using 1–5 scale	Ordinal
Financial resources	Subjective rating using 1–5 scale	Ordinal
Experience	Subjective rating using 1–5 scale	Ordinal

the strategic issues between domestic and international strategy contexts. On the contrary of domestic context, additional strategic issues should be considered in the international context. Therefore, internationalization ratio, which is the ratio of international workload to total workload, is considered as a variable.

Finally, 13 variables that reflect the strategy content, process and context of construction companies are defined. Numeric, ordinal and nominal variables and how they are represented are depicted in Table 1. Binary coding is used for nominal variables.

## Research methodology

Within the context of this study, a questionnaire form is designed and submitted to 136 members of the Turkish Contractors Association, which represents the leading local Turkish companies via regular mail and e-mail. The construction companies whose yearly turnovers are above the definite limit can join this association. Therefore, the business volume of its members encompasses nearly 70% of all domestic and 90% of all international contracting work done so far by the Turkish construction companies. Thus, the strategic group analysis carried out in this research covers only the medium–big size contracting firms in Turkey. Small and local firms are excluded from the analysis. Eighty-four companies answered the questionnaire.

In the questionnaire form, each company representative is requested to give relevant information about 13 strategic variables. In addition, each respondent evaluated his/her company's performance considering the previous three-year period in terms of profitability, workload and other company objectives. In other words, subjective performance measures are utilized in examining the relative performance within the construction industry. Although most of the strategic group studies have relied on financial data, especially return on assets, in comparison with performances, the reliability of the perspective based on accounting data has been questioned in the literature (Fisher and McGowan, 1983; Hawawini *et al.*, 2003). Utilization of accounting ratios for assessing performance is criticized as they do not provide enough information about past or future profitability of companies and have got some conceptual shortcomings such as disregarding of intangible company objectives (Hawawini *et al.*, 2003). They fail to reflect firms' relative skills and objectives related to sustainable value creation (Short *et al.*, 2007). Therefore, subjective reporting approach has been preferred in performance assessment rather than collecting financial data. All subjective ratings are assigned using the 1-to-5 Likert scale, where 1 denotes the lowest level and 5 denotes the

highest level. The total number of returned questionnaires is 84, and the return rate is 0.61.

## Data analysis and results

To determine the appropriateness of the data for the analysis, reliability and validation of the data are evaluated according to the means and standard deviation of the variables, Cronbach's ratio and Guttman split-half reliability coefficient. First, the suitability of the variables is controlled for SOM and FCM methods. All variables, except type of projects which consisted of three categories, are identified as appropriate for the analysis. The type of projects variable is identified as inappropriate because the SOM algorithm ignores the specific meaning of each category of the nominal variables; these variables should be converted into numeric variables by using 1-of- $n$  coding (Vesanto *et al.*, 2000), in which a categorical feature having  $N$  possible values generates  $N$  binary features. Consequently, the type of projects variable is split into three variables, namely infrastructure, house building and industrial. Secondly, whether the data should be standardized or not is decided. Although standardization was advised by Milligan and Cooper (1988) and Harrigan (1985) in the cluster analysis, Aldenderfer and Blashfield (1984) proposed that the standardization decision should be made on the problem-to-problem basis; in addition, Ketchen and Shook (1996) stated that standardization in the cluster analysis can lead to the elimination of meaningful differences between members in the strategic group analysis. Since variables with larger dispersion (e.g. larger standard deviations) have more impact on the results of the cluster analysis (Hair *et al.*, 2009), the means and standard deviation of ordinal and numeric variables are calculated as shown in Table 2. According to the findings, high significant differences are not found between the mean values and standard deviations. In addition, Hair *et al.* (2009) advised that standardization should be applied when variables are measured by using quiet different

scales. Consequently, standardization is not applied to the current data set. Finally, internal consistency of the data is examined by calculating Cronbach's  $\alpha$ , which measures the extent to which the responses of a question in a questionnaire are highly correlated with each other. It is calculated as 0.868 which is over the threshold value of 0.70 as recommended by Nunnally (1978) to declare the data as internally consistent. Also, data are found to be internally reliable according to the Guttman split-half reliability coefficient calculated as 0.913. Consequently, data are determined as appropriate for the analysis.

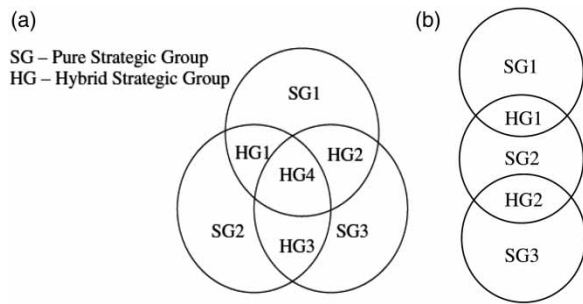
FCM analysis is conducted by using clustering toolbox for Matlab whose algorithm was developed by Bezdek (1981). The results of FCM are affected by two parameters, namely number of the clusters and fuzziness index. In order to determine the optimum number of clusters for this data set, several validity indices, namely fuzziness performance index, modified partition entropy, partition index, separation index, Xie and Beni's index, Dunn's index and alternative Dunn index, have been used. These indices are calculated for different fuzziness indices in order to check whether any difference exists in the general structure of the indices for different fuzziness parameters. According to these indices, a three-cluster solution is decided as the most appropriate solution for this data set. In order to determine the most appropriate fuzziness index, the method proposed by Odeh *et al.* (1992) is applied. According to this method, the optimum solution has been obtained when the fuzziness index equals 1.7. At the end of the analysis, the membership degrees of the data points to each cluster are obtained.

Hard clustering can also be conducted by placing the companies under a cluster by considering the highest membership value. However, some of the companies may clearly belong to more than one cluster, since the highest membership value of these companies is very close to the degree of membership value of another cluster. For instance, the degree of membership of 'Company 41' is calculated as 0.40 for the first cluster and 0.45 for the second cluster. Also, the degree of membership of 'Company 9' is calculated as 0.47 and 0.46 for the second and third clusters, respectively. Thus, it can be concluded that some of the companies utilize strategic recipes that can be associated with more than one strategic group. This can be evidence of existence of hybrid firms within the Turkish construction industry. For determining pure and hybrid strategic groups, the K-means cluster analysis is conducted by using the membership degrees of the data points to each cluster. However, in order to conduct the K-means cluster analysis, the number of clusters should be identified at the beginning of the analysis. Figure 1

**Table 2** Descriptive statistics of variables

Variable	Mean	Standard deviation
Internationalization	0.21	0.27
Relations with clients	3.50	1.09
Human resources	3.58	0.98
Managerial capability	3.30	1.03
Technical capability	3.95	0.94
Financial resources	3.69	0.99
Experience	3.63	1.10

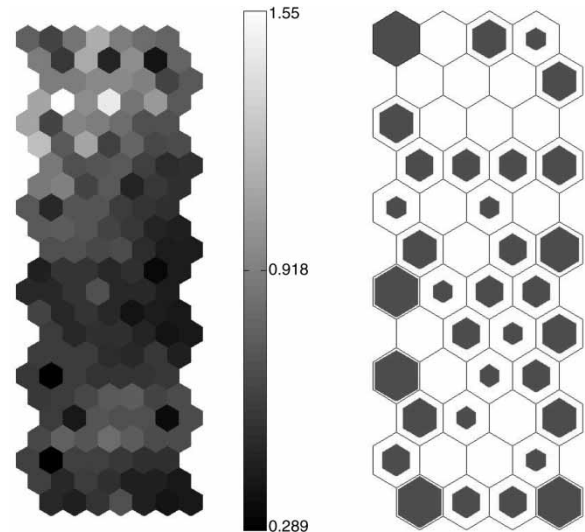




**Figure 1** Illustration of pure and hybrid strategic groups: (a) obtained from DeSarbo and Grewal (2008) and (b) modified for this study

(a) shows the illustration of pure and hybrid strategic groups proposed by DeSarbo and Grewal (2008) for three pure strategic groups. According to this figure, the number of groups is identified as seven, and the K-means analysis is conducted for seven-clusters solution. Table 3 shows the final cluster centres of seven clusters. According to this table, the clusters are tried to assign to SG1, SG2, SG3, HG1, HG2, HG3 and HG4. However, none of the clusters can be assigned to HG2 and HG4. In contrast, first and third clusters are assigned to the same hybrid strategic group, namely HG2, and second and sixth clusters are assigned to same pure strategic group, namely SG1. This shows that the proposed distribution of pure and hybrid strategic groups is not appropriate for this analysis; therefore, the number of clusters is determined as five. According to the findings of the K-means analysis for seven-clusters solution, the pure and hybrid strategic groups are modified as shown in Figure 1(b). Table 4 shows the final centres of K-means analysis for five-clusters solution. According to this table, the first, second, third, fourth and fifth clusters are assigned to HG2, SG1, HG1, SG3 and SG2, respectively. Consequently, three pure strategic groups and two hybrid strategic groups have been identified. Six firms belong to hybrid strategic group (HG1) in between strategic groups 1 and 2, and 21 firms belong to hybrid strategic group (HG2) in between strategic groups 2 and 3. However, no hybrid strategic groups have been defined between strategic groups 1 and 3. The reason could be explained by the argument that the strategic posture specific to these strategic groups is too distinct that no common features exist between them. There are 13, 21 and 23 firms in strategic group 1 (SG1), strategic group 2 (SG2) and strategic group 3 (SG3), respectively.

SOM analysis has been conducted by using SOM toolbox designed for Matlab. The number of clusters in SOM is usually decided by visual inspection of the map. The most widely used methods for visualizing



**Figure 2** Median distance matrix and hit histogram

the cluster structure of the SOM are distance matrix techniques such as U-matrix and median distance. In these methods, the distances between the adjacent nodes are represented with different colours. A light colouring between the nodes indicates borders; uniform areas of dark colouring indicate clusters themselves. In other words, the colouring scale can be used to demonstrate the degree of membership of the companies. The other method for identifying the borders is observing zero-hit units placed on U-matrix. Figure 2 shows the U-matrix and hit histogram. By examining these two figures depicted in Figure 2, three clusters are identified. The first cluster is determined by examining the hit histogram, where zero-hit units are observed at the top partition of the map. These zero-hit units separate the first two rows from the other neurons, which form the first cluster. The zero-hit units can also be observed at the bottom portion of the map. The median distance matrix has to be examined to decide on the boundaries. As the height of the neurons located at the upper part of the right portion of the third row from the bottom is higher compared with its neighbouring neurons, it has been decided that the border between the clusters should pass through this location. The companies placed in the nodes whose colouring is light grey are identified as the probable members of a hybrid strategic group. This map also shows that there exist no companies between strategic groups 1 and 3. This confirms the findings of the FCM analysis related to the number and type of the strategic groups. After that, each node is considered one by one according to the memberships obtained at the end of the FCM of the companies placed in this node. For example, the node placed at the top left consists of six companies, namely 40, 64,



**Table 3** Final cluster centres of K-means analysis for seven clusters

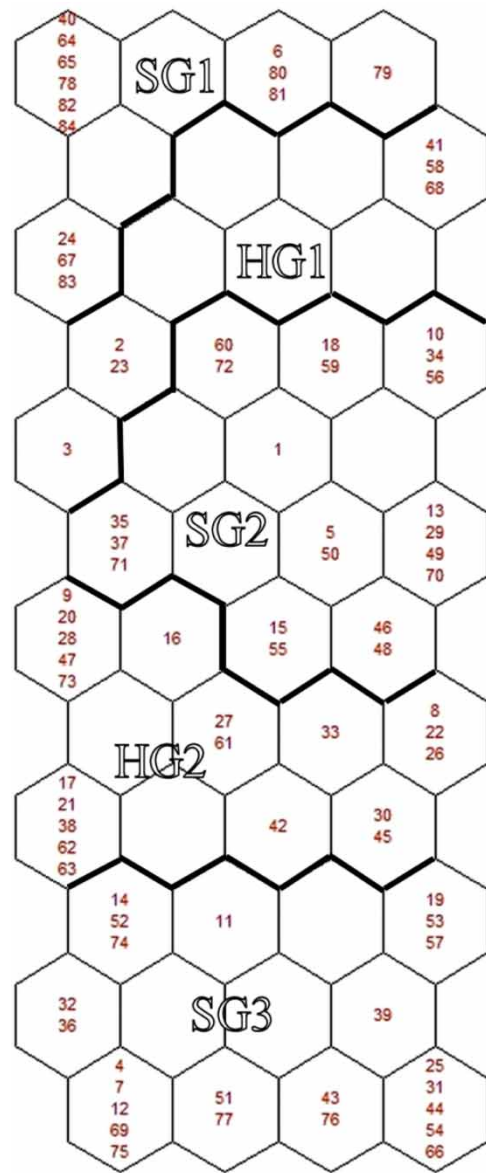
	Clusters						
	1	2	3	4	5	6	7
First cluster membership	0.07	0.63	0.04	0.02	0.10	0.83	0.35
Second cluster membership	0.55	0.27	0.38	0.17	0.70	0.12	0.46
Third cluster membership	0.38	0.10	0.59	0.81	0.20	0.05	0.19

**Table 4** Final cluster centres of K-means analysis for five clusters

	Cluster				
	1	2	3	4	5
First cluster membership	0.06	0.79	0.38	0.02	0.10
Second cluster membership	0.50	0.15	0.44	0.19	0.69
Third cluster membership	0.44	0.06	0.18	0.79	0.21

65, 78, 82 and 84. All of these companies belong to SG1, according to the FCM analysis. Therefore, this node is assigned to SG1. This analysis is conducted for all nodes to identify the strategic groups of the nodes. The strategic group memberships of five firms have been changed at the end of this analysis since the other members of the nodes at which these firms are placed are assigned to the other clusters. For example, ‘Company 70’ belongs to HG2 according to the FCM analysis; however, it is placed at the middle of the right side of the map shown in Figure 3 in which the memberships of the other firms in this node are determined as SG2. Therefore, it is inspected visually by considering the median distance matrix. According to this inspection, the node is decided as a member of SG2 since it is placed at the darker part of the median distance. In this way, the boundaries of the strategic groups are decided as depicted in Figure 3. According to this figure, 6 firms belong to hybrid strategic group (HG1) in between strategic groups 1 and 2 and 20 firms belong to hybrid strategic group (HG2) in between strategic groups 2 and 3. There are 13, 21 and 24 firms in strategic group 1 (SG1), strategic group 2 (SG2) and strategic group 3 (SG3), respectively.

Average performance values for each strategic group are represented in Table 5. As denoted previously, the performance ratings are subjectively assigned by the respondents considering the company’s performance in the previous three-year period in terms of profitability and workload. 1–5 Likert scale (where 1 and 5 show the minimum and maximum performance levels, respectively) is used for performance assessment. Consequently, Table 5 shows that the mean performance



**Figure 3** Pure and hybrid strategic groups

rating is the highest (4.458) in SG3, whereas SG1 shows the lowest mean performance (1.538) among the groups. Besides, pure strategic groups, except SG1, show higher performance than the hybrid strategic

**Table 5** Average performance in strategic groups and significance level of performance difference between the groups

	SG1	SG2	SG3	HG12	HG23	Means	Standard deviation
SG1	–					1.538	0.519
SG2	0.000	–				3.857	0.478
SG3	0.000	0.001	–			4.458	0.509
HG1	0.002	0.000	0.000	–		2.500	0.547
HG2	0.000	0.006	0.000	0.009	–	3.300	0.470

groups. In order to determine the existence of statistically significant performance differences between clusters, analysis of variance (ANOVA) is performed by using SPSS. In the first step, since ANOVA assumes that the variances of the clusters are all equal, in order to verify this assumption, test of homogeneity of variances has been performed. According to the Levene statistics (0.491), the assumption is satisfied for this data set. ANOVA indicates that significant performance differences exist between clusters (significance level =  $2.08e - 27$ ). In addition, *post hoc* tests, namely Bonferroni test, are conducted for pairwise comparison of means. According to the results of this test depicted in Table 5, significant performance differences exist between all clusters ( $p < 0.10$ ).

## Discussion of findings

Results demonstrate that hybrid and pure strategic groups exist within the Turkish construction industry. It has been observed that there exist significant differences between the performances of pure and hybrid strategic groups. This result is consistent with the findings of McNamara *et al.* (2003). However, on the contrary to their findings that hybrid strategic groups outperform pure groups, results regarding Turkish contractors reveal that the relative performance of pure and hybrid strategic groups depends on the positioning of hybrid groups in between pure strategic groups having different performance levels; therefore, it cannot be generalized. A hybrid strategic group that is positioned in between two high-performing strategic groups may have a lower performance than the neighbouring pure strategic groups, whereas it may have a higher performance than a pure strategic group that has the lowest performance among all the groups. For instance, the average performance of firms in the hybrid group, HG2, in between SG2 and SG3 is low when compared with two pure strategic groups, SG2 and SG3. However, the mean performance in HG2 is higher than the mean performance in the pure strategic group, SG1.

Companies that adhere to a strategic group's recipe tightly (such as companies in SG2 and SG3) may outperform the companies that blend the strategic recipes of various groups (in this case, HG2) as the firms in this group are loosely adhered to strategic recipes of pure strategic groups and seem to have a 'stuck in the middle' position as mentioned by Porter (1980). The reason for low performance in hybrid strategic groups can be explained by considering that companies whose strategies and resource deployments are similar tend to establish collaboration with each other (Caves and Porter, 1977; Fiegenbaum and Thomas, 1990) and they try to achieve competitive advantages by creating and sustaining mobility barriers collusively. DeSarbo and Grewal (2008) explain that due to this collaboration within the same group, companies in pure strategic groups compete with hybrid companies and they consider hybrid companies blending their strategies as their main competitors. This means that hybrid strategic groups face intensive competition from at least two pure strategic groups. Also, pure firms are classified as more legitimate than the other companies sticking to the strategic recipes loosely (McNamara *et al.*, 2003; DeSarbo and Grewal, 2008) since the parties involved in the industry, such as customers, employees and governmental agencies, can also perceive these companies as legitimate due to the historical repeated interactions and recognition of the benefits of these recipes (DiMaggio and Powell, 1983; Rosa *et al.*, 1999). In addition, companies can only gain legitimacy by becoming more similar to the other companies and identifying themselves strongly as a part of a group (McNamara *et al.*, 2003). Due to this great legitimacy, other parties may be willing to establish business partnership, which in turn creates higher performance. This is particularly relevant to the construction industry in which strong business partnership may result in competitive advantage. Industry-specific conditions, especially competitive forces prevailing in a market, clearly affect the relationship between strategic positioning and firm performance.

Reasons why pure and hybrid strategic groups have performance differences may be investigated visually by drawing a 'competition map' of the industry, as

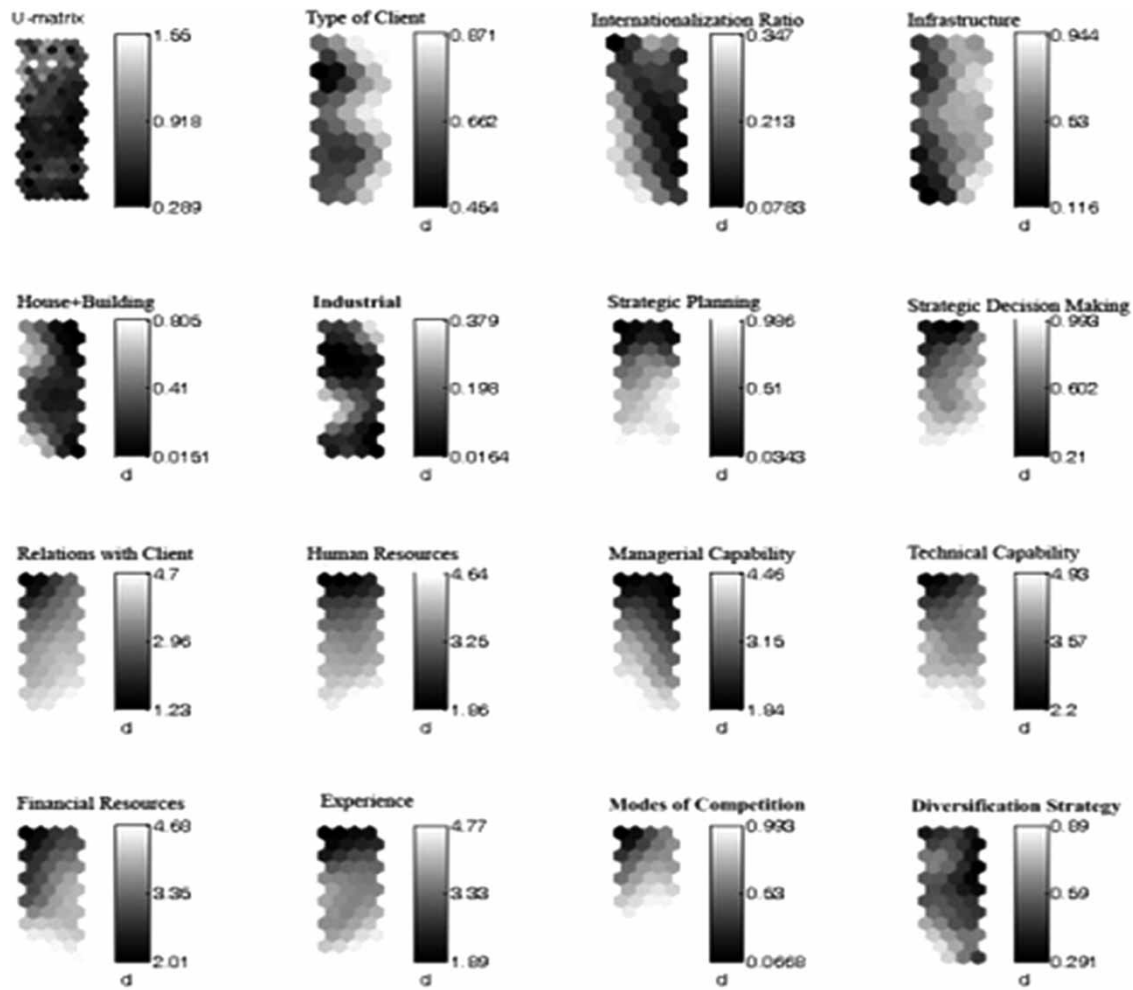


Figure 4 U-matrix and variables

proposed by DeSarbo and Grewal (2008). Figure 4, which shows the U-matrix of all the variables used in the analysis, may be denoted as a competition map that demonstrates the strengths and weaknesses of companies in different groups in terms of some strategic variables such as resources and capabilities. According to Figure 4, it is determined that the majority of firms in SG1 utilize a cost leadership and focus strategy. For a company that competes on lowest cost basis, there is only one possibility to maintain its position, which is reducing the prices. Therefore, intensive competition may exist between the companies following cost leadership strategy, which may lead to a decrease in the profit margins of these companies. Also, Figure 4 shows that companies in SG1 have weaknesses (mean scores lower than 3) in terms of all resources and capabilities. On the other hand, HG1 encompasses firms that are closer to SG2 in which its members have higher scores in terms of resources when compared with companies in SG1. Average performance rating in HG1 is higher

than the performance rating of SG1. Therefore, it is hard to generalize that firms in pure strategic groups outperform those in hybrid groups. Firms in hybrid groups that employ the best strategies or resources associated with more than one group may outperform the firms that are strictly connected with a low-performing strategic group.

### Conclusions

It is concluded that the hybrid strategic group structure is a valid structure for the Turkish construction industry. In this research, using a conceptual framework, which has three components, namely strategy context, content and process, and conducting an SOM and FCM analysis, three pure and two hybrid strategic groups are identified for the Turkish construction industry. SOM and FCM are proved to be effective methods to reveal hybrid strategic group structures,

and it is proposed that statistical cluster analysis should be accompanied with these methods to find out overlaps between strategic groups.

Statistically significant performance differences are found to exist between strategic groups. The firms in pure strategic groups, except SG1, show higher performance than the firms in hybrid strategic groups, implying that firms strongly associated with a group can outperform those that are loosely coupled with more than one strategic group. However, this result cannot be generalized as results demonstrate that firms in hybrid groups (for instance, members of HG1) may outperform the firms that are strictly linked with a low-performing strategic group (SG1) if they employ strategic perspectives of a better performing neighbour group (SG2).

In addition to its theoretical findings, research results have some practical value. Strategic group analysis may help managers understand a firm's strategic position within the competitive environment and assess its performance with respect to its competitors. Turkish contractors may use the findings to formulate strategies in order to shift to a better performing cluster. Results of statistical cluster analysis show that in order to promote to a group that has higher performance, companies should aim to increase their resources and capabilities (in the order of most important to least important: client relations, human resources, technical capability, managerial capability and financial resources). They should compete on quality basis and improve quality of their products, services and processes. Companies should be part of a high-performing strategic group in order to benefit from legitimacy. However, they should also recognize interdependence within the strategic group and possibilities of differentiation considering strategies adopted by better performing strategic groups. Using the results of strategic group analysis, companies can figure out their current strategic position within the competitive environment and identify potential competitors and collaborators in the sector. They can use this knowledge to establish future strategies, monitor threats and plan attacks against these threats.

Finally, there are some shortcomings of this research. First, it can hardly be argued that strategic group membership is the primary determinant of firm performance. Researchers who support environmental determinism describe environment as the primary mechanism for explaining performance differences. In the strategic group analysis, it is hypothesized that environmental forces have the same impact on all firms and its implications are reflected in the performance ratings in the same manner. Therefore, firm and industry levels should be considered in order to portrait the 'interwoven systems' (Short et al., 2007). Moreover, the relation

between strategic group structure and performance is studied at a single point in time. It is hard to make predictions that whether pure strategic groups can maintain their competitive advantages due to the collaboration and legitimacy. It may be that the collaboration within the strategic group will not be maintained leading to intensive competition within the strategic group. Alternatively, the hybrid strategic groups can establish a balance point between legitimacy and differentiation; therefore, they can benefit from being legitimate and different at the same time.

Finally, this research has got some limitations due to the target population. A single industry within a confined geographical area was examined with limited numbers of companies; thus results about strategic group membership and performance cannot be generalized. It should be concluded that the aim of this research is not to draw generic conclusions applicable to all industries, but to demonstrate that if appropriate methods, FCM and SOM, are used, the 'real strategic structure' of an industry can be revealed and hybrid clusters can be identified that may point out to more realistic strategic and performance implications of group membership when compared with the results of simplistic clustering techniques.

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