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Competitor Identification Through Vicarious Learning

Kwang-Ho Kim
College of Business Administration, Hankuk University of Foreign Studies, 107 Imum-ro, Dongdaemun-gu, Seoul, 130-791, Korea

ABSTRACT

Firms within the same industry do not always mutually recognize each other as competitors. Whereas firm A considers firm B a competitor, firm B may not consider firm A a competitor. The causes of such asymmetric competitive relations have not yet been examined and compared to the causes of symmetric competitive relations. This study extends vicarious learning theory to investigate how firms benchmark others to identify competitors in the U.S automobile industry. Although, vicarious learning based on trait similarity explains why firms become mutual competitors, vicarious learning based on outcome and media coverage explains the emergence of asymmetric competitive relations.

Key words: Competitor identification, symmetric competitor, asymmetric competitor, vicarious learning

INTRODUCTION

To formulate a competitive strategy, managers have to determine who their firm's rivals are and on what dimensions their firm competes with others (Porter, 1980). Identifying competitors is the starting point of competitor analysis which can benefit firms in sensitization, legitimation, benchmarking and inspiration (Ghoshal and Westney, 1991). Competitor identification has also been a basis for the analysis of dynamic competitive behaviors in achieving competitive success (Chen and MacMillan, 1992; Chen, 1996; Ferrier, 2001) and multimarket competition (Gimeno, 1999; Korn and Baum, 1999).

There are many studies on competitor identification in the existing strategy literature. Research on strategic groups proposes that firms are competitors if they have similar size, resources, strategies and products (Dess and Davis, 1984; Hatten *et al.*, 1978). Similarly, research on cognitive competitive mapping suggests that firms define a reference group of rivals based on managers' self-categorization of organizational attributes (Porac and Thomas, 1990; Porac *et al.*, 1989; Porac *et al.*, 1995; Reger and Huff, 1993). Although these studies have contributed to a group level understanding of competitor identification, they tend to assume that firms in the same group share a mutual understanding of competitors, ignoring the heterogeneity of competitive relationships within the same group (Clark and Montgomery, 1999) and the directionality of competitive relationship (Bergen and Peteraf, 2002). In reality, firms within the same industry are not always mutual competitors. Whereas firm A considers firm B as a competitor, firm B may not consider firm A as a competitor. The causes of such asymmetric competitive relations had not yet been examined and compared to the causes of symmetric competitive relations.

This study aims to fill this gap in the literature by investigating what distinguishes asymmetric and symmetric relations in competitor identification of firm dyads. More specifically, this study examines the antecedents of asymmetric as well as symmetric competitive relations by applying a vicarious learning perspective that describes how firms make their own decisions by observing other firms' actions and outcomes (Baum *et al.*, 2000; Haunschild and Miner, 1997). Vicarious learning is vital to competitor identification; firms cannot determine their competitors based on their experience of direct competition with every other firm in the industry. Identifying competitors through observing other firms' actions and competitive relations and comparing them can reduce the uncertainty as well as the cost of the direct experience. This study proposes several types of vicarious learning and shows how each type influences a firm's decision regarding with whom to compete. By extending the theory of vicarious learning to investigate how firms use others as a benchmark to identify competitors, this research advances the strategy literature by offering a better understanding of the process of competitor identification.

THEORY AND HYPOTHESES

Vicarious learning: Vicarious learning is a process of acquiring information or knowledge through observation of other firms' actions and outcomes when a firm's own experience is not sufficient for decision making (Baum *et al.*, 2000; Haunschild and Miner, 1997). Other firms' actions and the outcomes of those actions provide clues for interpreting uncertain situations and help firms to determine which actions are desirable under uncertainty. Vicarious learning suggests that firms need to be alert while watching other firms to improve awareness and knowledge of potential competition in the environment.

Vicarious learning is important for competitor identification because it is too risky for firms to determine their competitors on a trial and error basis. The cost of attacking a wrong firm is extremely high as it may induce serious counterattack which would result in irreversible damage to the focal firm (Chen and MacMillan, 1992). Also, trial and error may waste a firm's resources and efforts on irrelevant companies. The limitations of direct experience make benchmarking others necessary to determine competitors.

Several empirical studies have highlighted the importance of vicarious learning under uncertain environments. For example, Argote *et al.* (1990) and Haunschild and Miner (1997) found that companies commonly follow others for diverse strategic decisions; despite the relevance of a vicarious learning framework to competitor identification, previous research has been limited by focusing on adoption of practice (DiMaggio and Powell, 1983) and organizational structure (Burns and Wholey, 1993; Fligstein, 1985), diffusion of innovation (Abrahamson and Rosenkopf, 1993) and decision on market entry (Baum *et al.*, 2000; Korn and Baum, 1999).

Previous research has suggested three modes of vicarious learning: trait-based, frequency-based and outcome-based (Haunschild and Miner, 1997). With trait-based learning, companies adopt practices on the basis of certain traits of firms such as size or success while with frequency-based learning, firms implement practices that are used by a large number of other firms. With outcome-based vicarious learning, firms learn which practices are good and desirable through comparison of the positive or negative outcomes among practices. Traits, frequency and outcome are signals of verifying that certain strategies or actions are effective, valuable and appropriate in a given situation.

The current study extends vicarious learning theory in two ways. First, this research identifies two additional modes of vicarious learning: relation-based vicarious learning and media attention-based vicarious learning. Understanding the structure of the relationship is critical when studying competition because firms with similar relational structures are likely to behave similarly (Burt, 1987; Mizruchi, 1990) and eventually become competitors with each other. Media coverage is also critical for competitor identification because high visibility through media enables firms to effortlessly recognize whether other firms represent a major threat. These additional learning modes allow a focal firm to detect competitors based on industry network structure and public media in the environment. Second, this research broadens the applications of vicarious learning theory by relating different modes of vicarious learning to a new dependent variable concerning competitive identification at the dyadic level. Whereas previous studies on vicarious learning have mainly explained how firms imitate others, this research shows that vicarious learning can also help firms decide with whom to compete.

Trait-based vicarious learning: When faced with insufficient information, firm decision makers observe other firms to interpret the competitive environment. In particular, they selectively pay attention to the firms with specific traits (such as firm size, product type and advertising strategy) that can be used as a proxy for indirect interpretation of the competitive environment (DiMaggio and Powell, 1983; Haunschild and Miner, 1997).

Comparing traits across firms leads to the formation of strategic groups. Firms can be categorized into strategic groups on the basis of trait similarities (Lant and Baum, 1995). Firms from the same strategic group have similar goals and resource requirements which lead them to have similar strategies and capabilities and under this condition, firms are more likely to contest each other's market territory. As a result of this process, firms in the same group are usually regarded as competitors with one another. Many studies have applied strategic group analysis as the basis of competitor identification (Ketchen *et al*., 1993) for a review of these studies.

The idea of vicarious learning based on trait similarity or the process of categorizing firms into strategic groups tends to produce symmetric competitive relations. Firms in the same strategic group are likely to share similar understanding about the competitive environment; if a focal firm recognizes other firms in the same group as its competitors, the other firms in the same group are also likely to consider the focal firm their competitor. In other words, two firms are likely to consider each other as competitors when they have similar traits or belong to the same strategic group.

Trait-based vicarious learning, however, has limitations in fully explaining all different types of competitor identification. Assuming homogeneity of firms with similar traits, trait-based vicarious learning ignores the fact that each firm may have a distinctive position and aspiration in the competitive arena. Thus, trait-based learning cannot explain the emergence of an asymmetric competitive relationship in which only one firm considers the other a competitor:

- **Hypothesis 1:** Both a focal firm and a target firm are more likely to consider each other as their competitor when they have similar traits (or belong to the same strategic group). However, having similar traits does not necessarily lead to asymmetric competitor identification

Outcome-based vicarious learning: Organizational outcomes help firms interpret the competitive environment and understand competitive relations in the industry. Firms learn about what is desirable and what is undesirable in a given environment by observing and comparing the perceived impact of certain actions of other firms. Through outcome-based vicarious learning, actions that produce positive outcomes will be adopted and actions that produce negative outcomes will be avoided, because a positive outcome signals the effectiveness of adopted behaviors

(Haunschild and Miner, 1997) and a negative outcome discredits the usefulness of those behaviors (Chuang and Baum, 2003). Several studies empirically supported this learning mode in knowledge diffusion (Mansfield, 1961) and strike imitation (Conell and Cohn, 1995).

In the context of competitor identification, an important outcome to which a focal firm pays attention is the market share change of other firms which identify a certain company as their competitor; firms observe the economic outcome of others to determine a specific company as their rival or target of assault. If the overall outcome of firms that attack a certain company is positive, it implies that those firms benefited from attacking the company and accordingly, other firms can expect improved outcomes by targeting the same company. Thus, when a focal firm observes and compares the payoffs from other firms' competitive relations, it is more likely to imitate the other firms' competitor identification that produces positive economic results. In other words, a focal firm avoids attacking a company that caused negative economic returns to firms that targeted it; instead, the focal firm assaults a company that produced positive economic results to firms that targeted it. Therefore, a focal firm is likely to recognize as its own competitor a company that has increased the outcome of other firms that had identified it as their competitor, with the expectation of positive outcomes similar to those of the other firms:

- **Hypothesis 2:** A focal firm is more likely to consider a target firm as its competitor when companies that identified the target firm as their competitor have increased their market share

Frequency-based vicarious learning: To construct their own competitive map, firms take into account the way many firms compete in the industry (Haunschild and Miner, 1997). With frequency-based vicarious learning, the extent to which a target firm is considered a popular competitor in the industry is likely to influence a focal firm's competitor identification. Firms have a tendency to follow behaviors, practices and strategies that a large number of firms have adopted. The recurrent and prevalent use of certain actions by many firms implies that those actions are valuable and appropriate ways of dealing with the environmental ambiguity (Abrahamson and Rosenkopf, 1993). Therefore, firms are more likely to implement strategic actions that have been taken by numerous other firms.

Many studies have empirically supported the idea of referring to a large number of firms in the industry when a firm makes a strategic decision. Korn and Baum (1999) showed that a firm's decision on entering a target firm's market was influenced by the number of other firms engaged in multimarket contact with the target firm. In addition, adoption of the multidivisional firm structure (Fligstein, 1985; Palmer *et al.*, 1993), innovation diffusion (Mansfield, 1961) and curricular change in liberal arts colleges (Kraatz, 1998) as well as merger and acquisition choices (Amburgey and Miner, 1992) were found to be affected by the number of other firms that decided on the same strategic choice. Also, Haunschild and Miner (1997) found that the likelihood of using a specific investment banking firm is positively related to the number of other firms using that investment banking firm in acquisition. Given that identifying competitors is an important strategic decision, it is possible that firms determine their competitors based on the number of other firms that identify a target firm as their competitor and consider this decision process an effective and efficient approach for handling uncertainty:

- **Hypothesis 3:** A focal firm is more likely to consider a target firm as its competitor when many other firms identify the target firm as a competitor

Relation-based vicarious learning: Competitor identification can also result from the structure of interfirm network that influences information flows and behavioral patterns through direct or indirect ties (Burt, 1987; Gulati, 1995; Mizruchi, 1989). When determining whether a target firm is a major competitor, it is important for a focal firm to pay attention to the target firm's network ties compared to the focal firm's own ties. Structural equivalence and common third party ties are two main aspects of interfirm network structure characterizing relation-based vicarious learning at the dyadic level.

Firms are structurally equivalent to the extent that they have identical relations with all other firms in the industry (Burt, 1987). If two firms have the same relation with others, they are likely to be able to substitute for each other. Thus, the existence of structurally equivalent others became a threat to a focal firm. As Burt (1987) has argued, "the more similar ego's and alter's relation, that is, the more that alter could substitute for ego in ego's role relations and so the more intense that ego's feelings of competition with alter are".

In addition, structurally equivalent firms tend to act similarly and make similar strategic decisions (Burt, 1987). Because structurally equivalent firms have identical relations with others, they experience the same socialization pressure and are more likely to have similar status and behave similarly. In the competitive environment, behavioral similarities imply using similar strategies concerning key decisions such as new product introduction, price reduction and market entry. This tendency of behavioral similarity between structurally equivalent firms in the industry gradually intensifies tension between them and eventually they are likely to identify each other as competitors:

- **Hypothesis 4:** A focal firm is more likely to consider a target firm as its competitor when the target firm is structurally equivalent to the focal firm

The number of common third party ties between two firms is another aspect of interfirm network structure that may affect competitor identification. Common third party ties and structural equivalence represent two distinct concepts, even though they may be correlated. As Gulati (1995) has pointed out, "two firms with many partners in common are not necessarily structurally equivalent", given that these two firms may also have many ties to different others. Dissimilar to structural equivalence that explains behavioral similarity based on the logic of substitutability, the idea of common third party ties focused on cohesion and information access between firms in network. Firms that indirectly connected through many common third parties are likely to have access to information about each other and may thus have more opportunities to attack each other in the market place.

In addition, when two firms have many common third party ties, they are likely to adopt similar strategies and have similar business interests. In a network of interfirm competitive relations, two firms with many common third party ties mean that they have many common rivals and compete with the same other firms. Thus, a strategy favorable for one firm is likely to be effective for another that encounters the same rivals. Such a similarity in strategies makes firms act similarly in the marketplace and have similar business interests. Even though firms may sometimes collaborate to deal with their common rivals, these firms tend to consider each other as competitors because of their common interests and strategies:

- **Hypothesis 5:** A focal firm is more likely to consider a target firm as its competitor when the target firm shares a large number of common third party ties with the focal firm

Media attention-based vicarious learning: Media attention captures the degree of a firm's public visibility that leads to competitive threat. When firms scan and compare other firms in the market, they are likely to regard salient others who have a positive public image as meaningful competitors because their visibility makes a focal firm indirectly experience competition with otherwise distant firms (McLeod *et al*., 1991). Thus, the high salience of firms provides richer information about them and facilitates a focal firm's interpretation of them without having had direct experience of competition with them.

The degree of visibility is a function of the media coverage a firm receives (Pollock and Rindova, 2003). Media coverage affects the way a focal firm sees other firms through framing its description of them either positively or negatively (Golan and Wanta, 2001). Therefore, the media are not only an outlet of information on reality but also a mediator to share the assessment of companies (Ferrier *et al*., 1999). Media coverage which is an indicator of the public's knowledge and opinions about firms, allows firms to deal with uncertainty vicariously rather than through their own evaluation of firms. In terms of competitor identification, media coverage enables firms to recognize tough competitors without relying on direct experience with these companies (Ferrier, 1997). As a valuable signal for competitor identification, media coverage on market actions (such as active marketing plans, new product introduction and price reduction) provides vivid and detailed information about a firm's competitive environment (Ferrier, 1997). A focal firm can easily observe and compare its own versus other companies' media coverage on market actions and is likely to consider those with higher media coverage as its competitors:

- **Hypothesis 6:** A focal firm is more likely to consider a target firm as its competitor when the target firm has higher media coverage than the focal firm. The target firm, however, is less likely to consider the focal firm as its competitor

Public information on the number of product recalls is another kind of media attention that provides clues for a focal firm to assess the potential threat of a rival's product. Information on product recalls is easily accessible and highly visible through company announcement and various public media such as Consumer Reports and newspaper product reviews. Therefore, firms that produce products with a larger or smaller number of recalls can be easily recognized.

The number of product recalls a firm has is a salient indicator of the firm's product quality that can affect its reputation and legitimacy as well as its competitive advantage (Fombrun, 1996; Podolny, 1993). Consequently, a focal firm is more likely to identify a firm that is highly recognized by its smaller number of recalls (i.e., higher product quality) as its competitor whereas a focal firm would not regard a firm with a larger number of recalls (i.e., lower product quality) as its competitor:

- **Hypothesis 7:** A focal firm is more likely to consider a target firm as its competitor when the target firm has a smaller number of recalls than the focal firm. The target firm, however, is less likely to consider the focal firm as its competitor

MATERIALS AND METHODS

Sample and data collection: The sample for this study included all 30 automakers operating in the mid-size sedan market in the U.S. The analysis focused on the mid-size sedan market because it represents the largest segment in the U.S auto industry and contains the most active competitive relations among automakers. The retail price of a mid-size sedan in the sample ranged from \$15,000 to \$39,000. Within this selected price range, most automakers have only one mid-size sedan model, although some automakers have two or three models. All 435 dyadic competitive relations among 30 automakers [(30×30-30)/2 = 435] were used for analysis. To perform the analysis at the firm dyad level, first averaged the data of each model at the firm level and then compared the average data for each pair of firms.

Data on competitor identification were collected from each automaker's website in May 2005. Every automaker lists its competitors on its website since it compares its model with other competitive models. These competitor data showed which companies in the industry is a focal firm considers to be its competitors and thus enabled to construct a focal firm's perspective on the competitive environment. Data for the measures of the independent and control variables (such as market share, media coverage and product recalls that capture vicarious learning) were collected from diverse archival sources including Automotive News, Ward's Auto World and Consumer Guide. All the independent variables were based on 2004 data (a year prior to the dependent variable) except for data on relation-based learning which used 2005 data in order to capture relational structure in the current competitor identification network.

Dependent variable: The dependent variable in this study, competitor identification, is a categorical variable consisting of three types of competitive relations. The first type is a mutual non-competitive relation which implies that neither a focal firm nor a target firm identifies the other as a competitor. The second type of competitive relation is one-sided competitor identification from a focal firm. This asymmetric relation indicates that only a focal firm regards a target firm as its competitor, whereas the target firm does not identify the focal firm as its competitor in the competitive relation dyad. The third type of competitor identification is mutual competitor identification between a focal firm and a target firm, implying that the focal firm and the target firm recognize each other as a competitor simultaneously.

Independent variables: To operationalize trait-based learning, first, firms were classified into groups based on similarities in traits, including size and advertising. Size and advertising have been prominently adopted as criteria grouping companies in various studies (Ketchen *et al.*, 1993; Dess and Davis, 1984; Hatten *et al.*, 1978). To measure the size, market share (Hatten and Hatten, 1985) and the number of dealerships were used. Also, television advertising expenditures were used as a measure of advertising (Hatten *et al.*, 1978). The market share of each firm was measured by dividing the car sales of the focal firm in 2004 by the total car sales of all the companies in the market in the same year. Sales data was collected from Automotive News and Ward's Auto World. These automotive-industry publications represent the voice of auto producers and are the most commonly used data sources in automobile industry research (Nohria and Garcia-pont, 1991; Rosa *et al.*, 1999). The number of dealerships and television advertising expenditures of each company were also taken from 2004 data which were collected from Automotive News.

I used the average-linkage algorithm to construct groups of firms with similar traits. Following Reger and Huff (1993), two decision rules were used to determine the number of clusters from average-linkage algorithm's output: Adopt cluster solutions at large breaks in the dendrograms and avoid cluster solutions that produce one firm group. Based on the results of strategic groups, I created a dichotomous variable, coding 1 if two firms in a pair had similar traits and belonged to the same group but 0 otherwise.

To measure outcome-based learning, I first used Consumer Guide May 2004 to identify a target firm's competitors in 2004 and then calculated the percentage increase of market share from 2004 to 2005 of firms that recognized a target firm as their competitor. The market share of each company was calculated by dividing the car sales of the focal firm in each period by the total car sales of all the companies in the market in the same period.

Frequency-based vicarious learning was measured by counting the number of other firms that considered a target firm as their competitor. Similar to the way that measured outcome-based vicarious learning, Consumer Guide May 2004 was also used to identify a target firm's competitors in 2004.

Moreover, two variables were used to capture relation-based vicarious learning: structural equivalence and common third party ties. To measure these two variables, a network of interfirm competitive relations was constructed first among the 30 firms in the sample, then a 30×30 relational matrix was created in which each cell ij represents whether firm i identifies firm j as a competitor. Based on this relational matrix, the measures for the two variables were calculated.

For structural equivalence, Euclidean distance d_{ij} between two firms (Burt, 1976) was calculated; Euclidean distance captures how different the relations of two firms are in terms of their connections with other firms in the network of interfirm competitive relations. As sugested by Wasserman and Faust (1994), the Euclidean distance was calculated as:

$$d_{ij} = \sqrt{\sum_{i=1}^{g}[(x_{ik} - x_{jk})^2 + (x_{ki} - x_{kj})^2]}$$

where, x_{ik} is the value of the tie from firm i to firm j on a single relation and the formula is for the distance between rows i and j and columns i and j of the industry matrix for i ≠ k and j ≠ k. A high Euclidean distance score means that two firms are not structurally equivalent as they have very different patterns of ties to other firms in the network. If the Euclidean distance between two firms is zero, it means that two firms are perfectly equivalent, sharing exactly the same relations with other firms in the network and occupying the same network position. Euclidean distance was reverse coded to arrive at a measure of structural equivalence. Common third party ties was measured by counting the number of firms with which the focal firm and the target firm commonly connected within the interfirm competitive network.

For media attention-based vicarious learning, two variables were used: media coverage and product recalls. Whereas media coverage tends to positively contribute to a firm' image, product recalls tend to negatively affect a firm's image. To measure media coverage, I relied on news announcements in the public media, mainly in Automotive News which is the most comprehensive and unbiased news source for the auto industry. Following Ferrier *et al*. (1999), the media coverage from the last two years, from June 2003 to May 2005 was reviewed and counted the number of headline news reports on new pricing, new products, new capacities, new marketing and new plans for each company in the sample. Since I focused on a firm's relative advantage in visibility, the difference between a focal firm's and a target firm's media coverage was acquired by subtracting the target firm's number of media coverage from the focal firm's media coverage after counting the frequency of media coverage for each company.

To measure product recalls, the number of recalls of each model in year 2004 was acquired from www.recall-warnings.com. Moreover, this Website contains recalls ordered by the National Highway Traffic Safety Administration as well as those announced by the auto manufacturers. The number of recalls of each model within the data collection price range was added which created the company level recalls. As a final step, the target firm's number of recalls was subtracted from the focal firm's number of recalls to calculate the difference in product recalls between the two companies.

Control variables: To account for firm level differences in experience, firm age was controlled in the analysis. Firm age is an important control variable because of its impact on a firm's competitive capability and, accordingly, survival and failure (Freeman *et al.*, 1983). In this study, firm age was defined as the number of years a firm had been established in the U.S. in the case of domestic automakers, or had entered into the U.S market in the case of foreign automakers. Both the focal firm's age and the target firm's age are included in the analysis. I also controlled for the number of other firms that identify a focal firm as a competitor to capture the potential effect of the fact that the focal firm itself is a popular target for other firms in the industry.

Statistical analysis: Multinomial logit model was used to test the proposed hypotheses because the dependent variable consists of several nominal outcomes. This model estimated the likelihood that a specific type of competitive relationship would occur relative to the occurrence of a mutual noncompetitive relationship as the base category. The general specification of the multinomial logistic regression model applied here was as follows:

$$\ln (P_i/P_o) = a+b_jX_j$$

where, P_i is the probability of an event occurring for the j-th case. The possible events are defined here as asymmetric competitor identification from a focal firm to a target firm (i = 1) or symmetric competitor identification between a focal firm and a target firm (i = 2). The P_o is the probability of a mutual non-competitive relation between a focal firm and a target firm as a comparison category. X_j is the vector of independent variables. At the dyadic level of analysis, autocorrelation might occur due to the fact that the same firm may repeatedly appear in multiple dyads. To deal with this concern, robust standard errors was used for the estimation of the models (White, 1980).

RESULTS

Among all of the 435 dyads (or pairs of firms) in this study, 83 had asymmetric competitive relationships and 48 had symmetric competitive relationships (the rest were mutual noncompetitive relationships). On average, a focal firm in the sample had 2.8 asymmetric competitive relationships and 1.6 symmetric competitive relationships with other firms in the industry.

Table 1 reports descriptive statistics and correlations for all the independent and control variables in this study. Potential multicollinearity was examined using the variance inflation factor (VIF). The VIF ranges from 1.03 to 1.96 with a mean of 1.33 which suggests no serious multicollinearity problem.

Table 2 presents the results of the multinomial logistic regression analysis. Model 1 is a baseline model that includes only control variables, whereas Model 2 is the full model with all the independent variables which was relied to test all the hypotheses.

Hypothesis 1 predicted that trait similarity leads to a symmetric competitive relationship but not to an asymmetric competitive relationship. As shown in Table 2, the coefficient for "trait similarity" is positive and statistically significant ($p<0.01$) in the mutual competitor identification whereas it is insignificant in an asymmetric competitive relationship. These results suggest that trait similarity

Table 1: Descriptive statistics and correlations[a]

Variables	Mean	SD	1	2	3	4	5	6	7	8	9
Focal firm's age	49.06	28.54									
Target firm's age	55.88	32.32	-0.02								
No. of other firms identify a focal firm as their competitor	2.65	4.39	0.02	0.01							
Trait similarity	0.19	0.39	0.01	-0.03	-0.09						
Outcome changes	-2.34	10.78	0.00	0.41**	-0.01	0.02					
No. of other firms identify a target firm as their competitor	4.54	4.70	0.05	-0.35**	0.01	-0.02	-0.05				
Structural equivalence	1.87	0.75	0.06	0.10*	-0.14**	0.11*	-0.04	-0.13**			
Common third party ties	1.51	1.81	-0.18**	-0.08	0.06	0.03	-0.05	0.11*	0.23**		
Media coverage	-1.34	8.22	0.20**	-0.43**	0.16**	0.06	-0.13**	0.06	0.13**	-0.17**	
Product recalls	0.33	2.33	-0.01	-0.41**	-0.05	0.06	-0.25**	0.05	-0.20**	0.09	0.23**

[a]N = 435, **Significant at $p<0.01$, *Significant at $p<0.05$ (two-tailed test)

Table 2: Results of multinomial logistic regression of vicarious learning on competiter identification[a]

	Asymmetric competitive relation		Mutual competitive relation	
Variables	Model 1	Model 2	Model 1	Model 2
Control variables				
Focal firm's age	-0.00	0.01+	-0.01	0.00
	(0.01)	(0.01)	(0.01)	(0.01)
Target firm's age	-0.01	-0.01+	-0.01	-0.00
	(0.00)	(0.01)	(0.01)	(0.01)
No. of other firms identify a focal firm as competitor	0.01	0.09*	0.15**	0.29**
	(0.05)	(0.04)	(0.03)	(0.05)
Trait-based VL				
Trait similarity		0.37		1.23**
		(0.34)		(0.49)
Outcome-based VL				
Outcome changes		0.04**		-0.03
		(0.02)		(0.02)
Frequency-based VL				
No. of other firms identify a target firm as competitor		0.08*		0.17**
		(0.04)		(0.06)
Relation-based VL				
Structural equivalence		0.95**		1.48**
		(0.23)		(0.35)
Common third party ties		0.77**		1.25**
		(0.12)		(0.26)
Media attention-based VL				
Media coverage		-0.08**		-0.01
		(0.03)		(0.03)
Product recalls		0.17		-0.08
		(0.11)		(0.11)
Log likelihood	-336.91	-219.23	-336.91	-219.23
Chi-square	50.60**	859.25**	50.60**	859.25**

[a]N = 435. Mutual non-competitive relation as the reference category and robust standard errors in parentheses, **Significant at $p<0.01$, *Significant at $p<0.05$, +Significant at $p<0.10$

can significantly account for the situation where firms recognize each other as mutual competitors but cannot explain the occurrence of an asymmetric competitive relationship. Thus, Hypothesis 1 is supported.

Hypothesis 2 stated that a focal firm is more likely to identify a target firm as its competitor when others who have recognized the target firm as their competitor have increased their market share. The coefficients for “outcome changes” in Table 2 are positive and statistically significant ($p<0.01$) in the asymmetric competitive relation. This finding implies that other firms’ outcomes that resulted from recognizing a target firm as their competitor positively influence the focal firm’s competitor identification. Therefore, Hypothesis 2 is also supported.

Hypothesis 3 predicted a positive effect of frequency-based vicarious learning on competitor identification. The coefficients for the “number of other firms that identify a target firm as competitor” in Table 2 are positive and significant in both asymmetric ($p<0.05$) and symmetric competitive relations ($p<0.01$). The results suggest that a focal firm is likely to consider a target firm as its competitor when a large number of other firms recognize the target firm as their competitor. Thus, Hypothesis 3 is confirmed.

Hypothesis 4 stated that firms are likely to consider structurally equivalent others in the industry as their competitors. The coefficient for “structural equivalence” is positive and statistically significant ($p<0.01$) in every competitive relation. The results suggest that two firms are more likely to identify each other as their competitor if they are structurally equivalent. Thus, Hypothesis 4 is confirmed.

Hypothesis 5 predicted that the greater the number of common third party ties between two firms, the more likely they are to consider each other as competitors. The coefficients for “common third party ties” are positive and statistically significant ($p<0.01$) in every type of competitive relation. These results imply that firms identify others as competitors when they have many competitors in common. Therefore, Hypothesis 5 is supported.

Hypothesis 6 stated that a lower media coverage firm would consider a higher media coverage firm as its competitor but the higher media coverage firm would not recognize the lower media coverage firm as its competitor. As shown in Table 2, the coefficient for “media coverage” is negative and significant ($p<0.01$) in an asymmetric competitive relationship whereas it is insignificant in a mutual competitive relationship. These results imply that a firm with lower media coverage identifies a firm with higher media coverage as its competitor but not vice versa. Thus, Hypothesis 6 is confirmed.

Hypothesis 7 predicted that a focal firm with a larger number of product recalls is likely to consider a target firm with a smaller number of recalls as its competitor while the company which possesses a higher quality is less likely to regard a firm with a low quality as its competitor. Contrary to the prediction, the coefficient for “product recalls” is not statistically significant in one-sided competitor identification from a focal firm to a target firm. Thus, Hypothesis 7 is not supported. The combined results of Hypotheses 6 and 7 indicate that the effect of media attention-based vicarious learning is only partially supported.

DISCUSSION

The results of this study provide direct empirical evidence of the effect of vicarious learning on competitor identification. Firms benchmark others to identify their competitors because doing so enables them to eschew the potential risk and waste of resources that might occur with trial and error based competitor identification. The findings of the study suggest that firms simultaneously rely on multiple modes of vicarious learning such as trait, outcome, frequency, relation and media attention in order to determine their competitors.

This research extends prior studies on competitor identification. By simultaneously examining different types of competitive relations, symmetric as well as asymmetric, this study shows how competitor identification can be better understood through a vicarious learning perspective. Prior studies have suggested that competitor identification is constructed through a categorization process of managerial cognition (Porac and Thomas, 1990; Porac *et al.*, 1995; Reger and Huff, 1993) and competitor identification through this process has been symmetric, paying less attention to other possible ways to recognize competitive relations as well as to the existence of asymmetric competitive relations. Different from previous studies, this study suggests that firms identify their competitors not only through a categorization process but also by using vicarious learning based on various information sources including organizational traits, outcome, frequency, structural relations and media attention of companies. This research represents the first attempt to simultaneously investigate asymmetric and symmetric competitive relations as well as to apply vicarious learning theory to elucidate the rationale of competitor identification in industry.

This study also highlights various types of vicarious learning. It extends vicarious learning theory by adding two additional modes (i.e., relation-based and media attention-based vicarious learning) to the existing modes of vicarious learning. Adding these modes to the existing types of vicarious learning makes the theory of vicarious learning more comprehensive, providing broad information about companies, industry network relations and potential dynamics in industry, eventually assisting companies to better interpret the competitive environment. In addition, this research expands the applicability of vicarious learning. By considering vicarious learning as a process of acquiring knowledge, this study extends vicarious learning to competitor identification research whereas prior studies have constrained vicarious learning in studying the imitation of specific strategic behaviors.

To operationalize outcome-based learning, only market share change was used due to inaccessibility to other data. Future research could test the effect of outcome-based learning on competitor identification by applying alternative outcome measures such as revenue, return on sales (Lewis and Thomas, 1990), return on invested capital (Fombrun and Shanley, 1990) and productivity change (Steensma *et al.*, 2005).

Despite its interesting findings, this study had several limitations. Competitive relations in this research were constructed based on data at the product level and then aggregated at the firm level. Because this study only focuses on the mid-size sedan market, findings of this study may not be easily generalizable to other markets such as SUVs and sport coupes. In addition, this paper only investigated one-year competitive relations and thus, is unable to capture the dynamics of changing competitor identification over time. A longitudinal study would enable to observe dynamic competitive relations over time. Future research that considers these limitations can provide greater confidence in the effects of vicarious learning on competitor identification.

The current study may suggest several directions for future research. There is a need for research to recognize the consequences of competitor identification. Firm performance depends greatly on the ongoing competitive interactions between a firm and its rivals (Chen and MacMillan, 1992; D'Aveni, 1994). Although, the findings of this research generally support vicarious learning based competitor identification, we do not have enough knowledge about whether this competitor identification contributes to appropriate strategy building and superior firm performance. Neo-institutionalists have argued that firms pursue strategic similarity to increase chance of survival (DiMaggio and Powell, 1983) but at the same time, firms should differentiate themselves from others to succeed in competition (Porac and Thomas, 1990). Therefore, investigating strategic similarity and differences between firms on the basis of competitor identification can enhance our understanding of whether firms identifying the same competitors adopt similar strategies and when and why they not implement different strategies for the same competitors.

Another useful extension of this work would be to apply the model of competitor identification to study multimarket competition (James and Emet, 2013). Research on multimarket competition suggests that mutual forbearance occurs between firms sharing many of the same markets, because concerns about possible attack and subsequent retaliation constrain competition (Edwards, 1955; Gimeno, 1999; Korn and Baum, 1999). Hence, mutual forbearance can be expected between firms that identify each other as competitors, while competition between asymmetric competitors would be more intense because competitors are cautious about their competitive moves against their mutual competitors and are aggressive towards their asymmetric competitors. This approach is different from previous studies on mutual forbearance, as prior studies focus on multimarket contact as an antecedent of mutual forbearance whereas this approach suggests that mutual forbearance can be a product of competitor identification.

CONCLUSION

Determining with whom to compete is a critical decision that firms have to carefully consider when formulating their strategies. To avoid costly trial and errors in engaging competitive interactions, firms can rely on vicarious learning, benchmarking others to acquire relevant information for identifying competitors in the industry. The results of this study demonstrate the effect of vicarious learning on competitor identification. Especially, this study distinguished between symmetric and asymmetric competitive relations and showed how these relations can be explained by different modes of vicarious learning. Furthermore, the current study highlighted the existence of multiple modes of vicarious learning by adding relation-based and media attention-based vicarious learning to the existing trait, outcome and frequency-based learning modes. This research represents the first attempt to simultaneously investigate symmetric and asymmetric competitive relations and provides the first systematic empirical evidence that competitor identification depends on other firms' competitive experience. Future research needs to study the outcomes of competitor identification based on vicarious learning. However, It is hoped that the results will open new paths of inquiry and inform future research on competitor identification.

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