Coalignment of Strategy and Resources in the U.S. Motor Carrier Industry

Introduction

Why do some companies succeed and others fail in the motor carrier industry? This major question has generated plenty of research across various fields of management and has yielded tremendous insights into the complex dynamics of organizations. For example, practitioners use the concept of business models to convey the configurations of strategies, resources and capabilities, and other factors that influence the performance of organizations.

The objective of this paper is to understand how companies in the motor carrier industry achieve competitive advantage. Specifically, we examine how competitive strategy and resources in trucking firms relate to one another and to company performance. Data were collected from top executives of 332 motor carriers in the U. S. Using competitive strategies of differentiation (innovation and customer responsiveness) and low cost and resources of logistics and management & human resources in the trucking industry, we developed ten combinations that used varied strategies and resources to accomplish firm performance. A rigorous examination of the relationships of competitive strategies and resources with firm performance is not only likely to help us in a better theoretical understanding of these relationships. It also is expected to provide executives with insights on which strategies and resources are likely to lead to gaining and sustaining competitive advantage for their organizations.

The paper unfolds as follows. First, we present a model of strategies and resources that will be used as an illustration for examination in

this study. Then, we present the context of the study and the methods used to collect data for analysis. Next, an application of the set-theoretic approach to the configurations of strategies and resources with respect to various dimensions of performance yielded interesting results, which we discuss before concluding the paper.

Configurations of Strategies and Resources

In this study, we examine the configurations of competitive strategies and resources and the relationship to trucking firm's performance. Figure 1 provides an overview of the conceptual framework of the study. Major schools of thought have merged that explain the reason why some organizations are more successful than others. For example, Michael Porter (1980, 1985) proposed that firms with clear competitive positioning strategies (e.g., low cost, differentiation) are likely to achieve high performance as compared to their rivals in the market place. Empirical studies in strategic management have found support for these relationships. In contrast to the external orientation of positioning strategies, another major stream of research, the resource-based view (RBV) (Barney, 1991) has contended that bundles of resources and capabilities (e.g., human resource management, logistics) are likely to help firms gain and sustain competitive advantage. For example, Some (Valle, Martin, Romero, & Dolan, 2000) examined the effectiveness of various human resource management practices. Logistics resources are also valuable in terms of cutting costs, fostering innovation and integrating different business processes more efficiently (Elmuti, 2002).

Combining external assessment with internal assessment, the Harvard Business School's design perspective (e.g., Andrews, 1971) has maintained that matching opportunities and threats with firm's strengths and weaknesses can lead to superior firm performance. Taking if further, a few scholars follow a configurational approach in strategic management (Miles & Snow, 1978). A configurational approach goes beyond a limited number of contingent factors, and proposes relationships of multiple dimensions in a holistic manner giving rise to gestalts or archetypes. Empirical research on

configurational approaches has also found support for the proposed relationships (Doty, Glick, & Huber, 1993).

Our major point is that the fit between strategy and resources will be related to firm performance in a variety of conditions. In this study, we consider five dimensions of firm performance: efficiency, flexibility, quality, timeliness, and resource acquisition.

Strategies and Resources in the Motor Carrier Industry

Managers in the trucking industry have different beliefs of what constitutes essential elements of firms' major competitive advantages. Some believe that in order to meet customer needs, firms are focused on providing innovative and customized services to their customers. They establish extensive distribution network and apply advanced techniques (e.g., Benchmarking, EDI, TQM, Re-engineering, satellite tracking systems, etc.) to monitor their products/services. They may also be focused on establishing brand name, advertising services, building relationships with customers, and improving customer satisfaction. Therefore, the key to success is the application of innovation and customer responsiveness strategies by exploiting and developing firm resources and capabilities.

By contrast, some firms think that the trucking industry is cost-driven with high pricing pressures (Belzer, 2002; Stank & Stephenson, 1995). Costs include recruiting their own drivers or contracts with owner-operators, transporting shipments between terminals, and sorting freight. The costs are high due to dramatic increases in fuel prices, taxes, and insurance rates (Stank & Stephenson, 1995). Typically, expenses related to the operation of equipment and transportations are major costs for trucking firms. For example, fuel expenditures account for 20 percent to 25 percent of total operating costs. Therefore, these firms believe it important to lower operating ratios by taking tight control over costs. Such firms will take a low cost strategy and price their services in a competitive manner. For example, Schneider National (long distance trucking) responded to deregulation with a low cost strategy by obtaining substantial

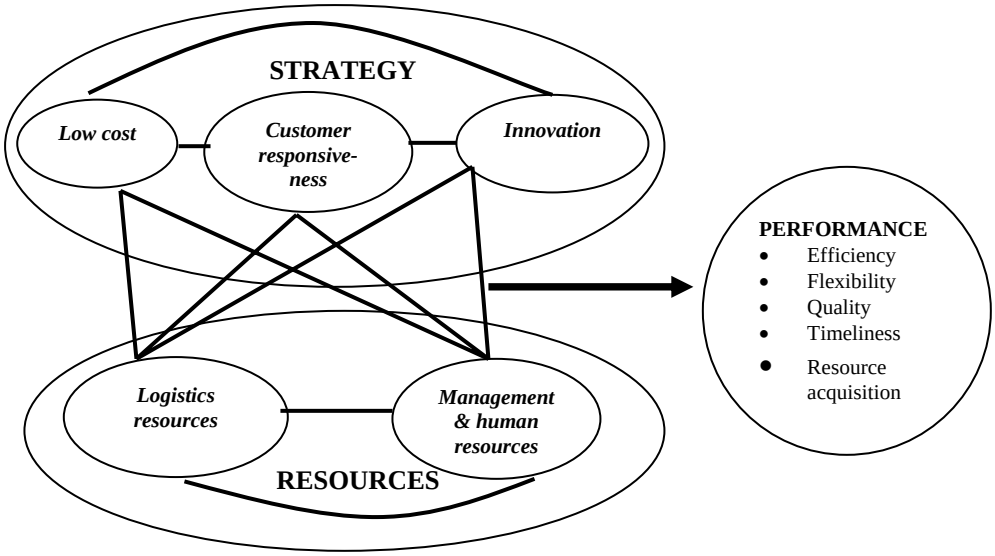
operating efficiencies based on heavy investment in logistics and communication infrastructure.

Smith, Corsi, and Grimm (1990) identified four strategic groups among less-than-truckload freight carriers after deregulation and found strategies were a major determinant of financial performance. Differentiation strategy was positively associated with the highest performance. Sum and Teo (1999) found four strategic types of logistics providers: pure low cost, pure differentiation, hybrid, and no strategy. They found almost half of the respondents used pure differentiation, and pure cost leaders and hybrids each accounted for 25.5% of all respondents. Hybrids performed the best along all dimensions of firm performance (e.g., growth in ROA, ROS, market share, etc).

Although previous research on competitive strategies in the trucking industry had its merits, it is not clear about the coalignment between resources and strategies. As argued in previous sections, competitive strategies are not the sole element that determines success of the firm. The fit between strategies and resources might be the key to success. By examining the motor carrier industry in the U.S., this study is aimed at exploring the match between competitive strategies and resources and its associated impact on firm performance, which distinguishes this research from works of other people.

Specifically, in this paper, we use three strategies and two resources and examine how they contribute to five types of firm performance in the motor carrier industry (Figure 1). Even with this limited number of variables the complexity of the relationships is significant and the concept of equifinality suggests that companies will use combinations of the variables directly and/or indirectly to accomplish the same end. Organizations may have a high, moderate or low emphasis on any of the five factors considered here, thereby leading to numerous combinations. Our objective is to examine empirically the relationships of these and other combinations of strategies and resources with performance in the U.S. trucking industry using a set-theoretic approach.

Figure 1: A model of business strategies, resources and firm performance



Research Design

In the study, we chose a random sample of 1100 U.S. trucking firms that reported information to the Interstate Commerce Commission (ICC) and were included in the 1995 *TTS Blue Book of Trucking Companies*. The criterion for inclusion was that the firm had at least 30 employees or US$5 million dollars in gross revenues. Out of the 1100 firms, we were unable to contact 31 firms that may have gone out of business; therefore, the final number of potential respondents was 1069.

To develop the questionnaire, first, potential questions and issues were raised based on an extensive literature review on strategic

management and the trucking industry. Next, drafts were pre-tested among representatives and experts in the field of trucking. Then, following initial mail and telephone contacts, a 21-page questionnaire was mailed to the CEO of each company in the final sample. Several follow-up contacts were made with each potential respondent. Data obtained through the questionnaires covered strategies, resources, performance and safety issues, information about the structural characteristics of the company (e.g., size, fleet, etc.), among others.

A total of 332 companies returned completed questionnaires, yielding a response rate of 31%. These 332 responses form the major database for the study. The completed questionnaire included responses from top executives (CEO, President, Chairman, Owner of the company, Vice President, Executive Vice president, Corporate officers, etc.) in the U.S. motor carrier industry. Among them, 67% were truckload firms, 16% were less-than-truckload firms, and the rest were special commodity carriers. Most executives responding to this study were males, about 49 years old. On average, they have over 25 years experience with about half of that in their present position. About 15% of the respondents have been owner operators. These top executives are likely to own about 30% of the company. Over half of the executives have at least a college (bachelor's) degree. They have exposure to several areas but Management was the most frequently mentioned area of expertise. While over two-thirds of the executives make $200,000 or less per year, 20% of LTL executives earn more than half a million dollars.

Survey of the top executives reflects top managers' perception of the firm's strategies, resources and performance. These cognitions reflect their mental models and the elements to construct competitive space. Objective data cannot offer the same insights based on cognitions. Therefore, we chose self-typing measures based on the survey of top executives in the industry. The executives were asked to rate each measure separately indicating the extent to which resources contribute to firm success, or the frequency of use of specific competitive strategies.

Operationalization of Variables

Performance. Performance in the study is measured in terms of timeliness (on-time deliveries, on-time pick-ups, and consistent transit times), flexibility (ease with which drivers can locate pick-up and delivery sites, adherence to special shipping instructions, and company's willingness to accommodate special customers' needs), quality (traffic safety rules compliance, accident rates, "logging" compliance, equipment breakdowns, and loss/damage history) and efficiency (miles driver per driver, fuel consumption, and cost of producing your organization's services). Additionally, resource acquisition for regulation operations and growth is also included as measure of performance.

Business strategies. We studied three major types of strategies: (1) Low-cost strategy (e.g., offer competitive prices, be the lowest cost provider, strive for high volume, etc.); (2) differentiation strategy by innovation (e.g., offer innovative services, offer services with distinctly different features from those of competing services, etc.); and (3) differentiation strategy by customer responsiveness (e.g., match varied customer needs, improve customer satisfaction, etc.)

Resources. Two types of resources that are given critical importance in the trucking industry are considered in this study: First, logistics resources (LOGIS) in the trucking industry is composed of dispatch (city and road), activities of order processing, and operations management. Second, management and human resources (MGHR) refer to organizational structure, management, inter-departmental relationships, drivers and employee training. Both these measures take into consideration the logistics or human resources as well their management, consistent with Barney's (1991) conceptualization of VRIO analysis (valuable, rare, inimitable resources and organization).

The multiple items related to firm performance were rated on a seven-point Likert scale with values ranging from 1 to 7 (1=significantly worse; 4=neither worse nor better; 7=significantly better), whereas strategies and resources were rated on a five-point Likert scale. We

use the principal component factor analysis with varimax rotation and oblimin rotation to explore multi-dimensions of competitive priorities (to counteract the possible effect that these dimensions may be not orthogonal but mutually supportive of each other). First, a factor weight of 0.50 was used as the minimum cutoff. Second, if an item loaded on more than one factor, with difference between weights less than 0.1 across factors, the item was deleted from the final scale. Third, the internal consistency was evaluated using Cronbach's alpha coefficients. Generally, the limit of acceptability is around 0.70 (Nunnally, 1978). Overall, the Cronbach's alpha coefficients are above the 0.70 level, except efficiency with 0.50.

Set-theoretic Approach

In this study, we use set-theoretic approach to examine configurations of business strategies and resources. In set-theoretic approach, set membership is a critical concept as it reflects relationships among different variables (Fiss, forthcoming; Ragin, 2000). Set-theoretic approach emphasizes the concept of set membership that reflects the relationships among different variables. It represents a synthesis of qualitative and quantitative methods and is designed to study complex combinations and configurations of constructs that are difficult to examine as multi-way interactions in traditional statistical methods.

A set-theoretic approach admits the notion of equifinality (Ragin, 2000), which indicates alternative ways to achieve the same final state. Further, it emphasizes the notion of configurations and causal complexity (Ragin, 2000), which is hard to be examined by traditional methods. Therefore, a set-theoretic approach (Ragin, 2000) distinguishes itself from those traditional methods by emphasizing holisticity, causal complexity, nonlinearity, and asymmetry. It is useful not only to explain how different combinations of causal factors lead to the same outcome but also to assess the contribution of each path to the outcome in question, which will be explained in the following chapters.

Results

Application of the set-theoretic approach to our illustration yielded exciting results, which we discuss in this section.

Ten Combinations and Their Comparisons

We used five factors in these analyses: (a) low cost strategy; (b) innovation strategy; (c) customer responsiveness strategy; (d) logistics resources; and (e) management & human resources. Further, we used five dimensions of outcome (firm performance)—efficiency, flexibility, quality, timeliness, and resource acquisition. Table 1 reveals the results of various combinations of strategies and resources. It also provides the names of the combinations as well as their composition.

TABLE 1 Ten combinations & their composition

Combo#	Composition of the Combo [1]
Combo1	innov*custo*COST*logis
Combo2	innov*custo*COST*mghr
Combo3	innov*custom*COST
Combo4	INNOV*CUSTO*cost*MGHR
Combo5	INNOV*CUSTO*MGHR
Combo6	INNOV*CUSTO*MGHR*LOGIS
Combo7	INNOV*CUSTO*COST*LOGIS
Combo8	INNOV*CUSTO*COST*MGHR
Combo9	INNOV*COST*MGHR*LOGIS
Combo10	Innov*custo*mghr*logis

[1] *Factors written in capital letters in this column show their presence in the combo. Factors written in small letters in this column show their absence in the combo.*

With each of the five outcome dimensions, the analysis provided a set of combinations that met an *overall* consistency (technically called solution consistency) of .85 or above. An overall consistency of .85 or more represents a significant solution (Ragin, 2000, forthcoming, a). Four of the five solutions had overall consistency levels in .90s,

whereas one solution (efficiency) had an overall consistency of .86. It provides support for the overall significance for each of the five solutions (one for each performance dimension). Each solution included several combinations of strategies and resources. For example, there were five combinations for efficiency, and four combinations for each of the two dimensions of flexibility and quality. We found six combinations for timeliness and three combinations for resource acquisition. Hence, there were a total of 22 significant combinations of five factors of strategies and resources with five dimensions of firm performance. Since some of the combinations were common across the five dimensions of firm performance (e.g., Combo5 for flexibility, quality, and timeliness), overall we found ten significant combinations of strategies and resources in our sample of firms.

In addition to an overall consistency score, an overall coverage (technically called solution coverage) is also provided. (It may be viewed as R^2 in regression analysis). Overall coverage for the five solutions ranged from .63 to .69.

We now turn to interpreting unique consistency and coverage for each of the ten combinations. These values may be thought of as representing relative significance of the combinations. Our analysis revealed that the 22 combinations of strategies and resources found with respect to five dimensions of performance were not equivalent. Each combination had its unique level of consistency. Over 80% (18 out of 22) combinations had their unique consistencies in .90s, whereas four combinations had their unique consistency scores in .80s. In addition, unique coverage of the combinations ranged from .02 to .12. Combination 5 representing a differentiation strategy (innovation and customer responsiveness) with management & human resources appears to be the most potent combination. It seems to be strongly associated with higher levels of flexibility, quality and timeliness. Three other combinations (4, 6 and 8) reveal their significance. Combination 4 represents combination 5 sans low cost strategy (i.e., higher emphasis on innovation and customer responsiveness and management & human resources and low to no

emphasis on low cost strategy). Likewise, combination 6 reflects combination 5 plus logistics resources (i.e., presence of innovation and customer responsiveness, with management &human resources and logistics resources). Interestingly, Combination 8 reveals combination 5 plus low cost strategy (i.e., presence of innovation, customer responsiveness, and low cost strategy with management & human resources).

It may be noted the some firms may use two or more combinations of strategies and resources. For example, a firm could be categorized in all four combinations mentioned above (combinations 4, 5, 6, and 8). Therefore, the sum of the total number of firms in the combinations is higher than the total number of firms in the sample. Therefore, the next step is to examine overlap of combinations to generate a set of configurations used by the firms in the sample.

Twelve Configurations and Their Comparisons

Since a firm could follow more than one combination of the strategies and resources to accomplish the same or different dimensions of firm performance, it is important to understand what combinations are likely to be followed together and in how many firms.

In this study, we found 41 firms followed five combinations. Interestingly, all 41 firms used the same five combinations numbered 5, 6, 7, 8, and 9! Similarly, all 21 firms that used four combinations utilized combinations 1, 2, 3, and 10! Likewise, all 25 firms that used three combinations adopted combinations 4, 5, and 6! There were five patterns of the use of two combinations used by 10 to 21 firms, except one that was used by 3 firms. In addition, each of the four combinations of 3, 7, 9, and 10 were used in isolation by 12, 11, 13, and 25 firms, respectively.

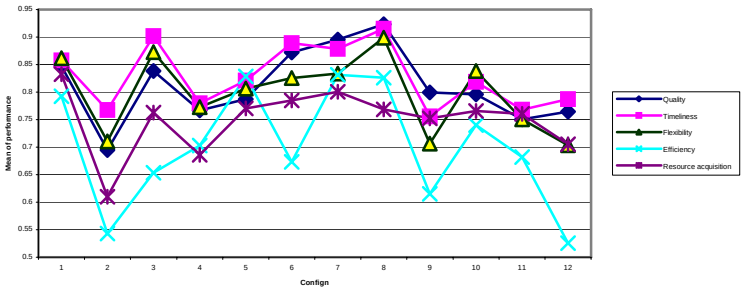
Among the twelve configurations, three involved differentiation strategies, whereas four used low cost strategies. Four configurations involved the used of hybrid strategies (differentiation—innovation and/or customer responsiveness—plus low cost). Very interestingly,

one configuration represented strategy absence (low to no emphasis on strategies on differentiation strategy and the two resources)! With respect to resources, four configurations used strategies with low to no emphasis on the resources. Seven configurations used either management & human resources and/or logistics resource with strategies. One configuration, as mentioned above, revealed the absence of strategies and resources (low to no emphasis on differentiation strategies and two resources of management & human resource and logistics resource).

The next step was to compare the twelve configurations with respect to each of the dimensions of firm performance. We used analysis of variance (ANOVA) for the purpose and found that some configurations were distinct from others. For example, configuration 2 (that involved combos 1, 2, 3, and 10 and can be described as high emphasis on low cost strategy and low to no emphasis on innovation, customer responsiveness, and management & human resources and logistics) was associated with significantly lower outcomes of flexibility and quality. In contrast, configuration 1 (that involved combos 5 to 9 and can be described as a hybrid strategy with differentiation and low cost using management & human resources and/or logistics) was associated with high outcomes on all dimensions of performance.

The comparisons may be easier to grasp using plots of the means of the twelve configurations on each dimension of performance. Figure 2 shows these plots. As is evident from the plots, various measures of performance seem to have a moderately high level of association with one another. Moreover, a few configurations are distinct from one another, whereas others can provide an evidence of equifinality with respect to the outcome measures. For example, using Bonferroni test of comparisons, we found that the following configurations were significantly or marginally significantly different with respect to various dimensions of firm performance:

FIGURE 2 Means plot (configurations and performance)



For efficiency, configurations 1 and 2, 1 and 12, and 7 and 12 were significantly different; configurations 2 and 7 and 5 and 12 were marginally significant; and no other configurations were different from one another. For flexibility, in addition to 1 and 2, and 1 and 12, other configurations that had significantly different means were 1 and 9, 2 and 3, 3 and 9, and 3 and 12. For quality, in addition to 1 and 2, configurations 1 and 3, 2 and 6, and 2 and 7 had significantly different mean values. For timeliness, no configurations had significantly different means; differences between configurations 2 and 3 were marginally significant. Finally, for resource acquisition, only one comparison revealed significant different mean values, and it was configurations 1 and 2.

Overall, out of numerous possible contrasts, only 14 comparisons had significant mean differences. Three of the contrasts had marginally significant mean differences. In other words, only a few comparisons (less than 5 per cent, i.e., 14-17 out of a total of 330 possible comparisons (66*5)) were found to have different values of means on the outcome variables. Therefore, there may be some support for distinctiveness. It appears that there is a stronger support for equifinality of configurations (Results of other contrasts/comparisons are similar to these findings; therefore, they are eliminated here for the sake of parsimony, but are available from the authors).

Conclusions

In this paper, we use a relatively new research methodology, set-theoretic approach, to examine configurations of competitive strategies and resources. We found 12 configurations of strategies and resources that are common in the sample of 332 U.S. trucking firms. Most of these configurations contributed to similar levels of firm performance (e.g., efficiency, flexibility, quality, timeliness, and resource acquisition). Specifically, we found the use of pure low cost strategies and hybrid differentiation and low cost strategies. Therefore, managers need to scan and analyze the opportunities and threats associated with the external environment so that they are able to establish the vision of the firm and formulate appropriate strategies at different levels. Additionally, seven configurations that used either logistics resource or management & human resources or the combination in the trucking industry implied that it is critical for the firm to grow resources and capabilities that are congruent with the strategies of the firm. Considering driver turnover has become a significant concern of most executives in the trucking industry, it is essential for managers to adopt effective human resource management practices for a sustainable growth.

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