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# POST-DEREGULATORY STRATEGIC PERFORMANCE: A STUDY OF THE RAILROAD INDUSTRY

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In striving to maximize firm performance, management must adopt strategies which are in accord with environmental conditions and with their organizations' distinct competencies. This is essential because organizations are dependent on their environments for resources ([1],[16]) and because these organizations have limited competencies ([22],[11]). Studying strategies firms employ and distinguishing high performing strategies from low performing strategies can provide useful insights for strategic managers.

A firm's strategy can be defined as a pattern of behavior with regard to strategic variables such as price, product quality, and degree of innovation [7]. For example, a firm may develop a pattern of behavior of having the lowest prices, the best product quality, or the most innovation. Each of these patterns of behavior would represent a distinct strategy.

The strategic management literature suggests that firms must seek distinct, focused strategies to survive. Researchers have identified a number of different strategies ([2],[7],[11],[13],[14],[15],[17],[24], and others.) For example, Porter [17] has argued that at a broad level, firms can choose between three strategies. Firms may choose an overall low cost position, a differentiation position (e.g., high quality) or a focus position (e.g., a particular market segment). According to these writers, choosing a distinct strategy is essential to obtain an advantage over the competition.

Researchers in strategic management have also used empirical techniques to identify different strategies. Typically, data are gathered on a number of strategic variables, and multivariate classification methods are used to categorize firms into groups based on the strategic variables. The technique most frequently used is cluster analysis, whereby firms most similar to each other are grouped into "clusters," each of which represents a different strategy. The nature of each strategy is determined based on the values of the strategic variables. For example, it can be inferred that a cluster of firms achieving the lowest cost of all clusters is following a "low-cost" strategy.

A number of different strategies have been identified empirically by using cluster analysis. For example, Miller and Friesen [14] first used cluster analysis to identify ten types of strategy from a data base comprised of case studies. These strategies ranged from an entrepreneurial strategy to a quality control strategy. Galbraith and

Schendel [5] used the PIMS data base and cluster analysis to identify ten different competitive strategies. Dess and Davis [3] studied strategic variables in the paint manufacturers industry and found strategies which correspond to Porter's theory: a low cost, a differentiation, and a focus strategy. Finally, Hawes and Crittenden [10] identified four different retailing strategies by studying food retailing strategic variables.

The strategies identified in the above studies are well-defined. Researchers have also identified strategies that are less focused. For instance, Dess and Davis [3] identified a "stuck in the middle" strategy—one without strategic direction. Also, Hawes and Crittenden [10] identified a "submissive defender" strategy, another unfocused one.

Researchers have also linked strategy types with varying levels of performance ([3],[5],[8],[10],[13]). An important finding from this research is that strategic focus tends to correlate with higher performance. For example, Dess and Davis [3] found no difference in performance levels of firms pursuing low cost, focus or differentiation strategies. However, they did find that firms which followed the unfocused "stuck in the middle" strategy performed at significantly lower levels than the other three. Also, Hawes and Crittenden [10] found that the "submissive defender" strategy was associated with poor firm performance.

Though much has been written on different strategies and their relationship to firm performance, few studies have focused on regulated industries and, in particular, on different railroad strategies [6]. A major purpose of regulatory reform in the railroad industry was to improve rail carrier performance. For decades, the railroad industry had been in decline, consistently losing ground to competitive modes. From 1940 to 1975, the rail industry's share of total freight revenues fell from 76 to 38 percent [23].

Much has been written as to the causes of the industry decline. Several writers, including Harris and Grimm [9], have argued that the fundamental problems of the industry are not technological or economic, but organizational. In the most comprehensive study of railroad management, Wyckoff [25] details the lack of organizational flexibility, innovation and adaptiveness that prevailed in most railroads prior to deregulation. He condemns regulation for promoting a false sense of insulation from the firm's environment and a sense of timidity regarding innovation. Mahon and Murray [12] also argue that regulation will in general impede management performance.

The 1980 Staggers Act, along with other legislative and administrative actions, has substantially reduced railroad regulation. In an effort to improve industry performance, regulatory reform has provided rail management with much greater freedom to design and implement specific strategies. As a result of this important environmental change, firms may exercise strategic choice by designing service, pricing and marketing strategies with few or no regulatory constraints.

The purpose of our paper is to identify the different strategies employed by railroads and to investigate the link between these different strategies and organizational performance. Using cluster analysis, the post-Staggers railroad strategies were identified. Objective performance measures such as return on investment were then

obtained for each strategic group to shed light on the relationship between organization strategy and performance.

### Methodology

#### *Assessment of Strategy*

There are a number of methods by which a firm's strategy may be assessed. These methods range from self-typing, where a firm's managers identify the firm's strategy based on what he/she thinks the strategy of the firm is, to more objective methods where published archival data or industry judges are used to assess strategy ([20],[21]). Objective data derived from railroad annual reports, Interstate Commerce Commission records, and the Standard and Poor's Directories were used for the present study. It is well accepted in the strategic management literature that valid inferences regarding strategy can be drawn from such data (see [5],[8],[10],[19]).

A number of researchers have identified the various strategic variables that firms can select to successfully align themselves with their environments ([13],[14],[17],[8]). In his seminal work *Organizations in Action*, Thompson [22] argues that managers neither yield to nor control all organizational and environmental forces. Rather these managers ensure the survival of their organizations by finding strategic variables (variables within the control of management) and manipulating these variables in such a way as to maintain a proper alignment with their environment. Within this context writers such as Miles and Snow [13] and Porter [17] identify a number of important strategy variables that managers can select, including cost position, degree of innovativeness and product/market focus. Specific indicators of strategy which reflect these variables were developed based on the authors' extensive research on railroad mergers, deregulation and structure (see [6],[20]) along with the availability of data from objective sources. The six indicators are as follows:

1. *Commodity Concentration* was calculated from Interstate Commerce Commission data. The total carloads of the five most frequently carried commodities were divided by the total carloads of all commodities. This is a measure of the degree to which the business specializes in transporting a small number of commodities. In the statistical analyses, commodity concentration was labeled *COMCONC*.
2. *Cost* was calculated on a net ton mile basis by dividing the total of all operating costs by the total net ton miles of rail traffic. In performing the statistical analyses, this variable was labeled *COST*.
3. *Innovation* was measured by the number of individual contracts each railroad negotiated with its customers. Since contracting with customers was illegal prior to deregulation, it can be considered as a new and innovative competitive approach for this industry. The number of contracts the railroad had signed as of June 1984 was scaled (divided) by net ton miles of freight carried. In the statistical analyses, this variable was labeled *INNOVATE*.

4. *Organizational Diversity* was operationalized as net income from non-rail activities divided by net ton miles of freight carried. This indicates the extent to which the firm pursues activities other than rail. In the statistical analyses, organizational diversity was labeled *ORGDIVER*.
5. *Average Haul Length* indicates a form of scale economies. Firms carrying out a low cost strategy could be expected to have longer average haul length, where organization and terminations costs are spread over more output. Average haul length was calculated as net ton miles divided by net freight tons. In the statistical analyses, average haul length was labeled *AVGHAUL*.
6. *Abandonment* of railroad track demonstrates an aggressive, profit oriented approach. Miles of track abandoned were scaled by the net ton miles of freight carried. In the statistical analyses, this variable was labeled *ABANDON*.

Cluster analysis was used to identify the different railroad strategies based on the six dimensions described above. Cluster analysis is a quantitative technique which classifies a sample of firms into different groups. In this instance it is argued that each group is reflective of a different strategy. Four different groups corresponding to four strategies were identified.

#### *Performance Measures*

Four performance measures were calculated for the present research. These were:

1. Return On Investment in 1983. This variable was labeled *ROI83*.
2. Return On Equity in 1983. This variable was labeled *ROE83*.
3. Net Ton Miles in 1983. This variable was labeled *NTMSIZE*.
4. Leverage. Leverage can be thought of as the extent to which the organization's assets are financed by debt vs. equity. As a general rule organizations financed by debt are at greater risk than those financed by equity. Consequently, a willingness to increase leverage could be viewed as aggressive, risk-taking behavior. Because more direct measures of leverage were unavailable, a crude measure of the extent of leverage was calculated by dividing *ROE83* by *ROI83*. Generally, a high score would represent high leverage (debt financing). A low score would represent low leverage (equity financing). This variable was labeled *LEVERAGE*.

### **Results and Discussion**

The means and standard deviations of the six dimensions are shown in Table 1. This table also reports results of one-way ANOVA tests, which demonstrate that five of the six strategic dimensions are significantly different between the clusters. Table 2 provides a comparison of cluster performance and size. Reviewing the results for each of the variables and focusing on clusters that received the lowest and highest

scores on each variable provides insight into the characteristics of each of the clusters on each of the variables considered. The following paragraphs elucidate each cluster's ranking on the strategic dimensions and performance. However, it should be noted that performance differences across clusters are not statistically significant, and the overall significance of the results should be tempered accordingly.

Table 1  
Cluster Means

Variable	Cluster 1	Cluster 2	Cluster 3	Cluster 4	F-Ratio
<i>COMCONC</i>	.6821	.6527	.9660	.7187	7.58*
<i>ORGDIVER</i>	.1128	.0834	.5599	.2805	10.32*
<i>ABANDON</i>	.0001	.0006	.0003	.0005	1.42
<i>INNOVATE</i>	.0012	.0052	.0032	.0009	15.18*
<i>COST</i>	2.7476	3.9115	4.8137	3.2309	5.93*
<i>AVGHAUL</i>	6.0930	3.3359	.8234	2.9906	39.15*
<i>N</i>	7	7	3	8	

\* Denotes that differences in means across clusters are significant at the 99% level.

#### Variables Used for Clustering

*COMCONC* - Commodity concentration. The number of carloads of the five most frequently carried commodities, divided by the total carloads of all commodities (Source: ICC Quarterly Commodity Statistics).

*ORGDIVER* - Organizational diversity. Amount of non-rail income earned per net ton mile of freight carried (Source: 10-K Reports).

*ABANDON* - Number of miles of track abandoned per net ton mile of freight carried. Indicates aggressive, innovative behavior (Source: ICC Abandonment Records).

*INNOVATE* - Innovation. Number of contracts signed as of June 1984, divided by net ton miles of freight carried (Source: ICC Rail Contract Advisory Service).

*COST* - Total of all costs, divided by net ton miles of freight carried (Source: Railroad Annual Report Data).

*AVGHAUL* - Average haul length (Source: Railroad Annual Report Data).

Cluster 1 is the lowest on *COST* and highest on *AVGHAUL*. As expected, long hauls and low costs go together. The costs of loading and unloading cars and coupling trains are spread over many miles in long haul run. Firms in cluster 1 appear to be following a "low-cost" strategy and are labeled "Cost-leaders." Firms in this cluster appear to be exploiting economies of scale, as indicated by their large output (*NTMSIZE*). In terms of performance, this cluster had the second highest *ROI83*.

However, because of a conservative capital structure (lowest *LEVERAGE*), *ROE83* was a distant third.

**Table 2**  
**Comparison of Cluster Performance and Size**

Variable	Cluster 1	Cluster 2	Cluster 3	Cluster 4	F-Value	Prob
<i>ROI83</i>	1.9857	2.8500	-1.9333	1.6778	.7560	.5312
<i>ROE83</i>	2.8429	8.5833	-19.3000	7.5222	2.1157	.1287
<i>LEVERAGE</i>	2.2103	4.1643	4.6874	5.2943	3.9630	.0220
<i>NTMSIZE</i>	639.4097	100.0460	12.6077	357.1339	.4906	.6930

Cluster 2 scored highest on *ABANDON* and *INNOVATE*. Firms in this cluster appear to be aggressive, abandoning track which is unproductive. They have been quick to take advantage of legalization of contracting. Because they scored highest on the innovation dimension, firms in this cluster have been labeled "innovators." As mentioned previously, Miles and Snow have argued that an innovative strategy is appropriate in turbulent environments. Since the transition to deregulation is a dramatic environmental change for railroad firms, it was expected that firms scoring high on innovation should have high performance scores as well. The results confirm this expectation, with the Innovators scoring highest on both *ROI83* and *ROE83*.

In addition, cluster 2 was lowest in *COMCONC* and *ORGDIVER*. These firms earn relatively little income from non-rail operations, and are not concentrating in transporting any one commodity. The low *ORGDIVER* could indicate the management team is a group of highly committed rail specialists, rather than having broader experience and investments.

Firms in cluster 3 are the smallest in the industry and have the shortest average haul length. Their net ton miles of freight were only about 2% of the net ton miles by firms in the lowest cluster and about 8% of the net ton miles by the Innovators. They are very specialized, as nearly 97% of their business is in only five commodities. Probably as a result of their small size and short haul length, they have the highest costs per net ton mile and the poorest *ROI83* and *ROE83* in the industry.

In addition, firms in cluster 3 are quite diversified. These firms are rail divisions of parent companies, and their high cost positions suggest they are "neglected." However, losses in the rail division could be used to offset profits from other divisions such as land and mineral holdings and reduce tax burdens on these profits. Considering this tax savings, these firms may not be in as much financial trouble as would be indicated by examining only their profits from rail operations.

Firms in cluster 4 score in the middle on most variables and seem to be the slowest to adopt the new marketing technique of contracting. They appear to fit the pattern described by Porter as "Stuck in the Middle" and by Hawes and Crittenden [10] as "conservative reactors." However, performance is relatively high for these firms, indicating that a "poised in the middle" strategy may be appropriate in the turbulent aftermath of deregulation. When the environment settles down these firms

may be able to quickly move in any direction which proves profitable. An alternative explanation is that these firms are performing well because they are not incurring the costs and stresses of a more distinct strategy. It could be predicted that in the long run performance will suffer for these "in the middle" firms if they do not become more specialized.

**Table 3**  
**Summary of Cluster and Performance**

Variable	Cluster 1	Cluster 2	Cluster 3	Cluster 4
	"Cost-leaders"	"Innovators"	"Cash Cows"	"Poised in the Middle"
<i>COMCONC</i>	Medium	Low	High	Medium
<i>ORGDIVER</i>	Low-Medium	Low	High	Medium
<i>ABANDON</i>	Low	High	Medium	Medium
<i>INNOVATE</i>	Low-Medium	High	Medium	Low
<i>COST</i>	Low	Medium	High	Medium
<i>ROI83</i>		High	Low	
<i>ROE83</i>		High	Low	
<i>LEVERAGE</i>	Low			High
<i>NTMSIZE</i>	High		Low	

#### Cluster Interpretation

**Cluster 1** – Long haul, low cost, moderate profit.

**Cluster 2** – Aggressive, innovative, high profit.

**Cluster 3** – Costs out of control. Unprofitable rail operations. Profitable non-rail activities.

**Cluster 4** – Contingent, low innovation. Moderate profits.

Firms, then, appear to be grouped into clusters based on discernible strategies. However, an issue worth addressing is whether the regional markets served by a railroad force it into a particular cluster. To test this hypothesis, the primary region served by each railroad was identified, based on previous work by Harris and Grimm [9]. These authors classified all major U.S. railroads into one of four regions: Northeast, Southeast, Northwest and Southwest. The results of this analysis were that railroads of a particular region did not tend to cluster together. Each of the four clusters contained railroads from at least three of the four clusters and no particular region represented more than one-half of the railroads in any cluster.

#### Conclusion

This paper uses objective data to examine the relationship between strategy and performance in the railroad industry. Although the performance differences are not

statistically significant the results do indicate important variations in performance associated with the different strategies. Overall, the results indicate that management strategies will likely be important determinants of firm profitability in newly deregulated industries. If they are not already so doing, firms should ensure that adequate attention is now being paid to all aspects of strategic management.

Future researchers could extend this work in many directions. In particular, similar research should also be undertaken in other deregulated industries. In particular, the motor carrier and banking industries offer the potential for a substantially larger sample size and a rich array of strategic dimensions.

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