Developments In Business Simulation & Experiential Learning, Volume 24, 1997

TILE IMPACT OF AN ARTIFICIAL MARKET LEADER ON SIMULATION COMPETITORS' STRATEGIES

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ABSTRACT

This study continues a recent stream of research pursuing the concept of simulation participation validity predicated on the extent to which participants respond to a simulation environment, which is manipulated in meaningful ways. The present study investigates the impact of an artificial market-leading competitor on other competitors' strategies. The investigation is carried out in an experimental setting in which the responsiveness of the market to different strategy variables is also controlled. The findings provide substantial support that simulation players are sensitive to the presence of an artificial industry-leading competitor and, correspondingly, to the environment created by the simulation administrator.

PAST RESEARCH

This study continues a recent stream of research pursuing a new concept of simulation participation validity predicated on the extent to which participants respond to a simulation environment, which is manipulated in meaningful ways. Here a researcher-created company was among the competing teams in several test industries. This "artificial leader" company was in a position to exploit both awareness of the true responsiveness of the simulation game markets and the concurrent knowledge of competitors' strategies. In this fashion, the artificial Leader Company was manipulated so as to maintain a market leadership position in terms of earnings per share, the measure used to identify industry leadership. Thus, it was generally theorized that if simulation participation is a valid learning experience, the simulation participants (1) should adapt to the differential responsiveness of markets to specific strategy variables, and (2) should learn from a market leading competitor whose strategy is specifically manipulated to reflect market responsiveness.

While no past research has used an artificial industry leader to examine participant responsiveness to the simulation environment, several studies have examined participant response to manipulated game parameters (Faria and Dickinson 1990; Faria, Whiteley and Dickinson 1990; Whiteley, Faria and Dickinson 1990). In these studies, the simulation game parameters were manipulated in a fashion that created meaningfully different marketplace environments.

In each of the three studies, simulation participants were randomly assigned to "push" responsive or "pull" responsive marketplaces. Push and pull strategies are well known and discussed in all basic marketing texts (e.g., Lamb, Hair and McDaniel 1996; Semenik and Bamossy 1996). The focus of a pull strategy is consumer demand stimulation while the focus of a push strategy is the enlistment of channel co-operation to achieve distribution and marketplace sales. Games participants' decisions were monitored to determine if they moved in the direction that would be suggested by the responsiveness to the marketplace environment in which they were operating.

The results reported in these studies suggested that the participants' decisions only moderately reflected the importance weightings of the game parameters, which were manipulated to create the push and pull environments. As such, it was concluded that some other variables may be influencing the actions of the game participants. One such possibility is the action of competitor companies.

While no previous research has examined the effects of an artificially created industry leader, at least one study has utilized a simulation administrator created company (Dickinson and Faria 1994). In this study, an artificial competitor was created using a randomly generated set of decisions. The decisions of the artificial company were controlled to be within the upper and lower limits of the "real" competitor companies in each industry. The purpose of the study was to determine if the real competitors, developing strategies based on what they learned during their simulation game experience, could defeat an artificial competitor that was utilizing a "randomly" generated strategy. Overwhelmingly, the real companies outperformed the random decision strategy.

STUDY DESIGN

For the present study, four experimental conditions were defined comprising combinations of "push" and "pull" strategy responsive markets and industries with and without an artificial market leading company. While a market leading company would be expected to evolve during the play of any simulation game, this would normally take some time and market leadership may be less discernable due to minor and/or varying degrees of leadership as well as turnover in the leadership position. In this experiment, it was assured that a single company would assume and maintain a clear leadership position.

The simulation game used for this experiment was The Marketing Management Simulation (Faria and Dickinson 1995). The Marketing Management Simulation has been specifically designed for the principles of marketing course and lends itself to the creation of two meaningfully different marketing environments. Push and pull strategies are well known within the field of marketing and are taught in all principles of marketing courses.

Twelve simulation industries made up of four teams each were formed. Four treatment groups composed of three industries each were organized in a 2 x 2 experimental design as follows: 1) artificial leader industry - push responsive, 2) nonartificial leader industry -push responsive, 3) artificial leader industry -pull responsive, and 4) nonartificial leader industry - pull responsive. Artificial leader industries were composed of three actual student teams and an instructor operated "artificial leader" whose decisions would be based on knowledge of the environment created and of the decisions of all teams in the industry. The artificial leader team would, therefore, have advantages allowing it to lead the industry by making decisions which were correctly "tuned" to the industry environment.

To ensure that all of the student teams would be able to learn about the environment in which they were operating, all teams were provided a complete set of market research reports at the end of each period of competition. This would insure that all of the student teams would have the same information available and the same opportunity to learn about their environment.

Management decisions in The Marketing Management Simulation are made in four product-market segments (two products by two geographic markets). The decision areas for each product-market include price, quantity of

product to be shipped, advertising level, advertising media, advertising message, sales promotion spending, and type of sales promotion program. Geographic market decisions include co-operative advertising allowances and sales force size. Sales force salaries and commissions apply to both geographic territories while research and development decisions are specific to each of the products.

The environment of The Marketing Management Simulation can be adjusted in terms of the relative impact of decisions in each of the above mentioned areas using a weighting of 1 to 10. A weighting of 1 minimizes the relative impact of a specific variable while a weighting of 10 maximizes the impact of that variable.

As is commonly described in all basic marketing textbooks, the push variables were identified as those whose most direct impact are on trade channel members. These were initialized as 10's to create the push environment. The pull variables (initialized as 10's for the pull environment) are those whose most direct impact is felt by the final consumer. In each environment, the opposite variables were given a weighting of 1. Demand levels for all industries were initialized at the same level.

As opposed to the competitive environment, the impact of the structural environment is not as clearly identifiable to the student teams. Reasonably, the industry leader is the best decision-maker with regard to the environment in which the teams are competing. This would suggest that the industry leader is making decisions most in tune with the industry environment and vis-a-vis competitors. Therefore, the leader represents a barometer against which competitor teams can measure themselves and come to understand the industry environment.

The "artificial" leaders would have an advantage due to perfect knowledge of the industry environment. While nonartificial leader industries would have leaders too, these leaders must learn from experience as they explore the industry environment. The artificial leaders would not have to endure a discovery period and would lead from the start and continuously throughout the competition. In nonartificial leader industries the lead could change a number of times as teams experiment with different strategies while artificial leader teams would always have the best strategy. Of course, the competitors of the artificial leaders would be exposed to the optimal strategies through the market research studies provided to them and, reasonably, could imitate the artificial leaders.

HYPOTHESES

In a simulation competition, the student teams are competing for industry leadership and are rewarded (graded) based on their performance. The student teams, therefore, are constantly searching for a marketing strategy that will work. As part of the environment in which each team is operating are a number of competitors. A well performing competitor, the industry leader, has presumably developed a marketplace strategy that is working. It is reasonable to believe that other companies, in their attempt to develop a successful strategy, will monitor and copy the industry leader. As complete market research information was supplied to each company in every period of the competition, this was easy to do in the present study.

Based on the limited past research and what might be intuitively logical to expect, the following hypotheses were formulated.

H1: Companies in pull environment industries will allocate greater resources to pull variables in artificial leader industries than will companies in nonartificial leader industries.

H2: Companies in pull environment industries will allocate fewer resources to push variables in artificial leafier industries than will companies in nonartificial leader industries.

H3: Companies in push environment industries will allocate greater resources to push variables in artificial leader industries than will companies in nonartificial leader industries.

H4: Companies in push environment industries will allocate fewer resources to pull variables in artificial leafier industries than will companies in nonartificial leader industries.

H5: Companies in push environment industries will allocate greater resources to push variables and fewer resources to pull variables than companies in pull environment industries in the presence of artificial leaders.

H6: Companies in push environment industries will allocate greater resources to push variables and fewer resources to pull variables than companies in pull environment industries in non-artificial leader industries.

Allocation of resources to push and pull variables will be examined by product and region. The pull variables include broadcast and print advertising as well as research and development expenditures. The push variables include trade advertising, co-operative advertising and sales force size, sales force salary and commission percentages. The variable trade promotion was excluded from the analysis because it possessed both push and pull category choices and as such, the decisions with respect to this variable could not be meaningfully analyzed in terms of push and pull decision making. It has been hypothesized that teams in artificial leader industries will better assimilate the nature of the simulation environment since they have a leader that is "tuned in" to the environment of the simulation from the start.

METHODOLOGY

Data were gathered for a total of 42 companies made up of 153 students in an introductory marketing course required of all business students. Students were in two sections of the single introductory course taught by a single instructor. Generally, three or four students formed each company on a self-selection basis. Four student companies were assigned to each nonartificial leader industry. For artificial leader industries, the single experimenter-manipulated Leader Company plus three student companies comprised each industry. Sample sizes, i.e., numbers of companies, for each experimental treatment group are as follows: pull, artificial leader 9; pull, nonartificial leader 12; push, artificial leader 9; push, nonartificial leader 12.

In order to test these hypotheses, the decision-making data gathered had to be transformed in order to make scale free comparisons between the various decision-making variables. In addition, it was noted that respondents set the same level of cooperative advertising expenditures for both of their regions thus making the two variables "linearly dependent" for analysis. Therefore, for the purposes of analysis, they were added together and combined into a single variable, called cooperative advertising, prior to transformation. The data were standardized and transformed into T-scores (mean of 50 and standard deviation of 10) as suggested by Glass and Hopkins (1984).

All of the hypotheses Hi through H6 were tested using SPSS MANOVA analysis to compare the overall decision making patterns with respect to the push variables (trade advertising, co-operative advertising, sales force size, sales force salary, and sales force commissions) and pull variables (broadcast advertising, print advertising, and research and development). In addition, the means of individual variables were tested by looking at the univariate F-test results are produced by the MANOVA program.

Hypotheses Hi through H4 call for comparisons of criteria between artificial leader and nonartificial leader industry companies in the pull simulation environment and, separately, comparisons between artificial leader and nonartificial leader industry companies in the push environment. Hypotheses H5 and H6 call for comparisons between push and pull industry companies in the artificial leader environments and non-artificial leader environments.

FINDINGS

Sample sizes, i.e., numbers of companies, in each experimental treatment group are typical if not larger than typical for simulation studies of this sort. However, sample sizes for purposes of achieving substantial power in statistical tests are small. Therefore, the findings must be viewed with some caution. Significance levels of MANOVA and F-tests are nevertheless reported in Tables 1 and 2.
Otherwise, results of this study are interpreted on the more descriptive basis of whether or not differences in company strategy decisions are in directions consistent or inconsistent with the hypotheses.

A total of 8 overall relationships were analyzed, and 76 (4x10 pull and 4x9 push) individual comparisons of variables between ringer and nonringer industries in each of pull and push simulation environments were analyzed. These are reported on Tables 1 and 2 which also includes the means and percentages for each experimental treatment combination, broken down variously by product model (Standard 100 and Deluxe 200) and geographic territory (Territory 1 and Territory 2) as appropriate. The findings support the acceptance of Hypotheses 1,3 and 5 and the rejection of Hypothesis 2, 4 and 6.

For H1, the pull environment comparison of artificial leaders versus non-artificial leaders on pull variables the MANOVA results indicate a significant difference in overall decision making strategy. Examination of the individual pull comparison variables indicated that 3 of the ten analyzed were significantly different (standard print advertising in both regions and deluxe print advertising in region 1) and all three values were in the hypothesized direction. As such, H1 was accepted.

For H2, the pull environment comparison of artificial leaders versus non-artificial leaders on push variables the MANOVA results indicated no significant difference in overall decision making strategy. In addition, none of the nine individual variables were significantly different as well. Therefore, H2 was rejected.

For H3, the push environment comparison of artificial leaders versus non-artificial leaders on push variables the MANOVA results indicate a significant difference in overall decision making strategy. Examination of the individual pull comparison variables indicated that 7 of the nine analyzed were significantly different (all four trade advertising, cooperative advertising and salesforce salary and salesforce commission) and all seven values were in the hypothesized direction. As such, H3 was accepted.

For H4, the push environment comparison of artificial leaders versus non-artificial leaders on pull variables the MANOVA results indicated no significant difference in overall decision making strategy. In addition, none of the nine individual variables were significantly different as well. Therefore, H4 was rejected.

For H5, the overall comparison of push and pull environments with artificial leaders, separate MANOVA results of the push and pull variables were both significant. In addition for the pull variables, eight of the ten analyzed were significantly different (all broadcast and print advertising) and for the nine push variables, three of the nine analyzed were significantly different (deluxe trade advertising in territory 2, salesforce salary and salesforce commissions). All of the variables were different in the hypothesized directions. As such, H5 was accepted.

Finally, for H6, the overall comparison of push and pull environments without artificial leaders, separate MANOVA results of the push and pull variables indicated no significant differences between these groups. However, an analysis of the individual pull variables indicated four of the ten analyzed were significantly different (standard and deluxe broadcast in region 2 and standard and deluxe print advertising in region 2) and the values were in the correct directions. With respect to individual push variables, three of the nine analyzed were significantly different (cooperative advertising and salesforce size in both regions). However, these significant variables were not in the hypothesized direction. As such, H6 was rejected.

DISCUSSION AND CONCLUSION

The findings provide both descriptive and material inferential support to the notion that players are sensitive to the presence of an industry-leading competitor. They do, indeed, adjust their strategies to be, in this research design, simultaneously more like a leading competitor and more effective vis-a-vis the market environment. At a broader level, this general finding attests to the validity of the simulation experience. Players do appear to make their decisions on systematic and meaningful bases. However, one interesting "non" result of the research was the general finding that while teams in artificial leader industries appeared to quickly discover what would worked well (Hypotheses i, 3 and 5 -spending on pull variables in pull environments or spending on push variables in push environments) they did not seem to discover what did not work as well (Hypotheses 2, 4, and 6 - spending on push variables in pull environments or spending on pull variables in push environments).

In this study the responsiveness of companies' strategy decisions to the simulation environment is compounded with their responsiveness to the artificial leader company, a company manipulated by the experimenters to be both an industry leader and a leader in strategy directions appropriate for the environment. This was the planned research design. It is, however, a less rigorous test of the responsiveness of companies to the simulation environment per Se, i.e., without the presence of an artificial leader company. Previous research of this more rigorous design has found mixed results (Faria and Dickinson 1990; Faria, Whiteley, and Dickinson i990; Whiteley, Faria, and Dickinson 1990). The largely supportive results of this study, then, encourage the belief that participation in simulations is a meaningful exercise. Adaptation to the simulation environment, however, might be more subtle and difficult to isolate than the small sample sizes of earlier studies have allowed.

(References and Tables available on request.)