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A RESEARCH STUDY ON STRATEGIC DECISIONS IN A BUSINESS SIMULATION

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ABSTRACT

This study's purposes were to explore strategic decision making in a computerized simulation and to generate a model reflecting that process. Multiple regression was utilized to ascertain the influence of eleven independent variables on organizational effectiveness, and factor analysis was performed to determine the relationship among the independent variables. The subjects were college seniors, and the setting was The Executive Game [9]. Organizational effectiveness varied significantly with forecasting accuracy, formal planning, strategic stability and degree to which strategies were price oriented. Factor analysis yielded four significant factors, and one of them included strategic clarity, group cohesion, formal planning and strategic stability.

Introduction and Background

The purpose of this study was to explore the strategic decision making process in a computerized business simulation. Although this process has been covered in the literature with decision making models [e.g., 1, 2, 17, 18], none of these are laboratory research based nor attempt to depict the decision making process specifically in a business simulation. Part of the purpose of the paper is to begin the development of a strategic decision making process model applicable for computerized business simulations.

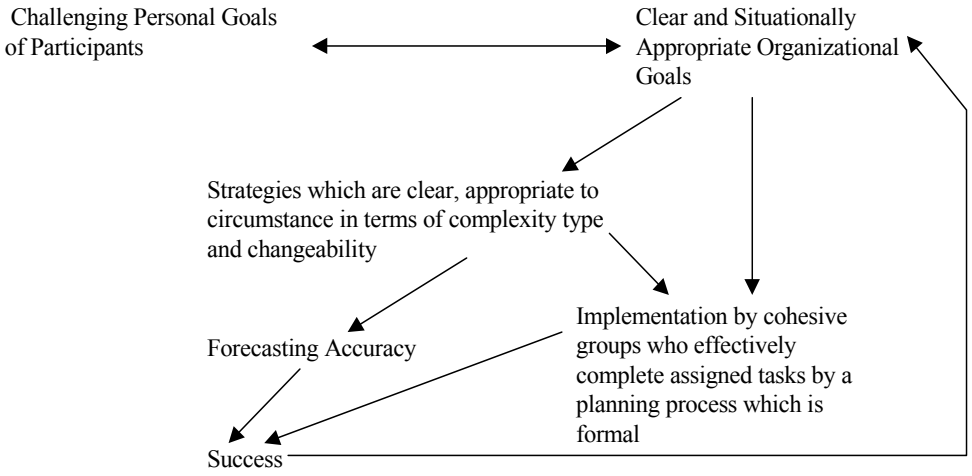
Assuming that the strategic decision making process in the game is similar to that in real organizations, models depicting strategic decision making in the game will be similar to those developed to capture decision making in other situations. Although there is no direct evidence that game and real world strategic decision making processes are exactly alike, Wolfe provides evidence that the decision making contexts are similar. He has found (1) that under certain conditions games do create situations that support real world policy type situations [22], and (2) that students who perform well in the game are also more successful in their business careers [24].

Most general strategic decision making models are fairly similar in their basic components [16]. They suggest that successful firms set goals, continuously scan both the external environment and the firm's strengths and weaknesses, develop and test strategies, formally plan and implement strategies, obtain results, and modify the strategy based on obtained results. Some of these models are extremely complex and suggest dozens of sets of relationships among variables which are difficult to research. However, such research is feasible with statistical techniques such as multiple regression and path analysis.

Much of the research on the strategic decision making processes tests whether specified individual variables (e.g., goal setting) influence organizational effectiveness. While there are very few research studies examining the entire strategic decision making process, there are numerous studies which have tested these hypothesized individual relationships.

The present research borrows from these more general strategic process models. Our proposed model suggests a series of processes which facilitates organizational effectiveness (game success), and it suggests relationships among specified variables. In addition, the model in the present study borrows some of its specific elements from previous models, and it suggests that

FIGURE 1
HYPOTHESIZED DECISION MAKING MODEL



goal setting, strategic formulation, implementation and forecasting (a combination of environmental and internal resource scanning) are important ingredients for successful strategic decision making. The hypothesized model is depicted in Figure 1 and the variables in it are described below.

Personal Goals

Personal goals are often not covered in models of strategic decision making, but many authors who discuss strategic planning suggest that there is a relationship between organizational success and the personal goals of the decision makers [4, 6, 12, 20]. Personal goals are not included in many models because the relationship between the goals of the individual organizational member and organizational success is not well understood, and there is disagreement as to how the goals of the individual member affects success. On one hand, Schendel and Hofer [18] argue that consistency among individuals' goals is necessary before effective behavior can result because goals provide cues for action that are instrumental to both planning and control. Furthermore, according to Locke [12], higher performance levels are attained when individual goals are specific and difficult and there is commitment to their accomplishment. On the other hand, Bourgeois [4] provides evidence that agreement on goals is not necessary for organizational success, and Hall and Foster [8] found that strength of individual intention to do well (individuals' goals) was not directly correlated with performance.

Organizational Goals

Organization goal setting has long been regarded as a major and valuable aspect of strategic decision making. It is a major early step in most models, and there is ample evidence that the explicit setting of goals improves performance [11, 12, 13].

Strategic Formulation

Virtually all models suggest formulating strategic alternatives, evaluating the alternatives, and deciding on appropriate strategies. Descriptions of potential alternative strategies are available in the literature. Most authors agree that strategy type and degree of complexity should be consistent with the firm's internal and external environment, and most agree that strategies should change as circumstances change. However, there is some disagreement as to how clearly strategies should be stated. Hofer and Schendel [101 and Thompson and Strickland [21] argue that strategy should be as clear and explicit as possible. However, Christensen et. al. [5] disagree and claim that the explicit articulation of strategy is counter productive. At present, there is no research evidence supporting any of the above strategy related contentions. No research studies have been undertaken concerning whether strategies should be simple or complex, stable or evolving, or clear or vague.

Formal Planning

Most strategic models recommend formal planning, or an explicit process for determining long range objectives, generating and evaluating alternatives, and monitoring results. Some authors, however, do not advocate formal planning for all situations. For example, Hofer and Schendel [10] point out that many organizations develop very effective strategies in informal ways. There is a great deal of research on the issue. Armstrong [3] has reviewed the literature and found formal planning to be superior to informal procedures in ten of fifteen comparisons drawn from twelve studies, and inferior in only two comparisons.

Group Cohesion

Most strategic models do not include group cohesion as a variable affecting strategic decision making. However, many believe that cohesion facilitates performance, and Zalenznik, Christensen and Roethlisberger [25] argue that greater group cohesion increases productivity if the group supports the organization's goals. In studies using business games, both Norris and Niebuhr [15] and Wolfe [22] found that cohesion and performance were positively related.

General Purpose and Research Design

As indicated above, the purposes of this study were to explore the strategic decision making process in a computerized simulation and to generate a model reflecting that process. The intentions were to (1) use multiple regression to study the relative influence of eleven independent variables: personal goals, organizational goals, strategic type, strategic complexity, strategic stability, strategic clarity, the generation of alternative strategies, formal planning, team cohesion, time spent decision making and forecasting accuracy on the dependent variable return on equity and (2) use factor analysis to study the relationships among the independent variables.

METHOD

The setting for this study was Henshaw and Jackson's The Executive Game [9] and the subjects were undergraduate students. Although a simple simulation of a single product industry, this game is still "a dynamic business case, whose outcome is determined by the functioning and external interactions of several competing firms in a hypothetical industry" (Henshaw and Jackson, p. 1). The game requires long-range planning, whereby the participants make quarterly decisions on product price; allocate budgets for marketing, research and development, plant maintenance, and plant investment; schedule production volume and purchase raw material; and distribute dividends. Performance depends on the interaction of the current decision, competitor actions,, simulated economic factors, and past results.

Eleven independent variables were measured for this study. There were five strategy-related variables: type of strategy, strategic clarity, strategic complexity, strategic stability, and degree to which alternative strategies were generated. Three of the variables were implementation variables: cohesion, degree to which planning was formal, and time spent decision making. The three final variables were the degree to which personal goals were challenging, degree to which organization goals were appropriate for the computer game situation, and forecast accuracy. Forecast accuracy was measured by comparing the percent deviation in meeting targets for market share in units, dollar revenue changes, and profit as a percent of sales. The other ten independent variables were measured by questionnaire. Likert-type questions were used for all but complexity and type of strategy. These latter two variables were measured with an open-ended question requesting subjects to briefly describe their firm's strategy. A content analysis of the answers to this question was undertaken, and nine categories of strategic type emerged into which all responses fell. The number of categories mentioned by the students comprised the measure of strategic complexity. The dependent variable was performance as measured by return on equity (ROE), more specifically the discounted rate of return earned on beginning owners' equity over two simulated years of game plan.

Questionnaires were received from 106 Out of 126 (84%) undergraduate seniors in four sections of a capstone course in business policy. The questionnaires were administered after game results were returned for the fifth quarter, and play proceeded through the eighth quarter when forecasting accuracy and return on investment were calculated. The game comprised thirty percent of the students' final grade, distributed between an objectives paper (5%), final letter to the stock- holders or successors (5%), forecasting accuracy *(5%* for each of two simulated years), and final return on equity ranking (10%). Thirty-six teams formed six industries, ranging from five to seven teams per industry. Each team consisted of two to five members. There were no significant performance differences based on either industry membership or size of team.

FINDINGS AND DISCUSSION

Two significant results emerged from this study. The first concerns variables affecting performance, and the second concerns the relationship between strategic stability, formal planning, strategic clarity, and group cohesion. Concerning variables affecting Return on Equity (ROE), a backwards regression (see Table 1) was performed with ROE as the dependent variable. The resulting regression equation with the highest adjusted coefficient of determination (R^2=. 274) contained four independent variables. The variable significantly affecting ROE with the largest regression coefficient (Beta = .32) was forecasting accuracy. Other variables significantly affecting ROE were: the degree to which planning was formal (Beta=.21); the degree to which strategies were stable (Beta=.20); and the degree to which resulting strategies were price-oriented (Beta = .17). This suggests that performance, as measured by ROE, increases when forecasts are accurate, when planning is formal and when strategies are stable over time. Also, the results suggest that the Executive Game appears to reward price-oriented strategies.

An adjusted R^2 of .274 means that 27.4% of the variance associated with performance was explained by this study's strategic decision making process variables. Although this study provides no data for understanding the source of the other 72.6% of the variance, we are not at a total loss for explanations. Some of the variance can be explained by the fact that computer games are academic experiences and it is likely that such factors as academic ability, motivation and academic background affect performance. There is evidence to support this notion. Grey [7], Wolfe [23] and Seginer [19] found significant positive relationships between previous academic ability and game performance, and Niebuhr and Norris [14] found a relationship between academic background (measured by college major) and performance. Another portion of the performance- related variance can be explained by the fact that the game environment introduces random factors complicating relationships between performance and antecedent variables. Student motivation is one such random factor. The game is usually a small percentage of a student's grade and, especially in their last semester, many students are not motivated. The fact that many students try to outwit the game introduces more randomness. Such randomness explains some of the variance associated with performance and, without it, the correlations between strategic decision making variables and performance in this study may have been higher than they were.

It should be noted that just as ROE varied as forecasting accuracy varied, forecasting accuracy varied with ROE (Beta =. 29) when a backwards regression was performed with forecasting as the dependent variable.

The fact that these two variables affected each other makes sense because both variables were measured in this study at the same time. Apparently forecasting accuracy was helpful in attaining a high ROE, and those who were skillful at attaining ROE were also accurate forecasters.

TABLE 1
MULTIPLE REGRESSION ON RETURN ON INVESTMENT

Independent Variables	Beta	p
Forecast Accuracy	.316	.000
Strategic Stability	.202	.022
Price Strategy	.175	.041
Formal Planning	.213	.189

F=l0.84, p=0.000; Multiple R=.550, Adjusted R^2=.274.

These two variables may be correlated because high performers have high aspirations and they tend to set high forecasting targets which they are able to meet; whereas others do not have high aspirations, do not bother to plan and do not perform well. Correlational analysis of this study's data bears this out. The correlation between ROE and forecasting accuracy was .39 ($p < .001$), and a first order partial correlation between the same two variables, controlling for the degree to which personal goals were challenging, was .30. This suggests that the degree of aspiration accounted for some of the relationship between forecast accuracy and performance.

The second significant results appear in Table 2, which shows a factor analysis of all of this study's independent variables plus two other variables: grade point average (GPA) for business courses and GPA for all university courses. This factor analysis used iteration and the verimax rotation method. It produced four factors with eigen values greater than 1.0, which explain 73.7% of the total variance. Of special interest here is factor 2. Four variables loaded on factor 2 with coefficients of .50 or greater: strategic clarity, group cohesion, formal planning and strategic stability. The fact that these four variables loaded on one factor suggests that they comprise a pattern the teams use in approaching strategic decision making. Causality among the four variables is unclear, thus the way to state the pattern is uncertain, but the pattern includes cohesive teams which plan formally and generate clear and stable strategies.

The results further suggest that this decision making pattern leads to success. As indicated in Table 1, both formal planning and strategic stability positively affected performance as measured by ROE. This gives us reason to believe that those who utilize the type of decision making characterized by formal planning, strategic stability and clarity, and group cohesiveness do better in a simulated game than those who do not.

Part of the purpose of this study was to begin the development of a strategic decision making model for the business game, and the results do suggest components of that model and tentative relationships. This proposed model appears in Figure 2. Success (or good performance) affects and is affected by forecasting accuracy. Success also results from formal planning and a stable strategy.' Planning formally and maintaining a stable strategy is part of a strategic decision making process which also includes cohesive teams and clear strategies.

FIGURE 2
Proposed Model for Strategic Decision Making in Simulations Based on Results of Present Study

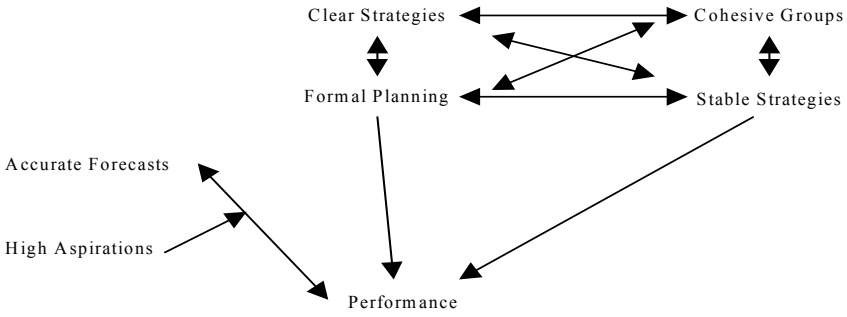


TABLE 2
FACTOR ANALYSIS OF INDEPENDENT VARIABLES

	Factor 1	Factor 2	Factor 3	Factor 4
Degree Goals Were Challenging	0.31445	0.20758	-0.08584	0.10495
Appropriateness of Organizational Goals	0.04436	0.20517	-0.09837	0.04642
Degree of Formal Planning	0.01065	0.50325	0.11160	0.10460
Team Cohesion	0.01896	0.62103	-0.03731	-0.14403
Strategic Clarity	0.10005	0.65497	0.25488	0.04098
Strategic Stability	0.21565	-0.54588	-0.02228	0.13787
Degree to Which Alternatives				
Were Generated	-0.04444	-0.23109	0.03082	0.08040
Time Spent	0.14493	-0.12946	0.02884	-0.03187
Strategic Complexity	0.51411	0.17057	0.60418	0.01885
Dividend Strategies	0.01105	0.07338	-0.00666	0.09107
Price Strategies	0.00547	0.12982	0.65376	-0.03334
R & D Strategies	0.72596	0.25578	0.21755	-0.03998
Quality Strategies	0.23349	0.05153	0.58491	-0.06819
Volume Strategies	-0.12178	-0.03569	0.17977	-0.02879
Marketing Strategies	0.78921	0.04290	0.10387	-0.00443
Plant Maintenance Strategies	0.16721	0.14876	-0.04506	0.09364
Turnover Strategies	-0.00691	-0.01446	0.04444	-0.04352
Overtime Strategies	0.10378	0.10797	-0.05315	0.15670
Forecasting Accuracy	0.30591	0.16723	-0.00946	0.02621
Business GPA	0.01132	-0.05029	-0.05535	0.77619
University GPA	-0.02962	-0.10959	-0.01522	0.77338
Eigenvalue	3.197	1.488	1.344	1.182
Percent of Variance	32.7	15.2	13.7	12.1

The results of this study confirm the notions of some writers and not others and are consistent with the results of some previous studies and contradictory to those of others. They are consistent with studies showing that performance is influenced positively by formal planning [3]. They are also consistent with Hall and Foster's research [8] showing that performance is not influenced by individual intention to succeed. The regression analysis results showing that performance did not vary with strategic clarity support Christensen et. al. [5] in their arguments against the necessity of strategies being clear. Finally the results do not support the arguments of those who contend that performance will be enhanced by the explicit setting of organizational goals, by team cohesion and by strategies which are complex and flexible.

There were methodological weaknesses which affected the results that should be noted. First, variables were measured only once: forecasting accuracy and ROE at the end of the game and others during the fifth week of the game. It is likely that performance up to that time affected perceptions of such variables as group cohesion and strategic clarity, but verification is impossible without repeated measures. Repeated measures are desirable, in any case, because process variables such as cohesion, strategic clarity, and team objectives are likely to change with time. Second, strategic process variables were measured via questionnaire. Questionnaire responses are perceptions and can be affected by social desirability needs and by performance. It would be better to measure decision making process variables by observing the process. Finally, the

sample was 106 students from one university, and the generalizability of the results is therefore suspect. This is especially true given that different universities use different simulations and assign different weights to performance in the game. This study's results need to be replicated at different universities with different games in order to be generalizable.

[1]Performance also varied positively with a price strategy. That relationship was not included in the model because of the high probability that it held only for the Executive Game.

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