ARE GOOD STRATEGY DECISIONS CONSISTENTLY GOOD? A REAL-TIME INVESTIGATION

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ABSTRACT

The present study is a variation of an earlier study by Green and Faria (1995) that examined the consistency of good simulation game strategies across industries. The original study used post-facto data where, a winning strategy in one simulation industry was randomly transferred to a second industry and then all decisions were rerun to test the effectiveness of the strategy in a different competitive environment. The winning strategies were identified at the "end" of the simulation and the strategies stood on their own. Further, in the re-run neither the original winning strategies nor competitor strategies could be adjusted in real-time. The present study, using Merlin: A Marketing Simulation (2004), sought to overcome these limitations by introducing an "optimal" winning strategy decision in every industry, by adjusting the strategy period-by-period and by having the optimal strategy decision introduced during interactive game play. The study, involving 423 students grouped into 73 different industries, found that an optimal strategy decision was significantly superior in seven out of eight simulation competition decision periods and the set of optimal decisions were superior at the end of the simulation play. It was concluded than an optimal strategy decision is consistently good and is transferable in a simulation environment.

INTRODUCTION

It has now been 50 years since the first use of a business simulation game in a university class in 1957 (Watson 1981). Since that time, the number of business games and their usage has grown enormously. One survey estimated that over 200 business games were in use at over 1,700 universities and community colleges (Faria 1998). An e-mail survey of 14,497 business faculty at U.S. universities reported that 47.7 percent of the respondents were currently using or had used a business simulation game (Faria and Wellington 2004). Empirical research on business gaming has been extensive. Comprehensive reviews of the research can be found in Greenlaw and Wyman (1973), Keys (1976), Wolfe (1985), Miles, Biggs and Shubert (1986), Randel, Morris, Wetzel and Whitehill (1992) and Faria (2001).

Despite the widespread use of business games, an ongoing issue among many game users is whether or not participation in business simulation games is a meaningful experience. This paper examines the meaningfulness of business gaming through an examination of the internal validity of a marketing simulation game as measured by the repeated success of marketing strategy decisions. The present study builds upon repeat performance results reported in three earlier studies (Green and Faria 1995; Wellington and Faria 1995; and Wellington, Faria and Whiteley 1997).

PAST RESEARCH

Meaningfulness, as applied to business games, has been examined in a number of ways, including: (1) the learning, or skills training, aspects of business games; (2) the relative merit of business games versus other teaching methods; (3) the external validity of business games; and (4) the internal validity of business games.

The reported types of learning brought about by the use of business games includes goal setting and information processing; organizational behaviour and personal interaction skills; sales forecasting; entrepreneurial skills; financial analysis; basic economic concepts; inventory management; mathematical modeling; personnel skills such as hiring, training, leading and motivating; creative skills; communication skills; data analysis; formal planning and report preparation; and more. Faria (2001) provides a history and detailed list of references covering research on skills training through the use of business games.

The merit of simulation games versus other teaching approaches has been investigated by a number of researchers (e.g., Greenlaw and Wyman 1973; Keys 1976; Snow 1976; Waggener 1979; Wolfe 1985; Miles, Biggs and Shubert 1986; Hall 1987; Spect and Sandine 1991; Washbush and Gosenpud 1991; Randle, Morris, Wetzel and Whitehall 1992; Wolfe 1997). Across all of the reported studies, simulation games were found to be more effective teaching tools, as measured by performance on common course final exams, than conventional instructional methods (generally lectures and cases) in 75 of the study comparisons, conventional methods of instruction were found to be superior in 27 of the studies, while no differences were reported in 58 of the studies.

The external validity of business games (how well games model the real world) has been measured in two ways. First, if externally valid, successful business executives should also be successful when participating in the simulation exercise. A number of studies have supported this view. The most comprehensive of these studies is Wolfe and Roberts (1986). The second approach to measuring external validity employs a longitudinal study design. In this approach, a student's business game performance is compared with some measure of business career success (e.g., number of promotions, salary level, etc.). Two studies by Wolfe and Roberts (1986 and 1993) have supported this view of the external validity of business games.

The internal validity of business games has also been measured in two ways. The first approach states that if a business game is internally valid, better students should outperform poorer students. Several studies (see Wolfe 1987 for the best of these studies) have supported this view. A second approach to internal validity examines whether participant decisions in a simulation game, over time, conform to the environment of the game. While the dynamics of the simulation and the actions of competing companies will influence participants' decisions, the simulated environment must be considered and, *ceteris paribus*, participant decisions over time should adapt to the simulation environment. Past research of this type has been only moderately supportive of the internal validity of business games (Faria 2001).

THE PIMS PERSPECTIVE

While past research approaches have considerable merit, another approach to examining simulation validity and meaningfulness is discussed in this paper. This approach relies on the reported findings of the PIMS project of the Strategic Planning Institute. The PIMS (Profit Impact of Marketing Strategies) project was initiated in the 1960s within the General Electric Company. In order to expand the program beyond GE, the project was moved to the Harvard Business School in 1972 and to facilitate the further growth and evolution of the program, the Strategic Planning Institute was formed in 1975.

The PIMS program is a multi-company activity designed to provide an innovative database for business research. Each member company of the PIMS program contributes detailed information about its business conditions and strategies to the PIMS database. The PIMS staff analyzes the data searching for general laws of business behaviour (Henderson 1980). Currently there are over 3,000 businesses contributing to the yearly data being gathered by the Strategic Planning Institute.

Several major findings have been reported from the PIMS database including: (1) Business situations generally behave in a regular and predictable manner; (2) All business situations are basically alike in obeying the same laws of the marketplace; (3) The laws of the marketplace determine about 80 percent of the variance in business performance; and (4) Business strategies are successful if their fundamentals are good, unsuccessful if they are unsound (Schoeffler 1993).

The implication of points three and four in the previous paragraph is that strategies that are successful in one marketplace/economic environment will continue to be successful in a similar environment even if the firm's competitors are changed (Buzzel and Gale 1987). If the business game environment is internally valid, successful business game strategy decisions should be consistently successful even when applied in different competitive arenas. This can, of course, be easily tested in a business gaming environment as was done by Green and Faria (1995).

For their study, Green and Faria (1995) removed the winning companies (highest earning companies) in 25 separate, five team simulation industries, after the completion of a three year (twelve periods) competition, and moved them (the leading companies) to a different industry which still contained the remaining four companies. All twelve decision periods were then re-run. In 18 of the 25 (72%) of the industry re-runs, the original winning team and, hence, the winning strategy, once again emerged as the industry profit leading strategy. These results are significant at the $p < .001$ level. In fact, the original winning strategy won again even with four new competitors using different strategies and without the ability to adjust to these new strategies.

Using a similar approach, Wellington and Faria (1995) studied 555 students in two rounds of a simulation competition. Student teams made six decisions, at which point the competition was restarted. The simulation teams were randomly reassigned so that new industries were created with each new industry having a first, second, third, fourth, fifth and sixth place team from the first competition. From this new start, a second round of six decisions was then initiated. The results reported by Wellington and Faria (1995) indicated that there was a medium-strong correlation (r value .4491) between participant performance in the second round of the competition with performance in the first round of the competition. The conclusion reached was that good simulation performers continue to be good performers in repeated competitions.

In yet another study, Wellington, Faria and Whiteley (1997) took the repeat play idea one step further. In the Wellington and Faria (1995) study, the game participants played the same simulation game in two separate six decision competitions. This might lead one to conclude that successful strategies in the first round of the competition were simply repeated in the second round. Wellington, Faria and Whiteley (1997) tracked participant simulation performance from a Principles of Marketing course in which *The Marketing Management Simulation* (Faria and Dickinson 1995) was used into a second Marketing Management course in which *COMPETE: A Dynamic Marketing Simulation* (Faria, Nulsen and Roussos 1994) was used. Thus the Wellington, Faria and Whiteley (1997) study examined game participants in two separate courses, taught by two different instructors, using two different simulation games. In both courses, participants performed as single member companies. In this study, a correlation of .0580 (significant at the .774 level) was reported indicating there was only a weak relationship between performance in one simulation game versus another.

PURPOSE AND HYPOTHESES

The purpose of the present study is to determine whether, in fact, a good strategy decision continues to be good as stated by Green and Faria (1995). While the Green and Faria study was well designed, one difficulty with it was that participants could not "react" to or "learn" from the "good strategies" as the simulation progressed. In this respect, the "strategies" could not be tested interactively. In this study, the strategy decisions of the "best" performer were revealed to the participants in every industry and could be examined and reacted to during each decision period. Further, the Green and Faria (1995) study included only 25 separate simulation industries while the present study included 73 separate industries.

Based on past simulation research findings and results reported from the PIMS project, the following four hypotheses will be tested:

H1: A successful business strategy decision as measured by highest earnings performance will remain a successful business strategy decision when employed in a different industry environment.

H2: The top ranked business strategy decision for a whole group of industries will remain the top ranked business strategy decision when employed in each industry.

H3: Across the eight periods of the simulation, the set of successful business strategy decisions as measured by earnings performance will remain a set of successful business strategy decisions when employed in different industry environments.

H4: Across the eight periods of the simulation, the set of top ranked successful business strategy decisions will remain the top ranked set of successful business strategy decisions when employed in different industry environments.

METHODOLOGY

The subjects for the research to be reported here were 423 Principles of Marketing students formed into 73 different industries. The students played *Merlin: A Marketing Simulation* (Anderson, Beveridge, Lawton and Scott 2004) in two separate semesters of the Principles course taught by the same instructor. The participants played as single member companies divided into industries of seven or eight companies and participated in an eight decision period game. The 7th or 8th team position in each industry was designated as the "optimal" team *a priori* and participants were told that the strategy decision of the best performing team (best performance being highest earnings) would be used for this last team with a single exception. The exception was if the industry already contained the top performer. In this case, the second best performing team's strategy decision would be used for the last company. In this way, every participant, in every industry, would be competing against the strategy decision of the best other performer in the class.

In order to identify the best strategy decision in each period, the simulation was run in two stages. In the first stage, the simulation was run using the decisions submitted by all students with a "default" decision provided for the "optimal" team. After this initial run, the teams with the highest and second highest earnings for the period were identified. The simulation was then rerun with the strategy decision of the highest earnings team being substituted into the "optimal" team position in all industries with the exception of the industry that already had the highest earning company. For this industry, the strategy decision of the second highest earning team was substituted for the optimal team. This process was undertaken in each of the eight periods of simulation play.

H1 and H3 were tested using an ANOVA procedure to compare the earnings performance of the optimal group industry member versus all other industry members on a decision by decision basis and for overall game performance.

H2 and H4 were tested two ways. Firstly, because the data were ordinal and involved *Merlin* rank order performance dependent variables versus optimal or student group membership, it is most appropriate to use a non-parametric procedure. As such, the Kruskal-Wallis One-Way Analysis Of Variance By Ranks test was used because it fit the data type best. However, when samples are large, as in this case (73 industries and at least 60 individuals in each ranking group), "parametric tests are robust to deviations from Gaussian distributions. . . . Unless the population distribution is really weird, you are probably safe choosing a parametric test when there are at least two dozen data points in each group" (Motulsky 1995). Consequently, the parametric ANOVA procedure was also used to compare optimal versus student group as factor variables versus the *Merlin* rank order performance. The decision to use ANOVA was based on the fact that its output is more illustrative than that from the Kruskal-Wallis tests and, presumably, it would produce the same test results.

FINDINGS

The overall findings from ANOVA and the Kruskal-Wallis One-Way Analysis Of Variance By Ranks tests are reported in Tables 1 through 3. The findings support the acceptance of all four hypotheses.

To test H1, the simulation teams were divided into two groups, actual student players and the optimal strategy decisions. A comparison of earnings performances for each decision was then undertaken. As shown in Table 1, for every strategy decision, the average earnings of the optimal group were greater than the earnings of the remaining student companies although the difference between the two groups for strategy decision 3 was not significant at the .05 level. These results provide overwhelming support for the acceptance of H1.

H2 was tested using both ANOVA and a Kruskal-Wallis One-Way Analysis Of Variance By Ranks test. The findings presented in Tables 2 and 3 indicate that for every decision, the optimal strategy decision performance ranking was higher than that of the competing student company decisions and that the differences were significant for all decisions. As such, H2 is accepted.

H3 examines the overall outcome of the set of eight simulation strategy decisions with respect to total earnings. The findings reported in Table 1 show that the average cumulative earnings for the set of optimal strategy decisions were $3,723,670 versus an average loss of -$638,422 for the regular student companies and this difference was highly significant. Consequently, H3 is accepted.

Finally, H4 considers the overall outcome of the set of strategy decisions in terms of the "final" ranking of optimal strategy decision teams versus other teams. The results reported in Tables 2 and 3 for the final performance rank indicate that the average rank for optimal strategy decision teams was 1.47 versus 4.36 for other companies and this difference was highly significantly. Clearly, the optimal strategy decision teams outperformed the normal competing teams throughout the simulation and this supports the acceptance of H4.

TABLE 1

ANOVA Results of Student and Optimal Decisions (Company Earnings)

Merlin Decision	N Student Teams	N Optimal Teams	Mean Earnings Student Team	Mean Earnings OptimalTeam	Sig. Level
1	423	73	202689	457148	.000
2	423	73	47866	335389	.000
3	423	73	31580	133308	.086
4	423	73	71617	263957	.003
5	423	73	-179670	458706	.000
6	423	73	-275443	371124	.000
7	423	73	-272174	736935	.000
8	423	73	-277819	1047077	.000
Set of 1 to 8	423	73	-638422	3723670	.000

TABLE 2

ANOVA Results of Student and Optimal Decisions (Industry Ranking)

Merlin Decision	N Student Teams	N Optimal Teams	Mean Rank Student Team	Mean Rank OptimalTeam	Sig. Level
1	423	73	4.20	2.12	.000
2	423	73	4.28	1.99	.000
3	423	73	4.03	3.49	.037
4	423	73	4.06	3.36	.006
5	423	73	4.30	1.79	.000
6	423	73	4.30	1.62	.000
7	423	73	4.34	1.82	.000
8	423	73	4.36	1.52	.000
Set of 1 to 8	423	73	4.36	1.47	.000

TABLE 3

Kruskal-Wallis One-Way Analysis of Variance of Student and Optimal Group Decisions (Total Company Earnings)

Merlin Decision	N Student Teams	N Optimal Teams	Mean Rank Student Team	Mean Rank OptimalTeam	Sig. Level
1	423	73	270.6	120.4	.000
2	423	73	272.7	108.4	.000
3	423	73	253.9	217.3	.042
4	423	73	255.6	207.2	.007
5	423	73	274.9	95.6	.000
6	423	73	273.8	101.9	.000
7	423	73	277.3	81.6	.000
8	423	73	278.5	74.7	.000
Set of 1 to 8	423	73	279.1	71.0	.000

DISCUSSION

The results reported in Table 1 strongly support the research hypothesis that a successful strategy decision will remain a successful strategy decision as long as the marketplace/economic environments remain similar.

The dramatic difference in earnings and rankings between the Optimal Decision Team and the remaining Student Teams (overall positive earnings for the Optimal Strategy Decision group versus an overall negative earnings for the Student Team), raises the question why the different competitive decisions did not alter the results. The findings of the PIMS project have suggested that a good strategic decision will continue to be successful in similar marketplaces. Practitioners have noted that competitors will generally follow the market leader's strategic moves, such as price increases and decreases. Academics that have used business simulation games in their courses have noted that competing teams will generally attempt to follow the leader in regards to strategic decisions. However, these "copycat" competitors are followers, though, and are at least one period behind in their strategy adjustments.

The findings also suggest that since the optimal strategy decision was successful in a similar marketplace/industrial environment, then adjusting the decision to your competitor's strategy is not as important as adjusting to the market. In realty, adjusting a strategy decision using all environmental information is advisable; however, satisfying the marketplace is more important.

CONCLUSIONS

The research reported here sought to examine whether good strategy decisions would remain consistently good even when participants had an opportunity to evaluate them and react to them in real-time. The findings indicate that there is very strong evidence that this is so. These findings are fully consistent with earlier findings reported by Green and Faria (1995) and are based on a much larger sample size (73 versus 25 industries). The study results support the notion that good strategy decisions are consistently good from one industry to another, even when the firm's competitors changed and, as such, continue to strongly support the internal validity of business simulation games.

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