An Investigation of the Relationship of Plan Quality, Forecast Accuracy and Earnings Performance Under Equal and Unequal Starting Positions in Marketing Positions in Marketing Simulations

William J. Wellington
University of Windsor
r87@uwindsor.ca

David Hutchinson
University of Windsor
dhutch@uwindsor.ca

A.J. Faria
University of Windsor
ad9@uwindsor.ca

ABSTRACT

The present study investigates the relationship between participant planning quality, sales and earnings forecasting accuracy, and earnings performance in two different marketing management simulation games. The subjects of the study were fourth year strategic marketing management students who competed from an equal starting position in the ***Compete*** *simulation game (n=32) or from an unequal starting position in the* ***StratsimMarketing*** *Simulation game (n=34). A bivariate partial correlation analysis of two of the three variables of plan quality, forecasting accuracy and earnings performance controlling for the third variable was undertaken. For both the equal and unequal starting positions, the findings were: there were no significant relationships between plan quality and forecasting accuracy controlling for performance; and there were no significant relationships between plan quality and earnings performance level controlling for forecast accuracy; finally, there was a significant relationship between forecasting accuracy and earnings performance level controlling for plan quality.*

INTRODUCTION

Business simulation games have been in use in North America since 1957 (Watson 1981). Since that time, the use of business simulation games has grown enormously. In 1961 it was estimated that more than 100 business simulations were in use in the U.S. alone and had been played by over 30,000 business executives and countless students (Kibbee, Craft and Nanus, 1961). *The Guide to Simulations/Games for Education and Training* (Horn and Cleaves, 1980) published in 1980 described 228 business simulation games then in use at universities, community colleges and by business firms for management training purposes. Various surveys of AACSB member schools undertaken from 1962 through 1998 reported that business simulation game usage at these universities grew from 71.1 percent of the responding universities in 1962 to 97.5 percent of the responding universities in 1998 (Faria, 1998). A 2004 e-mail survey sent to 14,497 university business professors, yielding 1,085 returns, reported that 47.4 percent of the survey respondents had used one or more business simulation games during their teaching careers (Faria and Wellington, 2004).

As simulation game usage has grown since 1957, there has also been a growing body of research on simulation game usage. This body of past research includes examinations of: (1) the internal validity of business simulations; (2) the external validity of business games; (3) the relative merit of simulation games versus other teaching approaches; (4) the learning, or skills training, benefits of simulation games; and (5) correlates of simulation performance among other research areas.

When used, simulation games generally require significant student time and contribute in a significant fashion to each student's final grade. Across the 514 responding business professors to the Faria and Wellington (2004) e-mail survey who use business simulation games, on average, 23.8 percent of class time and 25.1 percent of the final course grade were accounted for by the simulation exercise. If simulation games are to merit this usage level and the amount of course time devoted to them, one would hope that the simulation game would have a positive impact on the game participants.

A key consideration when simulation games are used that has always been an issue is the method used to evaluate and grade the learning/performance of students in the simulation activity. This paper seeks to revisit the debate between measuring learning in business simulations via performance (Wolfe, 1993) and measuring learning in business simulations via forecasting accuracy (Teach, 1993).

STUDY BACKGROUND AND PURPOSE

Research into the skills training or learning aspects of business simulation games dates back almost to the earliest uses of these exercises. The reported types of learning brought about by the use of business simulation games include goal setting and information processing; organizational behavior and personal interaction skills; sales forecasting; entrepreneurial skills; financial analysis; basic economic concepts; inventory management; mathematical modeling; personnel skills such as hiring, firing, training, leading and motivating; creative skills; communications skills; data analysis; and formal planning and report preparation skills among others. Faria (2001) provides a history and extensive list of references covering research on learning and skills training through the use of business simulation games.

Past simulation research has also examined the relationship between student performance in simulation games and a wide range of participant and team variables. Among the variables examined have been numerous personality characteristics, locus of team control, achievement motivation, previous academic performance, time pressure, ethnic origin of team members, gender, team size, previous business experience, team organizational structure, method of team formation, and grade weighting (see for example Anderson and Lawton, 1992; Brenenstuhl and Badgett, 1977; Butler and Parasuraman, 1977; Chisholm, Krishnakuman and Clay, 1980: Edge and Remus, 1984; Faria, 2001; Gentry, 1980; Glomnes, 2004; Gosenpud, 1989; Gosenpud and Miesing, 1992; Hergert and Hergert, 1990; Hornaday, 2001; Hsu, 1984; Moorhead, Brenenstuhl and Catalanello, 1980; Newgren, Stair and Kuehn, 1980; Patz, 1990; Roderick, 1984; Walker, 1979; Washbush, 1992; Wellington and Faria, 1996; Wheatley, Anthony and Maddox, 1988; and Wolfe, Bowen and Roberts, 1989).

The approach taken here is a simple investigative study where learning in a strategic marketing management simulation is measured in three ways: via forecasting accuracy, earnings performance, and the development of a strategic plan for the simulated company which would be implemented in the simulation exercise. The quality of the strategic plan developed by the game participants would be evidence of their understanding of the simulation and competitive environment as is the ability of the game participants to forecast performance accurately and to out-earn their competitors.

Teach (2007) discusses the use of total enterprise simulations to assist student learning for strategic management processes and decision making processes. Teach (2007, 58) comments that: "Neither of these processes could proceed effectively unless the players forecast some form of competitive response from the strategic standpoint and the market-place response from the decision making perspective." Teach (2007) believes that management decision making skills are better developed and demonstrated through the process of demand forecasting as opposed to simple earnings performance. As such, Teach (1993, 477) advocates the use of "the student's ability to forecast the outcomes of decisions made in a business simulation as a surrogate for performance."

Teach (1993) sought to link the forecasting accuracy of students operating business simulation firms to their profitability using the *Marketing In Action* (Ness and Day, 1984) simulation game. Teach (1993) undertook an experiment where student's played a simulation game in which performance grading was not tied to profitability but rather to forecast accuracy and report activity. Teach (1993) reports that forecasting accuracy improved on a period by period basis throughout the game which was taken as evidence of learning with respect to forecasting techniques. However, when Teach (1993) tried to relate forecasting accuracy to profitability performance with a simple direct measure he reported that a relationship could not be established. As a result, Teach (1993) developed a goodness of fit model to compare rank order of performance and rank order of forecast errors to establish a relationship which he reports produced evidence of a "very strong relationship between the ability of a simulation team to forecast outcomes and the relative profitability of the firm that team manages when the game *Marketing In Action* is used" (p. 487). The acceptance of this finding is not without controversy given that simple direct measures did not uncover a relationship. In addition, given that performance was not directly rewarded in grading it is quite possible that the nature of the competition was dramatically different than what is reported in simulation game competitions which are typically evaluated on earnings results.

Wolfe (1993, p. 48) discusses the use of forecasting accuracy as a measure of team management ability versus the use of "company profits as the predominant measure of the team's ultimate performance." Wolfe (1993) undertook "an empirical test of the relationship between the forecasting accuracy of simulated company managers and their perceptions of their abilities as managers of their firms" (p. 48). In his study, the objective function of the simulation involved making profits as well as undertaking forecasting exercises. Wolfe (1993, p. 58) reports that, based on his study results, "little support exists for using forecasting accuracy as a measure of a management team's ability."

It would seem obvious that both Wolfe (1993) and Teach (1993) have made good points and the logical conclusion would be to employ both earnings and forecast accuracy as performance measures when designing a grading approach for these exercises. The authors believe that an empirical study aimed at a reconciliation of these perspectives is warranted and a simple retrospective study to shed some light on the debate has been undertaken.

Clearly, real world managers are expected to earn profits for their firms and, towards this end, undertake detailed market planning which usually includes sales and earnings forecasts. The ability to forecast accurately would be expected to be based on a clear understanding of the market place and the firm's competition. All things being equal, competent managers with a clear understanding of the market and competition would be expected to be able to achieve a higher earnings performance than less competent managers. In the real world, all things are usually not equal but in the world of business simulation games all things can be made equal at the start of the competition. The authors will present an investigation of business simulations that examine earnings performance, forecast accuracy and planning quality in competitions with both equal and unequal starting positions.

METHODOLOGY

The study design was a post-test quasi-experimental design. The subjects for the research to be reported here were 66 teams composed of three to five students who competed in 14 industries of four to five firms each. All of the students completed the same fourth year undergraduate Strategic Marketing Management course from the same instructor over seven different semesters. There were two simulations used in the study.

The *Compete* (Faria, Nulsen and Roussos, 1994) simulation was used by 32 teams who competed in seven different industries, four of which were composed of five teams and three of which were composed of four teams. The *Compete* simulation is a marketing simulation which normally has industries of four to five teams and all teams have equal starting positions. Palia (1991, 81) describes *Compete* as follows: "a widely used marketing simulation designed to provide students with marketing strategy development and decision-making experience. . . Competing teams plan, implement and control a marketing program for three high-tech products in three regions within the United States. . . Each decision period (quarter), the competing teams make a total of 73 marketing decisions with regard to marketing their three brands in the three regional markets. These decisions include nine pricing decisions, nine shipment decisions, three salesforce size decisions, nine salesforce time allocation decisions, one salesforce commission decision, twenty-seven advertising media decisions, nine advertising content decisions, three quality-improvement R&D decisions, and three cost-reduction R&D decisions. Successful planning, implementation, and control of their respective marketing programs requires that each company constantly monitor trends in its own and competitive decision variables and resulting performance."

The *StratsimMarketing* (Kinnear and Deighan, 2009) simulation was used over four different semesters by 34 teams who competed in seven different industries, six of which were composed of five teams and one of which was composed of four teams. *StratsimMarketing* is a complex and structured simulation which models the automotive industry and presents five unique competitors each with three unique products. As such, the actual starting position and situation for all teams is different. The simulation allows competition in both consumer and B2B markets. The *StratsimMarketing* competitions reported on in this

TABLE 1
Sample Competition Description by Semester, Simulation, Industry, Number of Teams and Grade Weighting

SEMESTER COURSE	SIMULATION USED	INDUSTRY IDENTIFIER	NUMBER OF TEAMS	FORECASTING ACCURACY GRADE WEIGHT	EARNINGS PERFORMANCE GRADE WEIGHT	PLANNING REPORT GRADE WEIGHT
Spring 2001	Compete	F	5	5%	10%	25%
Winter 2007	Compete	H	5	10%	10%	20%
Winter 2007	Compete	I	5	10%	10%	20%
Winter 2007	Compete	J	5	10%	10%	20%
Winter 2008	Compete	A	4	5%	5%	25%
Winter 2008	Compete	B	4	5%	5%	25%
Winter 2008	Compete	C	4	5%	5%	25%
Spring 2009	Stratsim	A	5	5%	5%	30%
Winter 2010	Stratsim	A	5	5%	5%	30%
Winter 2010	Stratsim	B	4	5%	5%	30%
Winter 2011	Stratsim	A	5	5%	5%	30%
Winter 2011	Stratsim	B	5	5%	5%	30%
Winter 2012	Stratsim	A	5	5%	5%	35%
Winter 2012	Stratsim	B	5	5%	5%	35%

study include only the consumer market competitions. *StratsimMarketing* requires students to make a wide variety of decisions. In the competitions used in this study students undertook the following decisions as described by Interpretive Solutions (2012), the publisher of *StratsimMarketing:*

- "Marketing Mix: Students set an advertising budget and theme, an MSRP, dealer discount, and promotions for each vehicle. In addition, students undertake product-level marketing with corporate advertising and direct mail campaigns.
- Product Development: Students may build and test new product concepts, upgrade existing vehicles, and invest in corporate technological capabilities.
- Distribution: Student decisions include breadth and quality of dealerships in multiple geographic regions.
- Other Functional Decisions: Students are asked to make decisions on production capacity, vehicle sales forecasts and production, retooling and inventory management.
- Purchase of Market Research: Research techniques included test markets, conjoint analysis, perceptual mapping, focus groups, concept tests, and purchased surveys."

The employment of two different types of simulations, one with common starting positions and one with unique starting positions enables the authors to consider one of the key issues raised by Teach (1993) with respect to simulation game evaluations. He contended that using earnings as a performance measure in simulation games with unequal starting positions would create an inherent inequity in the grading results. This was one of the reasons that he gives for using forecast errors as a performance criterion instead of earnings. The current study design allows for an evaluation of the impact of different starting positions on earnings performance and forecasting errors.

TABLE 2
Strategic Marketing Plan Report Requirements

Report Categories		Points Weighting
1. Executive Summary		4
2. Company Description		2
3. Strategic Focus and Plan		8
a. Mission	2	
b. Goals	2	
c. Core Competency and Sustainable Competitive Advantage	4	
4. Situation Analysis (buy the marketing research in all periods)		22
a. SWOT analysis	4	
b. Industry Analysis: Trends in the Automotive Market	4	
c. Competitor Analysis	6	
d. Company Analysis	4	
e. Customer Analysis	4	
5. Product-Market Focus		12
a. Marketing and Product Objectives	4	
b. Target Markets	4	
c. Positioning (Key Points of Difference)	4	
6. Marketing Program (Decisions for Period 9 and Reasoning for them)		20
a. Product Strategy	6	
b. Pricing Strategy	5	
c. Promotion Strategy	5	
d. Distribution Strategy	4	
7. Financial Data and Projections		8
a. Income Statements	4	
b. Balance Sheets	4	
9. Appendices to Report (Planned decision 9 must be included)		2
10. Writing Style (Grammar and Organization)		2
		80

For all of the simulation competitions, all of the teams were evaluated according to the following criteria: simulation performance in terms of earnings achievement (weight of 5% to 10% of final grade), accuracy of forecasting of sales and earnings on a period by period basis (weight of 5% to 10% of the final grade), and the development of a strategic marketing plan report (weight of 25% to 35% of the final grade). It is important to note that although earnings achievement and forecast accuracy had varying weights of 5% or 10% from semester to semester, they were generally set to an equal amount within a semester. A description of the sample and the evaluation weights of forecast accuracy, performance and strategic plan development for the simulation competitions are presented in Table 1.

The strategic plan report was structured into sections in accordance with those recommended by Kerin and Peterson (2010, pp. 18-32) and then grade weights were assigned to each section (see Table 2). The reports were evaluated for completeness and thoroughness within each section according to the criteria from Kerin and Peterson (2010, pp. 18-32) and graded. Whereas Wolfe (1993) used self reported perceptions of managerial ability as a validating measure of management ability in his research, this study uses the quality of a strategic planning report as an indicator of managerial ability and game learning. The quality of the reports is simply evaluated as being the grading of the report against a set of instructor developed criteria for assessing the completeness and thoroughness of these reports.

The total grading points of each of these assignments were transformed to a 100 point percentage scale for comparison purposes. As a result, each team had three scores out of 100 for simulation performance, forecast accuracy and strategic plan report quality with higher numbers indicating better performance, higher forecast accuracy and higher plan quality. The mean values of these three scores for the combined sample and the sample for each simulation game are reported on in Table 3.

A correlation analysis of the scores of the sixty-six teams was then undertaken to compare the strength of the relationships across performance, forecast accuracy and plan quality. The analysis was repeated for each simulation, *Compete* which had an equal starting position for all companies and then *StratsimMarketing* which had an unequal starting position. The analysis was undertaken in two forms: a simple bivariate correlation of the three scores with each other and then a partial bivariate correlation amongst pairs of the three scores while controlling for the third score. The partial correlation was undertaken to reduce the impact of possible interactions across the three measures.

In addition, the scores were examined using a partial least square structural equation modelling program, PLS Graph® 3.0, a component based software package developed by Chin (Chin, 2001). The PLS program assesses data in relation to conceptual models using multiple regression analysis techniques. The Partial Least Squares (PLS) statistical analysis method was developed by Wold (1982) for the latent variable conceptual models. An advantage of PLS programs is their ability to accommodate simple and complex modelling in exploratory studies.

FINDINGS

The overall findings from this study are reported on in Tables 4, 5 and 6. The findings shown in Table 4 indicate that there is no significant relationship between plan quality and forecast accuracy for either of the combined simulations and the *Compete* simulation. There is evidence of a marginally significant (.067) medium strength relationship (r value .318 such that $r > .3$ but $< .5$; Cohen and Cohen, 1983, p. 61) for the *StratsimMarketing* simulation but when the impact of performance is controlled the significance of this relationship is reduced. As such, there was no significant relationship between plan quality and forecast accuracy found in this study.

The findings shown in Table 5 differ a bit from those of Table 4 and indicate that the strength of relationship between plan quality and earnings performance for the two simulations combined is significant (.017) but of weak strength (r value of .294 such that $r < .3$; Cohen and Cohen 1983, p. 61). When the impact of forecast accuracy is controlled for, the r value drops slightly to .291 but remains significant (.019). The findings for the separate examination of the *Compete* simulation indicate that there is no significant relationship between plan quality and simulation performance from participants within this competition. Once again there is evidence of a marginally significant (.073) medium strength relationship (r value .311 such that $r > .3$ but $< .5$; Cohen and Cohen 1983, p. 61) for the *StratsimMarketing* simulation but when the impact of forecast accuracy is controlled for this relationship is nullified. As such, there is some evidence of

TABLE 3
Mean Managerial Ability, Forecasting Accuracy and Earnings Performance Scores By Simulation Game

Simulation	Sample Size	Mean Plan Quality Scores	Mean Forecasting Accuracy Scores	Mean Earnings Performance Scores
Compete & Stratsim Combined	66 teams	74.28	77.15	79.52
Compete	32 teams	76.14	77.39	80.46
StratsimMarketing	34 teams	72.53	76.92	78.65

Note: A t-test comparison of mean plan quality, mean forecasting accuracy and mean earnings performance scores indicated no significant differences between the *Compete* and *StratsimMarketing* teams for any of the variables.

a weak relationship between plan quality and earnings performance.

The findings presented in Table 6 indicate that the strength of relationship between forecast accuracy and earnings performance for the combined simulations is significant (.003) and of medium strength (r value of .365 such that r > .3 but < .5; Cohen and Cohen 1983, p. 61) and this relationship remains virtually the same when plan quality is controlled for (r value of .363 significant at .003). The *Compete* simulation results exhibit a marginally significant (.059) medium strength relation-ship (r value of .337 such that r > .3 but < .5; Cohen and Cohen 1983, p. 61) and this relationship increases slightly and becomes significant (r value of .368, significant at .042) when plan quality is controlled for. Finally, the relationship between forecast accuracy and simulation earnings performance is both significant (.002) and considered strong for the *StratsimMarketing* simulation (r value of .514 such that r > .5; Cohen and Cohen 1983, p. 61). However, this relationship reduces to only medium strength while remaining significant (r value of .461, significant at .007) when plan quality is controlled for.

The findings from the partial least squares (PLS) path analysis of the constructs earnings performance, forecast accuracy and plan quality are reported in Figure 1 and Table 7. The PLS path findings support the findings from the correlation analysis. The forecasting accuracy of the teams appears to be a slightly better predictor of team earnings performance than plan quality, based on the beta coefficient. Both paths were significant; however, the path between plan quality and forecast accuracy was not significant.

The results of the analysis of impact of the forecasting accuracy, and plan quality on the team earnings performance in the simulation games are illustrated by the effect size (f^2) of the PLS paths in Table 7. These findings indicate that forecast accuracy had a medium effect on game performance. In addition, the plan quality had a small to medium effect on the team's earnings performance in the game.

DISCUSSION AND CONCLUSIONS

The research reported here sought to revisit the debate between Wolfe (1993) and Teach (1993) and add some insight by adding in a measure of planning quality. The findings were very interesting in that they provided some support for the positions taken by each of Wolfe (1993) and Teach (1993).

In the case of *Compete*, a simulation where all teams have an equal starting position, the findings approximated those of Wolfe (1993). There was no relationship between plan quality and forecast accuracy at all. Similarly, for *StratsimMarketing* it was concluded that there was no relationship between plan quality and forecast accuracy. When the two groups are combined to increase the power of the statistical tests, the same results occur.

The analysis of the relationship between plan quality and earnings performance for the separate simulations, *Compete* and *StratsimMarketing* respectively, also found no significant results. In contrast, when the two simulation game groups were combined to increase the power of the statistical tests, the relationship was significant (.019) and on the borderline of medium strength (r values of .29). These findings were consistent with those reported by Wolfe (1993).

The results of the present study indicate that there was a relationship between forecast accuracy and earnings performance. This relationship was of medium strength in the *Compete* simulation which had an equal starting position and medium-strong in the *StratsimMarketing* simulation which has an unequal starting position. When the two groups are combined to increase the power of the statistical tests, the relationships are highly significant (.003) although they are only of medium strength (r values of .36). These results are fully supportive of those of Teach (1993). However, whereas he concluded that there was a strong relationship between forecast accuracy and game performance, these findings show only a medium relationship.

Finally, the PLS path analysis suggests that the forecast accuracy construct is not influenced by plan

TABLE 4
Correlations Between Plan Quality and Forecasting Accuracy

Game	Sample Size	Correlation Type	Correlation	Significance
Compete & Stratsim Combined	66	Bivariate	.064	.609
		Bivariate Controlling for Performance	-.048	.702
Compete	32	Bivariate	-.073	.692
		Bivariate Controlling for Performance	-.172	.356
Stratsim	34	Bivariate	.318	.067
		Bivariate Controlling for Performance	.194	.279

TABLE 5
Correlation between Plan Quality and Earnings Performance

Game	Sample Size	Correlation Type	Correlation	Significance
Compete & Stratsim Combined	66	Bivariate	.294	.017
		Bivariate Controlling for Forecast Accuracy	.291	.019
Compete	32	Bivariate	.248	.171
		Bivariate Controlling for Forecast Accuracy	.290	.113
Stratsim	34	Bivariate	.311	.073
		Bivariate Controlling for Forecast Accuracy	.182	.312

TABLE 6
Correlation between Simulation Earnings Performance and Forecasting Accuracy

Game	Sample Size	Correlation Type	Correlation	Significance
Compete & Stratsim Combined	66	Bivariate	.365	.003
		Bivariate Controlling for Plan Quality	.363	.003
Compete	32	Bivariate	.337	.059
		Bivariate Controlling for Plan Quality	.368	.042
Stratsim	34	Bivariate	.514	.002
		Bivariate Controlling for Plan Quality	.461	.007

TABLE 7
EFFECT OF THE INDEPENDENT LATENT VARIABLES ON DEPENDENT LATENT VARIABLE (DLV)

Construct	Paths Remaining	Latent Variable R^2	Path as Predictor* of DLV
Performance (DLV)	Forecast to Performance (Path 1)	0.133	f^2= 0.15; Medium Effect Size of Path 1;
	Plan Quality to Performance (Path 2)	0.086	f^2= .09; Small to Medium Effect Size of Path 2
	Full Model (S7 DM Construct)	0.206	

*Cohen (1988) Effect Size f^2 = .02 small; .15 medium; .35 large effect size

Effect Size (Chin 1998): $f^2 = R^2$ *included* - R^2 *excluded* / (1-R^2 *included*) quality or vice a versa. This suggests that there is no indirect or mediating path and they appear to be independent constructions or attributes of the team members. The R2 suggests that these two variables account for 20% of the variance of the performance construct, suggesting that other variables may also be good predictors of performance.

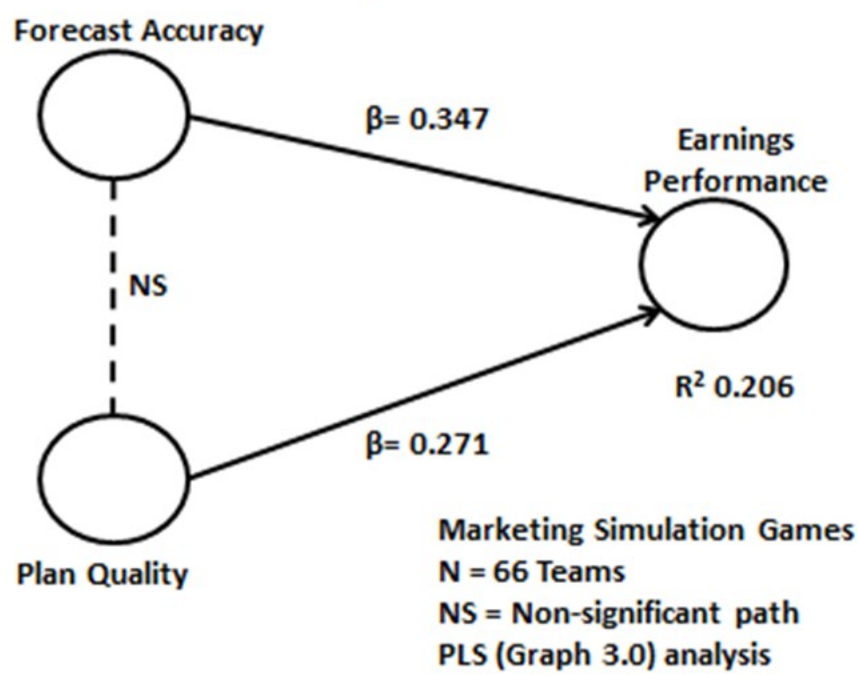
A major limitation to this study is having a total sample size of only 66 firms which was subdivided into two smaller samples of 34 and 32 respectively. As such, the power to detect effect sizes is substantially reduced. Despite this limitation, the results do provide some insights. For example, the discovery of a significant and medium relationship between forecast accuracy and earnings performance does provide support for the position of Teach (1993) that the use of forecast accuracy is a potential substitute for earnings performance in evaluating simulation performance. In particular, if a simulation game is designed with unequal starting positions, the use of forecasting accuracy as part of the performance measurement system would be of particular value. Having said this, the findings also support an emphasis on earnings performance over forecast accuracy when a simulation has an equal starting position. After all, it would be expected that forecast accuracy would lead to enhanced earnings performance.

The strongest implication from the findings is that they provide evidence that the simultaneous use of both earnings performance and forecast accuracy as graded measures of performance in business simulation games has strong validity. The finding that the quality of planning did not assert itself in either of the simulations separately was disappointing. However, when the samples from the two simulations were combined, some evidence of a relationship between planning report quality and earnings performance emerged. This kind of relationship was expected by Wolfe (1993) and the research here does provide some evidence for it. This finding certainly provides support for the use of earnings performance as a grading evaluation measure in a simulation competition.

In conclusion, although not definitive in resolving the debate between Teach (1993) and Wolfe (1993), the current study provides evidence that both positions have reasonable validity. That is, earnings performance and forecasting accuracy in business simulations are related and, as such, the choice of either to assess the learning outcomes of the simulation activity would be acceptable. However, based on the current study, the authors assert that a mixed approach using both earnings performance and forecasting accuracy combined might be the most appropriate manner in which to resolve the debate.

FIGURE 1

Forecast Accuracy and Plan Quality as Predictors of Earnings Performance



REFERENCES

Anderson, P. H., & Lawton, L. (1992). The Relationship between Financial Performance and Other Measures of Learning on a Simulation Exercise. *Simulation & Gaming, 23*(3), 326-340.

Brenenstuhl, D. C., & Badgett, T. F. (1977). Prediction of Academic Achievement in a Simulation Mode via Personality Constructs. *Developments in Business Simulation & Experiential Exercises, 4*, 223-229.

Chin, W. (1998). The Partial Least Squares Approach to Structural Equation Modeling. In G. A. Marcoulides (Ed.), *Modern Methods for Business Research*. Hillsdale, N.J.: Lawrence Erlbaum Associates.

Chin, W. (2001). PLS-Graph User's Guide Version 3.0 (Vol. 2005). Houston, Texas: University of Houston.

Chisholm, T.A., Krishnakuman, P. and Clay, J. P. (1980). Are Computer Simulations Sexist? *Developments in Business Simulation & Experiential Exercises*, 7, 160-164.

Cohen, J. and Cohen, P. (1983) *Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences* Hillsdale, New Jersey: Lawrence Erlbaum Associates.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates.

Edge, A. G. and Remus, W.E. (1984). The Impact of Hierarchical and Explitarian Organization Structure on Group Decision Making and Attitudes. *Developments in Business Simulation & Experiential Exercises*, 11, 35-40.

Faria, A. J., Nulsen, R. O. and Roussos, D. (1994). *COMPETE: A Dynamic Marketing Simulation*, Burr Ridge, IL: Richard D. Irwin, Inc.

Faria, A. J. (1998). Business Simulation Games: Current Usage Levels--An Update. *Simulation & Gaming, 29* (3), 295-308.

Faria, A. J. (2001). The Changing Nature of Business Simulation/ Gaming Research: A Brief History. *Simulation & Gaming, 32*(1), 97-110.

Faria, A. J., & Wellington, W. J. (2004). A Survey of Simulation Game Users, Former-Users, and Never-Users. *Simulation & Gaming, 35*(2), 178-207.

Gentry, J. W. (1980). The Effects of Group Size on Attitudes toward the Simulation. *Developments in Business Simulation & Experiential Exercises,* 7, 165-168.

Glomnes, S. J. (2004). Antecedents of Game Performance, *Developments in Business Simulation and Experiential Learning*, 31, 229-233.

Gosenpud, J.J. (1989). Prediction of Simulation Performance as it is Affected by Time. *Simulation & Games*, 20, 319-350.

Gosenpud, J.J. and Miesing, P. (1992). The Relative Influence of Several Factors on Simulation Performance, *Simulation & Gaming*, 23: 311-325.

Hergert, M. and Hergert, R. (1990). Factors Affecting Student Perceptions of Learning in a Business Policy Game. *Developments in Business Simulation & Experiential Exercises*, 17, 92-96.

Horn, R. E., & Cleaves, A. (1980). *The Guide to Simulations/Games for Education and Training*. Beverly Hills, CA: Sage.

Hornaday, Robert (2001). Sex Composition, Cohesion, Consensus, Potency and Performance of Simulation Teams, *Developments in Business Simulation and Experiential Learning*, 28, 102-105.

Hsu, Ti (1984). A Further Test of Group Formation and Its Impacts in a Simulated Business Environment. *Developments in Business Simulation & Experiential Exercises*, 11, 6-10.

Interpretive Solutions (2012), *StratsimMarketing*, www.interpretive.com/rd6/?pg=ssm4, accessed November 15, 2012.

Kerin, R. & Peterson, R. (2010). *Strategic Marketing Problems: Cases and Comments* (12th ed.). Upper Saddle River, NJ: Prentice-Hall, Inc.

Kibbee, J. M., Craft, C. J., and Nanus, B. (1961). *Management Games.* New York: Reinhold.

Kinnear, T.C., James, S.W., & Deighan, M. (2007) *StratSimMarketing: The Marketing Strategy Simulation*. Charlottesville, VA: Interpretive Simulations.

Moorhead, G., Brenenstuhl, D.C. and Catalanello R. (1980). Differential Predictors of Academic Performance for White and Non-White Samples. *Developments in Business Simulation & Experiential Exercises*, 7, 154-156.

Ness, T. and Day, Ralph (1984), *Marketing In Action.* Homewood, IL: Richard D. Irwin, Inc.

Newgren, K.E., Stair, R.M. and Kuehn, R.R. (1980). The Relationship between Group Size and the Learning Curve Effect in a Gaming Environment. *Developments in Business Simulation & Experiential Exercises*, 7, 203-205.

Patz, A. L. (1990). Group Personality Composition and Total Enterprise Simulation Performance. *Developments in Business Simulation & Experiential Exercises*, 17, 132-137.

Roderick, R.D. (1984). Student Background as a Factor in Simulation Outcomes. *Developments in Business Simulation & Experiential Exercises*, 11, 76-79.

Teach, R. (1993). Forecasting accuracy as a performance measure in business games. *Simulation & Gaming* (Dec) 24 (4), 476 – 490.

Teach, R. (2007). Forecasting Accuracy and Learning: A Key To Measuring Business Game Performance. *Developments in Business Simulation and Experiential Learning, 34*, 57-66.

Walker, C.H. (1979). Correlations between Academic Achievement, Aptitude, and Business Game Performance. *Developments in Business Simulation & Experiential Exercises*, 6, 153-156.

Washbush, J. B. (1992). Personality Characteristics and Group Performance in Total Enterprise Simulations, *Developments in Business Simulation & Experiential Exercises*, 19, 176-179.

Watson, H. J. (1981). *Computer Simulation in Business.* New York: John Wiley.

Wellington, W. J., & Faria, A. J. (1996). Team Cohesion, Player Attitude, and Performance Expectations in Simulation. *Simulation & Gaming, 27*(1), 23-40.

Wheatley, W.J., Anthony, W.P. and Maddox, E.N. (1988). The Relationship of Locus of Control and Vividness of Imagination Measures to Simulation Performance. *Developments in Business Simulation & Experiential Exercises*, 15, 134-137.
Wold, H. (1982). Soft modeling: The basic design and some extensions. In K. G. Joreskog & H. Wold (Eds.), *Systems under indirect observation: Causality, structure, prediction* (Vol. Part II, pp. 1-54). Amsterdam: North-Holland.
Wolfe, J. (1978). The Effects of Game Complexity on the Acquisition of Business Policy Knowledge. *Decision Sciences*, 9 (1), 143-155.
Wolfe, J,. Bowen, D.D. and Roberts, C.R. (1989). Team Building Effects on Company Performance. *Simulation & Games*, 20, 388-408.