

# Developments in Business Simulation & Experiential Exercises, Volume 15, 1988

## FORMAL PLANNING, SIMULATION TEAM PERFORMANCE, AND SATISFACTION: A REPLICATION

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### ABSTRACT

This study is a replication of an earlier study that found no difference in performance between simulation teams that conducted formal planning and those that did not. In contrast, the present study found that planning teams produced higher profitability on four measures. As in the previous study, little difference was found between planners and nonplanners in their satisfaction with the simulation and their teammates. The study concludes that the different findings between the two studies can be best explained by the low market potential parameters used for the simulation in the first study. Planning teams simply did not have an opportunity to excel. In the second study, expanded market potential provided conditions where the effects of formal planning were reflected in organizational performance.

### BACKGROUND

"A properly designed formal strategic planning system will give a company an important edge over a competitor that does not have such a system" [16]. Similar statements can be found in most popular Business Policy/Strategic Management text books (for example [17]; [19]; [2]; [12]). This is an impressive statement, intuitively appealing. But empirical efforts to demonstrate its validity have produced mixed results. In general, studies conducted in the 1960s and early 1970s support a positive relationship between formal planning and organizational performance (for example [20; 10; 17; 4; 1; 24]). More recent empirical work finds that formal planning has little effect on organizational performance (for example [4; 9; 7; 12]). In sum, the empirical literature provides no consensus on the value of formal planning as it relates to the performance of "real world" firms.

Many of the differences in the results of these empirical studies are no doubt caused by methodological problems. First, what is formal planning? Can unwritten plans be considered formal? Are all written plans formal? Does "formal" imply regularity, meaning that at certain times, certain individuals in the organization "plan?" Assuming one can get through the formal planning definitional morass, what about organizational "performance?" What is it and how is it measured? Strategic planning scholars recognize these definitional difficulties and are groping for solutions [13]. For our purposes we assume that a written strategic plan, submitted before a simulation starts, covering the complete time period of the simulation, constitutes formal planning for simulation teams.

Not much research has been done that evaluates the use of formal planning in conjunction with a computer simulation. In his excellent literature review, Wolfe [23] did not find any studies dealing with formal planning in simulations and concluded that this is a field where basic research is needed.

Responding to Wolfe, Curran and Hornaday [3], using a

sample of 174 business policy students organized into 60 simulations teams, attempted to evaluate the relationship between formal planning and organizational performance in a management simulation. In addition, they examined the relationship between formal planning and student satisfaction.

The Curran and Hornaday [3] results showed little difference between simulation teams that prepared a formal plan and those that did not. In addition, members of planning teams reported the same feelings about the overall value and complexity of the simulation as did members of nonplanning teams. Some differences appeared between planners and nonplanners on scales designed to measure satisfaction with their teammates. Planners found their groups to be more appealing and have better morale [3].

Concluding that about the only difference they had identified between planners and nonplanners was that planners were better at managing cash flow, Curran and Hornaday suggested that if student cash management skills were an important goal of the simulation, then the preparation of formal plans would probably be a useful pedagogical tool. The differences in group satisfaction scores between planners and nonplanners were explained by Curran and Hornaday as results of the forced interaction between members of planning teams [3].

Some critics were dissatisfied with the results of the study and remained unconvinced that formal planning has little impact upon team performance in a management simulation. Spurred by the critics, the original study was reexamined with an eye to identifying exogenous factors that may have contributed to the results. Attention quickly focused on the market potential set by the simulation administrators. By setting the market potential variables in a low to moderate range, the administrators may have unwittingly penalized the planning teams. Perhaps, because of external market constraints, planning teams could not outperform nonplanning teams, no matter how much better they were operating. To modify an economic metaphor, the scenario may have produced a market potential "tide so low that no boats would float."

This study replicated the earlier Curran and Hornaday study, but provided considerably more market potential for the simulation teams--an environment in which better managed firms had room to excel. The same hypotheses were used:

Hypothesis 1. There is no difference in the performance of student simulation teams that develop formal long-range strategic plans and those that do no formal planning.

Hypothesis 2. There is no difference in the satisfaction of planners and nonplanners with regard to the simulation game.

Hypothesis 3. There is no difference in the satisfaction of planners and nonplanners with regard

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to their teammates.

### METHOD

**Simulation.** The simulation used in both studies was The Business Management laboratory (BML) developed by Jensen and Cherrington [6]. BML is a moderately complex [23] simulation of the stainless steel flatware industry. As used in this research participants were free to make over 50 separate decisions each quarter of play. Because BML is limited to a maximum of eight firms per industry, each class section simulated two different industries. BML firms competed within an industry of from four to six firm. BML administrators controlled market potential by setting *scale* factors, adjusted so that the overall potential within the different size industries was proportional to the number of teams. The scale factors for the first study were set at a moderate range. The present study used scale factors two and one half times the scale factors in the first study, providing more market potential for both planners and nonplanners. All other parameters of the simulation were the same. Correcting a fault in the first study, neither author required teams to build a new plant.

**Sample.** Students in four sections of business policy at a mid-sized Southeastern university constituted the sample. Each author taught two of the sections. The authors grouped 109 participants into 38 three-member teams which seems to be one of the optimal team sizes for simulations [22]. Whenever possible, each team was constituted so that a competitive balance was achieved in terms of functional expertise. Due to attrition, two of the teams finished the competition with only two members. A total of 14 decisions were made during the course of the simulation. Four practice decisions were completed for familiarization with BML. Following these trials, a new start up position was created and ten graded decisions were made over a ten week period. The BML team score counted for 20% of each student's course grade. Team course grades were based on team performance in the areas of profitability, liquidity, and leverage.

**Planning.** In two of the sections (one section taught by each author) all teams wrote a form 1 long-range plan after the practice sessions but before the start of the ten graded decisions. The plan covered the entire ten quarter time frame of the simulation. Contents of the plan included a section outlining the overall goals to be accomplished during the 10 decision cycles and a formal statement of the strategies that were to lead to the accomplishment of the overall goals. A breakdown of the specific functional policies to be utilized by the company was also presented. The final requirement for each planning team was to provide a proforma income statement and cash flow covering all ten quarters of the simulation.

The other two sections had no formal planning requirement. These sections, through the course of normal discussion of the simulation exercise, were told that they should consider what strategy they were going to use. However, they were never asked to describe or present this strategy in any written or oral format.

**Performance Measures.** At the completion of the 10 simulated quarters eight financial performance measures were calculated for each team. These eight measures were (1) total earnings, (2) average stock price, (3) average earnings per share, 4) average return on investment, (5)

average debt/equity ratio, (6) total forced loans, (7) ending plant capacity, and (8) ending total assets. Of these measures number six may need some explanation. Total forced loans represent automatic loans which are given to a team when they encounter a cash shortage due to improper budgeting.

**Satisfaction Measures.** At the completion of the 10 simulated quarters student satisfaction with the BML game and with their teammates was measured using a slightly modified self-report measure of satisfaction developed by Scott and his colleagues [14; 15]. The questionnaire is a semantic differential where factor scores were calculated for each subject based on their response to bipolar adjective pairs set against topical headings of "The BML Simulation" and "MY Team Members." The response to each scale was scored from one to seven, a score of seven indicating the respondent's most preferred condition. From the Scott and Rowland scales, two satisfaction factors (intrinsic worth of BML and BML complexity) measured student opinion of the BML simulation and three factors (group attractiveness, group affective tone, and group emotionality) measured student opinion of their teams.

### RESULTS

The results of testing organizational performance variables are quite different from those reported by Curran and Hornaday (Table 1). planning teams achieved significantly higher earnings, stock prices, earnings per share, and returns on investment than did nonplanning teams. Nonplanning teams ended with larger firms in terms of total assets. While not statistically significant, the test results show that nonplanning firms had much less control over their financial structures, indicated by higher debt/equity ratios, using more forced loans, and adding unnecessary plant and equipment.

Testing Hypotheses 2 and 3 involved individual responses from all students in the sample (Table 2). Hypothesis 2 suggested that there would be no difference between the satisfaction of planners and nonplanners with the BML simulation game. As in the previous study, this hypothesis was supported. There was no difference between planners and nonplanners on their general satisfaction with BML (Intrinsic Worth of BML) or their view of the difficulty of the simulation (BML Complexity). Hypothesis 3 stated that there would be no difference team satisfaction between planners and nonplanners on three factors. The first study rejected the Group Attractiveness and Group Affective Tone portions of the hypothesis and accepted the Group Emotionality portion. Here however, no differences between planners and nonplanners appeared in any of the group satisfaction scales. Hypothesis 3 is accepted.

### DISCUSSION

The results of this study stand in stark contrast to the earlier effort by Curran and Hornaday [3]. Whereas the first study found no difference in organizational performance between simulation firms that prepared a detailed plan and those that did not, here the planning firms clearly outpaced the nonplanners in earnings, stock price, earnings per share, and return on investment.

Two major factors could have caused the different results obtained in the two studies:

1. The relationship between formal planning and

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performance is not stable across samples.

2. The assumption that the initial study did not provide market conditions that would allow superior planning to have an effect on profits was correct. More favorable market conditions of the present study permitted planning firms to outstrip their nonplanning rivals.

The apparently contradictory findings can be interpreted to support the second conclusion. In periods of weak economic conditions, well-managed firms, unable to reach their profitability goals, will settle for getting the most out of whatever revenues they can attract. In short, they will concentrate on cash flow. This seems to be what happened to the planning firms in the initial study.

When times are good, however, well-managed firms will produce superior profitability. In these two studies, the element of good management under consideration was the effect of formal planning. The satisfaction scales present a different picture. Except for the Group Affective Tone scores, the subscale scores for all scales were significantly different between the two samples. While the initial sample was over 50% larger than the second, there was no pattern to the differences. It is probable that the satisfaction scales are not useful in evaluating the opinions of simulation participants under these conditions.

The results of these two studies underscore importance of strict controls when using simulations to evaluate any hypotheses. Researchers must be sure that the parameters they build into the scenario are constant across samples and will allow important performance behavior to occur.

### LIMITATIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH

This is exploratory research and suffers several limitations:

1. Both studies were conducted at the same university. Would other student populations yield different results?
2. The contradictory results indicate that the study must be replicated using the same high market potential parameters to rule out the possibility that the effects of formal planning are not consistent across different samples.

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Table 1  
Analysis of Variance  
Detailed BML Plan Teams versus No Plan Teams

Criteria	Mean		F	p.
	Plan n=20	No Plan n=18		
Total Earnings (\$ 000s)	471	267	6.816	.013*
Average Stock Price	2.81	1.99	17.868	.000**
Average Earnings per Share	.92	.39	15.509	.000**
Average Return on Investment	.14	.09	16.900	.000**
Average Debt/Equity Ratio	.86	1.50	0.521	.475
Total Forced Loans (\$ 000s)	222	921	2.066	.159
End Plant Capacity (Hours 000s)	16.4	18.9	3.122	.086
End Total Assets (\$ 000s)	855	1010	5.168	.029*

Table 2  
Analysis of Variance  
Detailed BML Plan Students versus No Plan Students

Criteria	Mean		F	p.
	Plan n=58	No Plan n=51		
Intrinsic Worth of BML	30.28	29.12	1.773	.186
BML Complexity	9.67	9.65	0.005	.945
Group Attractiveness	44.02	43.86	0.018	.895
Group Affective Tone	16.10	15.47	1.161	.284
Group Emotionality	14.62	15.39	2.627	.108

\* Probability of no difference < .05.  
\*\* Probability of no difference < .01.