

## Developments in Business Simulation and Experiential Learning, Volume 25, 1998

### AN EXPLORATION OF THE EMERGENCE OF PROCESS PROTOTYPES IN A MANAGEMENT COURSE UTILIZING A TOTAL ENTERPRISE SIMULATION

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#### ABSTRACT

Traditionally, total enterprise simulations (TES) have been used in strategic management courses because TES generally require an integration of knowledge of business functions in order to comprehend the purpose of the TES. It has also been assumed that use of TES increases conceptual learning (for a review, see Malik and Howard, 1996). However, when this assumption has been empirically tested, the results are equivocal (see Anderson and Lawton, 1997; Gentry and Burns, 1997; Gosen and Washbush, 1997). These findings have forced researchers to re-examine the use of TES and several different directions of research have developed. One of these directions is examining the learning of process issues, particularly participant behavior, which occur while subjects engage in the simulation process (Comer and Nicholls, 1997). However, since more TES are assigned in strategic management classes, there has not been a great deal of focus on the organizational/managerial processes which evolve as a function of participation in a TES situation. Recently, researchers have been focusing their attention on some group process variables (e.g., Wellington and Faria, 1996; Markulis and Strang, 1995). The findings of these studies suggest that this avenue of research might be a rich one when the ultimate criteria for examining the effectiveness of TES is the amount of increase in learning. This paper attempts to tie the strategic management focus of most TES with the organizational/managerial processes that emerge as a function of participating in a TES. Specifically, this paper examines whether group processes help enhance the implementation of specific strategic management principles and, thereby, making the learning more process-oriented.

#### Literature Review

While many organizational process issues have not been widely studied with respect to simulation research, group variables have been of interest. Wellington and Faria (1996) examined team cohesion as a predictor of simulation performance. Team

cooperation was the focus of two studies by Markulis and Strang, 1997; 1995. Comer and Nicholls (1997) looked at the impact of level of participation on simulation performance. While there has been a modest increase in the number of studies, investigating the process learning that occurs by engaging in a simulation this would seem to be a verdant area for research.

In the strategic management literature, the idea of having "prototypic" organizations is quite common. The categorizations of different types of organizations by Miles and Snow (1978) are well suited to a total enterprise simulation because this typology centers around how firms react to environmental change. One of the primary goals of using a TES is to illustrate the interaction between environmental change and organizational strategies. Miles and Snow (1978) suggest that organizations have profiles of different characteristics, which makes them react to environmental change in different ways.

To illustrate the point, **defender-type** organizations have a narrow product-market domain. Top managers in this type of organization are highly expert in their own organization's limited area of operation but don't search outside of their domains for new opportunities. The firms rarely make major adjustments to technology, structures or SOPs and they try to promote efficiency of existing operations. **Prospector-type** firms search for market opportunities and they regularly experiment with potential environmental changes. These types of firms have managers who are creators of change and uncertainty. A third category of firms is the **analyzer-type**. These organizations typically operate in two types of product-market domains, the one stable and the other changing, by exploiting new opportunities but still tending to old markets and products. Managers tend to rise and fall in this type of organization depending on what markets are being emphasized. **Reactor-type** organizations have top

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managers who perceive change and uncertainty in the organizational environment but cannot effectively respond to it. This type of firm does not make any sort of adjustment until forced to do so by the environment. In general, reactors have poor management processes and weakly defined strategic processes.

While Miles and Snow identify the strategic reactions to environmental changes for each category, they do not specify what managerial processes might lead to the behavior of the firms in each type of category. It is possible to draw upon the organizational behavior domain to identify managerial processes which might be prototypic of each of the four Miles and Snow organizational typologies. The research study described here set up a competitive environment which allowed the evolution of the types of strategic categories described by Miles and Snow and then examined the managerial processes of the members of the firms in each category to see if there were distinct group profiles which coincide with the strategic categories. Broadly based upon the Miles and Snow (1978) descriptions of their typology, the managerial processes examined were decision making styles, group cohesiveness, member similarity, motivation, conflict resolution strategies and attributions for performance.

This paper attempts to take the developments of this previous research and go a step beyond by identifying organizational/managerial process “prototypes” which may be associated with specific strategic management concepts through both qualitative and quantitative analyses.

### The Research Design

Subjects: Subjects were junior and senior Management and Accounting majors enrolled in a required Organizational Behavior class. Students were asked to form into teams of 3 by the second week of the session. There were a total of nine teams.

The Simulation: The DECIDE (Pray and Strang, 1980) was the TES simulation used. This simulation places students in the position of managing a simulated firm which produces, distributes and sells shoes. Students are required to make a number of decisions which include pricing, purchase of raw materials, production, capital investment, dividend,

etc.

Time Frame: After an initial trial period, students ran their corporations for five more quarters over the next five consecutive class periods. After this initial immersion, students made decisions once a week. Students ran their firms for a total of 15 quarters.

The Simulation/Pedagogical Protocol: For the initial seven decisions, students were expected to make the simulation decisions individually and submit them to the instructor (simulation administrator) each day that the simulation project was assigned. Subsequently, the students then met in their respective groups to make the group’s decisions for running the firm. It was the group’s decision which was used to create the simulated competitive environment. The protocol of submitting individual as well as team decisions was instituted to foster individual as well as collective decision making. After the seventh quarter, individual decisions were no longer required. Instead, students were asked to write a one/two page paper on how their group which demonstrated the Organizational Behavior concepts presented during class lecture and discussion.

Grading: Grading for the simulation project was based upon peer evaluations, final firm ranking and a final paper on the simulation learning process. Peer evaluations were used to discourage free ridership. The final firm ranking, which is a combination of stock price, cash flow, etc. was used as a motivator to keep students interested in the simulation. Finally, the paper was used to identify the process learning that occurred as a function of doing the TES.

### The Results

Although the research process actually involved 9 teams, in order to make the analysis manageable only 5 teams are presented in the following section. The teams that were selected were those teams the exhibited properties and performance at the extremes of various spectra. For example, the best and worst teams as well as some teams that changed position in the rankings are presented.

Textual Analysis: Using textual analysis (Manning and Cullum-Swan, 1994), individual student papers

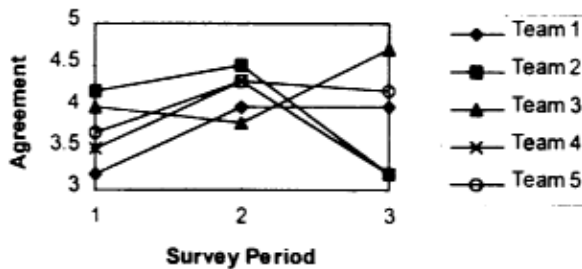
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and the group simulation papers were examined to identify unique group characteristics which distinctly identified specific team prototypes. The results of this analysis is discussed below.

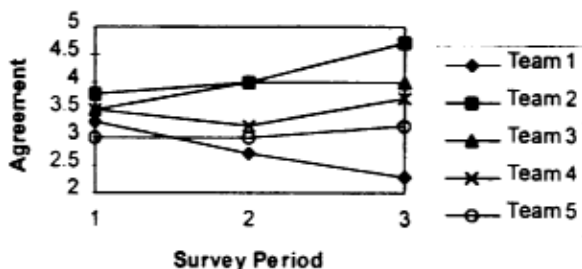
Survey Analysis: The students were surveyed at different times during the semester at the start of the simulation play, after 5 quarters, and near the end of the simulation play. Although the surveys permitted the researchers to monitor a number of factors, for the purpose of this study three factors that were thought to be potentially significant are reported. Students were asked to assess how similar they felt their group members were to them with respect to three key dimensions: Motivation toward the class, Personality, and General Values.

Using a 5-point scale with 1 = not at all similar, and 5 = very similar, students were asked to express their sense of similarity. The results of the assessment of perceived similarity for the 5 selected teams are presented in charts 1-3 for the 3 respective dimensions. It is worth noting what is being measured. A score of 5 with respect to motivation means that the students perceived a great deal of similarity with their group members in their degree of motivation toward the class. It does not necessarily follow that a score of 5 means they were highly motivated.

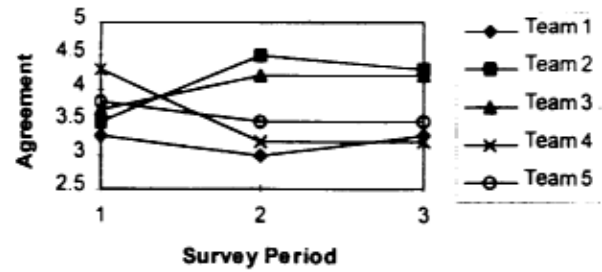
**Chart 1. Motivation**



**Chart 2. Personality**



**Chart 3. Values**



### Team 1 (DEFENDERS)

Based upon the decisions made by this team, this firm fell into the defender category. Team 1 locked into first place early in the game and continued to retain that spot for most of the game. Because of this, they tended to be much more internally oriented when examining what changes they would make. Only when they got “knocked out” of first place did they really start to pay attention to the other competitors in the field. Once they started to notice the other competitors their primary focus stayed on their competitors. They did not respond to the drastic changes within the industry, itself. Instead, they tended to try to maintain their own strategies in the face of challenge from other competitors. In spite of this myopic focus, this team finished second place in firm rankings. At the end of the game, when asked why they had not achieved first place, this team tended to be very externally oriented and blamed their “poor” performance on sabotage by another team.

Team I would meet outside of class to make their decisions because, initially, their decision making time was much longer than the other groups’. According to team reports, no dominant leader evolved during the entire simulation process. Members of this team did not know each other prior to starting this simulation and, during the length of the class, operated only as a work group. The three similarity measures (Charts 1-3) provide evidence of significant perceived heterogeneity in comparison to the other teams. In the case of values and personality the team was the lowest of the five selected teams for two periods and second from lowest once. In motivation the results moved from lowest to second lowest to third lowest. Although, team members

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described each other as being very heterogeneous in personality and interests but very cooperative in their working relationship. This team was characterized by different problem solving and decision making styles. Members B and C at opposite end of the scale in their positions concerning risk. Member B was willing to take more risks in that he advocated making changes in greater amounts than the other group members were willing to make. Member C was very conservative in making changes and would advocate making changes in smaller amounts. Member A was the moderate risk taker and would usually be the person offering the compromise. Compromise was the strategy of conflict-resolution for this group

### **Team 2 (COHESIVE PROSPECTORS)**

Team 2 started off in a less than desirable position within the industry. Early during the game, Member A emerged as the dominant leader of the team. Team 2, due to the interest of their leader, sought to understand the mechanisms of the game, itself. Therefore, they typically relied on more sources than other teams in order to make their decisions. While the problem solving and decision making styles were not exactly the same, the team members generally used similar decision strategies. There was overall consensus on what allocations to change and there was fairly high agreement on the amount of change that needed to be made. This team was careful to examine both their individual firm, as well as the dynamics of the industry when making their decisions. This is clearly supported by the fact that they were able to keep moving up the industry ranking while there were drastic changes occurring within the industry due to the action of the other players and because of the changes programmed into the simulation, itself. When asked to indicate the reasons for their performance, at the end of the simulation, this group was internally oriented and pointed to their insistence on understanding the underlying mechanisms of the game as the primary reason for their success.

This team regularly met outside of class and initially took longer than average to make decisions. Members A and B knew each other prior to becoming team members and had a solid social relationship. The initial working relationship of Members A and B with Member C gradually shifted to include a social component by the end of the term. Team members

described each other as being very heterogeneous in demographic and social characteristics such as age and ethnic backgrounds. Interestingly, though, in the similarity measures there appeared to be a great deal of homogeneity. In personality, the team was highest each period. In values and motivation the team was highest for two of the three periods. Members reported that group cohesiveness increased over the duration of the simulation. Conflict strategies were predominantly consensus building.

### **Team 3 (CONFLICTIVE PROSPECTORS)**

Team 3 started off very strong and quickly lost ground because they made some significant data entry errors which they repeated over several decision periods. These errors left them in a desperate financial position and firmly established them in last place. When attempts to rectify these errors made no impact on their financial situation or firm standing, this team was close to giving up on the simulation. While there was never any group cohesion, even group cooperation decreased over the duration of the simulation. Still, member A was able to establish dominance in the group by building a strong coalition with Member B. The decision making and problem solving styles of this team differed considerably. Both Members A and C were risk takers but from very different decision making frames. For example, Member A decided that, if he couldn't move his firm up, he would bring the entire industry down by undercutting every other firm's pricing strategy. In other words, Member A was willing to challenge the competitive framework of the game, itself. On the other hand, Member C tried to come up with effective strategies to improve the firm's financial situation. These strategies also involved considerable risk but this risk was within the given framework of the simulation. Member B, who was a moderate risk taker, was caught between these two extremes and would often have to settle a stalemate between her team members.

This team, as a group, from the start of the simulation, did not spend more than the allocated time on their decisions. Member C, however, did spend considerable time on his own trying to understand the simulation. Member A knew both Members B and C, both of whom did not know each other prior to joining the team. Team 3 maintained only a working

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relationship during the class. This group described themselves as being very heterogeneous on demographic, social, problem solving and decision-making characteristics. It is interesting to note that their perception of similarity indicated that they became more similar for all three measures as they progressed through the simulation. Conflict was often resolved through confrontation and frequently was taken personally by Member C. Member B eventually became thoroughly alienated from the simulation because of the very high degree of conflict within the team and because she was often the one who had to smooth Member C's hurt feelings. Furthermore, due to Team 3's sabotaging strategies, Team 3 was not very popular with members of other teams. Being the target of her classmates' wrath (most of which was usually exhibited through humor) made Member B even more frustrated with the simulation. Member A enjoyed the conflict while Member C became alienated from the team but not from the simulation because he reported that he still saw the challenge in it. In the end, team members were very internally oriented when asked the reasons for their performance. They blamed their initial performance on their own carelessness and then they blamed much of their process problems on the conflict that epitomized the group. Interestingly, while Members B and C expressed their considerable frustrations with each other, Member A found the entire process to be a very good learning experience.

### **Team 4 (ANALYZERS)**

This team started out with high levels of conflict for control and leadership of the team between Members A and B. Member C would have to serve as the moderator in these instances. Interestingly, this team, in spite of the conflicts, was generally both a social and a work team. As the team survived the storming phase of group development, they clearly articulated the norms each group member had to meet. Furthermore, they became more task oriented, cooperative and increasingly cohesive. As the conflict died down and the group moved past the norming stage, into the performing stage, their focus shifted from resolving interpersonal conflict to performing well on the simulation. While they did not spend as much time on their decisions as the first and second place teams, they did make an effort to learn about and understand the simulation process. As their decision making process became clearer and more standardized,

they were able to stabilize their game performance. Team 4 was the most volatile in terms of the three measures of similarity. In motivation and values the team moved from be the highest to the lowest as they progressed through the simulation. In personality their perception left them in "the middle of the pack". This team incorporated both internal and external performance issues. They were, perhaps, the most outspoken critics of Team 3's sabotaging strategies (probably because Members A and B of this team knew Member A of Team 3 well) but did not let those strategies overshadow the work that they needed to do on their own firm. In fact, Team 4 was successful at being able to adapt to the environmental changes as well as making the necessary internal adjustments. This shows in the fact that this team was able to move up in firm ranking when the simulation ended. By the end of the game, no leader emerged and team decisions were dominated by consensus and cooperation.

Team 4 displayed each stage of the group development sequence proposed by Tuckman (1965): forming, storming, norming and performing. The group took the assigned amount of time to make their decisions for the simulation during most of the game. Member A knew Member B very well and also knew Member C prior to joining the team. Members B and C did not know each other. Members A and B described themselves as very similar in personalities but as being different from Member C. The decision making and problem solving styles of the three also differed. Member A was very detailed oriented while C was less so and Member B was least focused on details. The team made both internal and external attributions for their final performance. While pointing a finger at Team 3's unethical competitive practices, they also acknowledged that their internal conflict was the cause of their slow start in the game.

### **Team 5 (REACTORS)**

Team 5 had the abilities to do well in the simulation but, early on, dropped their motivation to perform. This was reflected in the sharp decreases in the amount of time it took to make their decisions over the duration of the simulation. Due to a lack of specific strategic direction, this group's decisions were haphazard and not well thought out. To make

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performance worse, the group did not pay any attention to environmental changes. The group saw its performance slide over time due to the myopic decision making that took place. The assigned leader was Member A, the lone male. While this was often suggested in jest, Member A, in fact, emerged as the leader of the group. This is clearly evident in the reports from the group members about their motivation and their conflicts. Members B and C reported that their motivation for the class and the simulation could have been higher had the group norms been different. In fact, Member B pointed out that there were overt group pressures NOT to exhibit any signs of involvement or motivation for the simulation, a strong indication of the group-think phenomena. The only member of the group whose report had no indication that motivation would be different under any other circumstances was Member A. He clearly stated that he lacked motivation to perform in the simulation, the class and in college, in general. Since these were individual reports, it is obvious that Member A was strongly influencing team dynamics. While team members reported that, initially, there were differences in decision making and problem solving styles, over time, due to the group-think that characterized this group, these differences disappeared and decision-making styles standardized.

All the members in this group knew each other, although not very well. This team was similar to Team 4 in that they generally avoided the extremes in the perception of similarity. The group was predominantly a social group and members' focus on this aspect of their relationship increased over time. The group reported feelings of heterogeneity based on gender and there was considerable bantering over gender-related characteristics of the members. On the surface, the team members attested to considerable homogeneity about values, motivation and interests. However, when forced into a closer examination, individual members did report underlying feelings of heterogeneity with respect to these variables. Irrespective, the team was extremely cohesive and grew more so as they went through the term.

The team put in the absolute minimum required for making the simulation decisions. They were one of the

few groups who reported that they did not continue to make individual simulation decisions once these were no longer a class requirement. At the conclusion of the simulation, this group thought that members' attitudes, the simulation's artificial constraints and the general abstract nature of the course content contributed to their performance. They also did make an external attribution to Team 3's sabotage of the industry as another factor adding to their disengagement.

### CONCLUSIONS

Several of the results of this study are notable. The researchers expected to see the emergence of distinct managerial group profiles within the competing teams in a TES environment. The results indicate that this emergence happened and was discernible. It seems that there are definable characteristics and that some of the participating teams demonstrated these characteristics. There are several actual and potential benefits of this result. One of the actual benefits is pedagogical. Instructors of strategic management are frequently faced with the challenge of illustrating the existence, parameters and impact of process issues which although they may not be directly addressed with the principles of strategy, may be significant. In the traditional pedagogical mode of strategy principles, there is a lot of categorization, but there is not a lot of discussion of how a firm becomes associated with a particular category and what outcomes result. This experiment demonstrates how the use of the TES can provide an environment in which process issues in strategic management can be taught.

The questions that this research raises may be as significant as the answers that it provides. If it is possible to demonstrate and identify managerial group profiles, can these group profiles be related to ultimate success in a TES simulated world-- in the "real world"? Clearly this is a fascinating issue that calls for additional research. If certain group profiles can be demonstrated to be associated with success, can they be cultivated in the classroom--in the "real world"? If the answer is 'yes' to any of these questions, the implications in terms of how we teach strategic management are obvious and significant.

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### REFERENCES

- Anderson, P. and Lawton, (1997) Demonstrating the Learning Effectiveness of Simulations: Where We Are and Where We Need to Go. *Developments in Business Simulation & Experiential Exercises*, 24, 68-73.
- Anderson, P. and Lawton, L. (1997) TE Simulation: What Does *Developments in Business Experiential Exercises*, 24, 19-25.
- Anderson, P. and Lawton, L. (1991) Personality Types and Total Enterprise Simulation Performance. *Developments in Business Simulation & Experiential Exercises*, 18 (1) 1-4.
- Comer, L. and Nicholls. J. (1997) Does Involvement Influence Learning from Simulation Participation? Some Relationships with Helpfulness and Performance Outcomes. *Developments in Business Simulation & Experiential Exercises*, 24, 11.
- Gentry. J. and Burns, A. (1997) Thoughts about the Measurement of Learning: The Case for Guided Learning and Associated Measurement Issues. *Developments in Business Simulation & Experiential Exercises*, 24, 241-246.
- Gosen, G. and Washbush, J. (1997) Antecedents of Learning in Simulations. *Developments in Business Simulation & Experiential Exercises*, 24, 60-67.
- Gosenpud, J. and Washbush, J. (1996) Total Enterprise Simulation and Performance as a Function of Myers-Briggs Personality Type. *Simulation and Gaming*. 27(2), 184-205.
- Malik, S. and Howard, B. (1996) How Do We Know Where We Are Going If We Do Not Know Where We Have Been? *Developments in Business Simulation & Experiential Exercises*, 23, 49-53.
- Malik, S. and Howard, B. (1995) Investigating the Use of a Computer Simulation as an Effective Pedagogical Tool for the Application of a Strategic Model. *Developments in Business Simulation & Experiential Exercises*, 22. 38-42.
- Manning, P. and Cullum-Swan, B. (1994) Narrative, Content and Semiotic Analysis. In Denzin, N. and Lincoln, Y (eds.) *Handbook of Qualitative Analysis*, Thousand Oaks, Ca: Sage Publications, 463-478.
- Markulis, P. and Strang, D. (1995) An Ethnographic Analysis of the Pedagogical Impact of Cooperative Learning. *Developments in Business Simulation & Experiential Exercises*, 22, 179-188.
- Miles, R. and Snow, C. (1978) *Organizational Strategy, Structure and Process*, NY: McGraw-Hill Publishers.
- Patz, A. (1990) Personality Bias in Total Enterprise Simulations. *Simulation and Gaming*, 23 (1) 45-76.
- Pray, T. and Strang, D. (1980) *DECIDE*. NY, NY: McGraw-Hill.
- Tuckman, B. (1965) Developmental Sequence in Small Groups. *Psychological Bulletin*, 63(6), 385-99.
- Wellington, W. and Faria, A. (1996) Team Cohesion, Player Attitude, and Performance Expectations in Simulations. *Simulation and Gaming*, 27(1), 23-40.