Developments in Business Simulation and Experiential Learning, Volume 28, 2001

ANTECEDENTS OF WORK TEAM PERFORMANCE IN A BUSINESS SIMULATION: PERSONALITY AND GROUP INTERACTION

Gerard Kickul, University of St. Francis
gkickul@stfrancis.edu

This research study focused on the group dynamics that occur within student teams in a business simulation environment. Using Hackman's Input-Process-Output (IPO) model, this study investigated the theoretical relationship between individual personality factors and group performance as they are mediated by various group process variables. A total of sixty-one groups comprised of graduate and undergraduate students participated in the study. All participants, involved in a total enterprise simulation completed the Big Five measures of personality and the group process variables of homogeneity, goal clarity, cohesion, open group process, and internal fragmentation. In addition, the outcome performance measures of a group's profit, market share, return on sales, return on assets, return on equity, asset turnover, and stock price was also measured.

Results revealed partial mediation between the personality variable extraversion and the performance measure asset turnover as influenced by the open group process variable. Additionally, a negative relationship was found between emotional stability and internal fragmentation. Although openness to experience was positively related to group homogeneity and internal fragmentation it was negatively related to goal clarity and open group process.

In today's rapidly changing business environment, many organizations have come to rely on team-based arrangements to increase and improve quality, productivity, and customer service (Swezey & Salas, 1992). As these organizations progress toward decentralization and employee involvement and empowerment programs, the use of teams has become increasingly important in making critical decisions that are essential to the overall survival and success of the organization (Guzzo & Salas, 1995). Underlying this importance and demand for teams is the opportunity for managers and researchers to uncover the individual attributes of team members and their relationship to teamwork effectiveness. One implicit assumption throughout organizational research is that the characteristics of individual team members can play an integral part in modeling and facilitating teamwork knowledge, skills, and abilities (KSAs); processes; and outcomes (Stevens & Campion, 1992). Most of these individual characteristics can also serve to strengthen the quality and effectiveness of the intellectual and social functions of a work team (Guzzo & Salas, 1995). This study concentrated on specific personality factors and their impact on group-process variables that might influence the performance of the team or group.

PURPOSE OF THE STUDY

This study investigated the theoretical relationship between individual personality factors and group performance as they are mediated by various group-process variables (see Figure 1). More specifically, the study uses Hackman's (1987) Input-Process-Output (IPO) model to determine this causal relationship. The basic assumption in the IPO model is that input factors affect group outputs through the interaction that occurs within the process. It was posited that individual personality factors might explain group performance as mediated by the group-process variables.

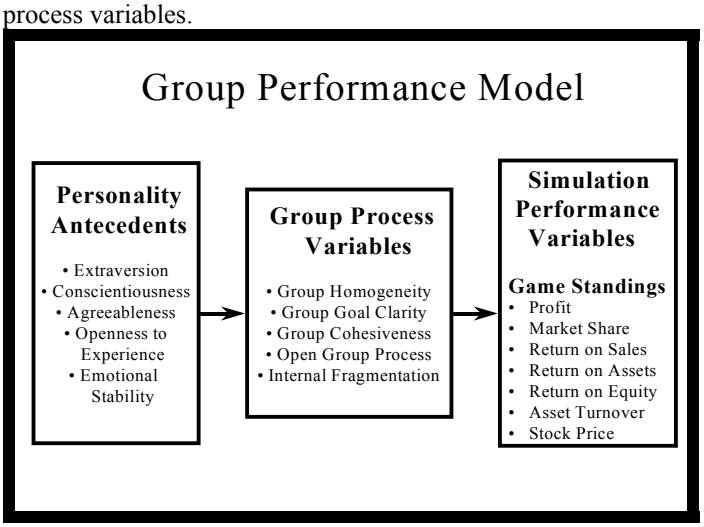

Figure 1. The Relationship Between Personality, Group Process Variables, and Group Performance.

OPERATIONAL DEFINITION OF TERMS

Throughout this paper, the following terms and definitions are employed:

Mediation: The process of explaining how one variable influences another variable (Baron and Kenny, 1986).

Extraversion: Associated with or pertaining to a person's comfort with relationships. Characteristic words associated with extraversion include sociable, talkative, and assertive (Goldberg, 1993).

Agreeableness: A person's tendency to interact with others and the degree to which one yields to the desires of others. Words associated with agreeableness include cooperative, good-natured, and trusting. (Goldberg, 1993)

Conscientiousness: Relating to the number of goals or commitments a person has at any given time. Characteristic words include responsible, dependable, persistent, and achievement oriented. (Goldberg, 1993)

Emotional stability (also called neuroticism): The measure of the stability of a person in relation to stress. Words associated with this measure as viewed from the negative pole include tense, insecure, and nervous. (Goldberg, 1993)

Openness to experience: The ability to accept new things or a person's range of interest. Adjectives used to described this measure include imaginative, artistic, sensitive, and intellectual. (Goldberg, 1993)

Group homogeneity: A measure of the similarity of the group members regarding background, experience, and other characteristics (Cammann, Fichman, Jenkins, & Klesh 1983).

Goal clarity: Related to the team member's understanding of the group's goals and the person's satisfaction (Cammann et al. 1983).

Cohesion: Relates to the social characteristics of a group and measures how attractive a particular group is to an individual outside of the group (Cammann et al. 1983).

Open-group process: Refers to the level of satisfaction a person receives from member involvement, formidable tasks, and social rewards, which results in a decrease in the group conflict (Cammann et al. 1983).

Internal fragmentation: The degree or level of group conflict and the interpersonal relationships that exist within the group (Cammann et al. 1983).

RESEARCH QUESTION AND HYPOTHESES

In the group performance model (see Figure 1), each person brings to the group his or her personality and experience. Together, the group members must perform as a team and successfully achieve the company's goals that they have established as a group. The group dynamics that develop also affect the performance outcomes of the team. Considering the various input factors, group processes and company performance decisions resulted in an overall research question for this study: What is the relationship between personality and group performance as affected through various group interactions and processes?

Hypothesis 1: The group-process variables of homogeneity, goal clarity, cohesiveness, open-group process, and internal fragmentation positively relate to a team's performance measures in the simulation.

Hypothesis 2: Extraversion is positively related to a team's performance in the simulation through the mediating group-process variables.

Hypothesis 3: Conscientiousness is positively related to a team's performance in the simulation through the mediating group-process variables.

Hypothesis 4: Agreeableness is positively related to a team's performance in the simulation through the mediating group-process variables.

Hypothesis 5: Openness to experience is positively related to a team's performance in the simulation through the mediating group process variables.

Hypothesis 6: Emotional stability is positively related to a team's performance in the simulation through the mediating group-process variables.

METHODOLOGY

This study employed a correlational research methodology to examine the possible relationship between the personality antecedents, group-process variables, and the group performance outcomes. More specifically, the study employed Hackman's (1987) IPO model for exploring group effectiveness. The basic assumption in the IPO model is that input factors affect group outputs through the interaction that takes place among the group members. The IPO model employs a three-stage process in which group members' personalities take action in Stage 1 (inputs), affect the group interactions in Stage 2 (process), and impact group performance outcomes in Stage 3 (outputs). Thus, in this study, group interaction in Stage 2 will mediate personality factors in Stage 1 and company performance outcomes in Stage 3. The use of the IPO model is consistent with previous studies of group effectiveness (e.g., Campion, Stevens, & Medsker, 1996; Hackman & Morris, 1975).

This study employed a total of seven professors teaching multiple sections of a strategic management-related course at two Midwestern universities. No screen of the instructors took place other than to verify that they were using the Capstone business simulation (Park Li Management Simulations, 1997) in their class.

Because the individual data on personality and group-process variables were aggregated during the study, the demographic information was included to give a global view of the study's participants. The 257 participants of this study were undergraduate and graduate students majoring in business at two private Midwestern

universities. All subjects were enrolled in business courses with a content area related to strategic management and were using the Capstone business simulation (Park Li Management Simulations, 1997). The courses used a total enterprise simulation as an experiential learning tool as one component of the class. Of the 257 participants, 58.8% were males and 41.2% were female. The youngest participant was 18 and the oldest was 47, with an average age of 27.03 with a standard deviation (SD) of 5.43 years. The students had a self-reported GPA between 3.0 and 3.5. Approximately 58% of the participants worked full time with a mean of 7.52 years of employment (SD = 4.78).

SIMULATION

Capstone is a moderately complex simulation that requires the students to make business decisions on production levels, marketing, human resources, and finance. The participants made numerous decisions, with each decision representing one business year. All firms operated in the same industry-selling electronic sensors, competed against the other teams in the same class, and began in identical starting positions.

The participants in this study were told that the purpose of the study was to explore the relationship between personality dimensions and group performance only after the completion of the simulation so as not to influence the study. There were 61 groups in the study with an average size of 4.2, a standard deviation of 1.05 and a mode of four students per group. The exact size and make-up of each team, the structuring of the simulation environmental factors, and all other operating decisions affecting the running of a particular simulation setting were left to the discretion of each individual instructor.

At the conclusion of the simulation, the participants completed the various data-gathering surveys and the performance ranking that ascertained the performance of each company group.

To assess the personality factors of each participant, the GAC was administered at the conclusion of the study. The GAC consists of 50 adjectives designed to operationalize the five-factor model of personality posited by Digman (1990) and McCrae and Costa (1985). This measure uses a 9-Point Likert scale to rate each of the adjectives (1 = Not at all true of me; 3 = Partly true of me; 5 = Moderately true of me; 7 = Very true of me; 9 = Extremely true of me). Goldberg (1993) established the internal consistencies (Cronbach's alpha) of the GAC instrument as follows: agreeableness (α = .81); extraversion (α = .85); conscientiousness (α = .78); emotional stability (α = .67); and openness to experience (α = .71). The measure of emotional stability falls slightly below the recommended level of .70 (Nunnally, 1978), but based on the prior usage of this instrument by researchers, it was deemed acceptable for this study.

To assess the effectiveness of the groups and individual behavior within the group, the MOAQ Work Group Functioning measure by Cammann et al. (1983) was administered to the participants at the end of the simulation. This measure is designed to assess the group's homogeneity, cohesiveness, goal clarity, open group process, and internal fragmentation. The questionnaire consists of 14 questions and uses a 7-point Likert scale to rate each response (1 = Strongly disagree; 2 = Disagree; 3 = Slightly disagree; 4 = Neither agree nor disagree; 5 = Slightly agree; 6 = Agree; 7 = Strongly agree). The internal consistencies (Cronbach's alpha) of the MOAQ for Work Group Functioning instrument are published as follows: group homogeneity (α = .62); goal clarity (α = .61); group cohesiveness (α = .64); open group process (α = .72); and internal fragmentation (α = .79). Although three of the five variables were slightly below the .70 level recommended by Nunnally (1978), given the lack of available group process measures and prior usage of this instrument by researcher, it was decided that the use of the MOAQ was justified.

Capstone simulation measures and reports each company's performance after each management decision (Park Li Management Simulations, 19970). How each team is performing is based on seven financial performance measures used in the business world. At the start of the simulation, each team has the identical performance, financial, production, and other business measures.

The first of the seven performance measures is market share, which is computed by dividing the company's sales by the total industry sales. Profit is the second performance measure and is calculated by subtracting all business expenses from the firm's sales revenue. Another measure is Return on Sales (ROS) or net profit margin, which indicates the percentage of each sale dollar remaining after all expenses have been accounted for. Return on Assets (ROA) measures the efficiency of the firm's asset and their ability to generate revenue. Asset turnover ratio indicates whether a firm is generating a sufficient volume of business for the size of its assets investment. Return on Equity (ROE) measures the proceeds that an investor receives from the money invested in the firm. The final performance measure is the stock market price of the company's common stock as calculated by the simulation. The average of each of these performance measures is used to determine how well each company is doing on a game to date and yearly basis.

Because the purpose of this study was to examine the IPO model at the group-level, all personality measures and work-group functioning measures were aggregated for each team. For example, for one particular team, each team member's score on the agreeableness scale was combined and a composite score for the team on that personality dimension was formed. This same method was applied to all personality variables, which resulted in a composite personality for each group. Similarly, all of the group-process variables for a particular team were combined to form a composite score for each group.

When the descriptive statistics, reliabilities, and correlations were computed on the study's data, the mediated regression approach recommended by Baron and Kenny (1986) was employed to test the IPO model. In this approach, three separate regression equations were estimated. First, the mediator or each group-process variable was regressed on the independent or each personality variable. If there was a significant relationship between the mediator and the personality variable, then the second of the three equations was run. Failure to establish significance meant that mediation did not exist between the personality factor and group performance as affected by the group process variable.

In the second regression equation, the dependent or performance variable was regressed on the independent or personality variable. Again, if there was a significant relationship between the simulation performance variable and the personality factor, the process was moved to the final phase or third equation. Failure to demonstrate significance meant that there was no relationship between the dependent and independent variables, and thus, no mediation existed.

In the final step, the dependent or simulation performance variable is regressed simultaneously on both the personality (independent) variable and the group process variable. Mediation is indicated when these conditions are met: the independent variable must affect the mediator in the first equation; the independent variable must affect the dependent variable in the second equation; and finally, assuming that all of these conditions are in the proper direction, the effect of the independent variable on the dependent variable must be less in the third equation than in the second equation. Full or perfect mediation is supported when the independent variable has no significant effect when the mediator is controlled. Partial mediation occurs when the effect of the independent variable is reduced in magnitude but still significant when the mediator is controlled (Baron and Kenny, 1986).

RESULTS

Three significance levels were used in this study: significance at the 10% level, at the 5% level, and at the 1% level. Although significance levels of 5% and 1% are used commonly in studies, this study included the use of the 10% level for two reasons. First, this study used the IPO, which is uncommon in previous business simulation studies; no significant amount of literature existed to base the methodology upon. Second, the use of a 10% significance level has been common in several studies that, although not using the IPO process, did involve simulations (Gosenpud & Washbush, 1991; Hemmasi & Graf, 1992; Hemmasi, Graf, & Kellogg, 1989; Isabella & Waddock, 1994; Regan & Rohrbaugh, 1990).

The data in this study were collected from 61 student groups that were enrolled in strategic management-related. The means, standard deviations, correlations, and reliabilities for the measures used in the study are reported in Table 1. The reliabilities for all measures were above .70, as recommended by Nunnally (1978) and Churchill (1979). The range of scores on the five-factor model of personality is based on a 9-point Likert scale, and the group-process variables were based on a 7-point Likert scale.

Among the predictors reported in Table 1, extraversion was significantly related to open group processes ($r = .22$, $p < .10$). Thus, as extraversion increased, there would be a corresponding increase in open group processes. Emotional stability was negatively related to the group mediator of internal fragmentation ($r = -.25$, $p < .05$). This result should be viewed as a positive focus because an increase in emotional stability results in a decrease in a group's internal fragmentation. Finally, the predictor of openness to new experience was related to homogeneity ($r = .28$, $p < .05$), goal clarity ($r = -.38$, $p < .01$), open group process ($r = -.26$, $p < .05$), and internal fragmentation ($r = .29$, $p < .05$). As openness to new experiences increased within the groups, there was a corresponding increase in the group homogeneity as well as an increase in internal fragmentation, which was negatively worded in the questionnaire. Similarly, as openness to new experiences increased, the groups experienced a decrease in goal clarity and open group process.

Table 1

Descriptive Statistics, Correlations, and Reliabilities

Variables	Mean	SD	Alpha	1	2	3	4	5	6	7	8	9	10
1 Extraversion	6.20	.77	.91	1.00									
2 Conscientiousness	7.18	.50	.82	-.04	1.00								
3 Agreeableness	6.90	.58	.86	.50**	.30*	1.00							
4 Openness to new Experiences	5.30	.58	.67	-.01	-.04	-.04	1.00						
5 Emotional Stability	6.48	.50	.77	-.06	.01	.11	-.14	1.00					
6 Homogeneity	5.43	.63	.49	-.16	.05	-.13	.28*	.19	1.00				
7 Goal Clarity	5.57	.85	.72	.18	.00	-.04	-.38**	.16	-.04	1.00			
8 Cohesion	5.69	.65	.40	.11	.00	.06	-.10	.00	.02	.70**	1.00		
9 Open Group Process	5.44	.78	.75	.22†	-.07	-.06	-.26*	.13	-.02	.77**	.80**	1.00	
10 Internal Fragmentation	2.45	.93	.78	-.13	-.09	.03	.29*	-.25*	.13	-.73**	-.73**	-.76**	1.00
11 Profits	56569	45203	---	.11	.19	.23†	-.10	.20	.24†	.18	.11	.04	-.16
12 Market Share	.17	.05	---	-.10	-.03	.05	-.13	.22†	-.04	.19	.10	.18	-.08
13 Return on Sale	.09	.10	---	.13	.00	.17	.12	.10	.31*	.00	.10	.02	-.01
14 Return on Asset	.14	.15	---	.20	.00	.13	.06	.11	.29*	.00	.07	.02	-.04
15 Return on Equity	.08	.55	---	-.02	.16	.16	-.10	.00	.15	.00	.05	-.04	-.13
16 Asset Turnover	1.57	.51	---	.28*	.06	-.07	-.15	-.05	-.20	.13	.22†	.26*	-.31*
17 Stock Price	70.41	48.04	---	.19	.10	.14	-.06	.18	.30*	.15	.07	.01	-.10

Note: ** p<.01; * p<.05; † p<.1 Variables 1-5 are personality factors on a 9-point Likert scale, variables 6-10 are group process factors on a 7-point Likert scale, and variables 11 - 17 are performance measures.

In examining the first hypothesis, which posited that the group-process variables of homogeneity, goal clarity, cohesiveness, open group process, and internal fragmentation would directly influence a team's performance measures in the simulation, partial support was found. As indicated in Table 1, group homogeneity was related to the simulation output measures of profit ($r = .24$, $p < .10$), ROS ($r = .31$, $p < .05$), ROA ($r = .29$, $p < .05$), and stock price ($r = .30$, $p < .05$). The group process (mediator) variables of cohesion ($r = .22$, $p < .10$) and open group process ($r = .26$, $p < .05$) were found to be related to the performance variable of asset turnover. Finally, internal fragmentation was found to be negatively related to asset turnover ($r = -31$, $p < .05$). This negative relationship is logical and expected because a decrease in internal fragmentation that measures levels of group conflict should cause an increase in this performance measure.

The second hypothesis investigated the relationship between the personality variable extraversion and team performance in the simulation through the mediating group-process variables. No significant relationship was found between extraversion and the group-process variables of homogeneity, goal clarity, cohesion, and internal fragmentation, and therefore, mediation could not be established. Partial mediation was found between the independent variable of extraversion, the mediator variable of open group process, and the dependent variable of asset turnover.

As shown in Table 2, there was a significant relationship in the first equation between the personality variable of extraversion and the mediator variable of open group process ($r = .22$, $p < .10$). The second step in mediation requires a significant relationship between the independent variable and the dependent variable. The study found a relationship between extraversion and the dependent variable of asset turnover ($r = .28$, $p < .05$). In the final equation or test for mediation, there was a relationship between the mediator of open group process and the dependent variable of asset turnover ($r = .21$, $p < .10$). This equation showed that there was significant relationship between the personality variable of extraversion and the dependent variable of asset turnover, indicating partial mediation. Therefore, as shown in Table 2, there was partial support of the second hypothesis of this study.

The remaining hypotheses this study examined the relationship between various personality factors and team performance as mediated by the various group-process variables. No significant relationship was found in the first equation of the regression analyses, and consequently, mediation could not be demonstrated. Accordingly, the remaining hypotheses were rejected.

Table 2
Mediated Regression Analyses for the Personality Factor of Extraversion, the Group Variable of Open Group Process and the Simulation Performance Variable of Asset Turnover

Personality Variable: Extraversion	Mediator Variable: Open Group Process	Performance Measure: Asset Turnover
Equation	Summary	
1.	Personality: Mediator	.22+
2.	Personality-dependent variable	.28*
3.	Personality-dependent variable	.23+
	Mediator: Dependent variable	.21+
R2		.12
F		4.00+

Note: $N = 61$ groups
+$p < .1$; *$p < .05$

DISCUSSION

The purpose of this study was to explore the relationship between individual personality factors and various group-process variables. Furthermore, it was posited that individual personality factors would explain group performance as mediated by the group-process variables. Overall, the results of this study did not demonstrate that personality factors influenced group performance as mediated by various group-process variables.

This study found several relationships between the Big Five personality factors and several of the group-process variables. More specifically, the study found that the personality factor of extraversion was positively related to the group-process variable of open group processes. Extraversion looks at the degree of outward orientation of individuals and measures how comfortable they are with various types of relationships. The group variable of open group process indicates the degree of satisfaction one receives from involvement with others, the level of social rewards, and the desire to decrease group conflict. The relationship between these two variables is apparent because people with high extraversion who are comfortable within their relationship associate with open group process, which looks at the need to decrease group conflict, and seek a high degree of satisfaction within the group.

A negative relationship between the personality variable of emotional stability and the group-process variable of internal fragmentation was found. Internal fragmentation measures the level of group conflict within the group. The personality variable of emotional stability examines the extent of stability in relationship to stress and the degree to which a person is affected by life events. The negative relationship between these two variables can be explained when one remembers that emotional stability is viewed from a negative perspective. Thus, as the level of emotional stability increases, internal fragmentation or group conflict decreases.

Another series of relationships was found between the personality variable of openness to experience and the group variable of group homogeneity. Openness to experience measures the ability of people to accept new things, their range of interest, innovation, and creativity. Group homogeneity examines how similar each person is within the group and how attractive the group appears to outside members. The relationship between these two variables is apparent because a larger range of interests and the person's ability to accept new things should be related directly with how similar people within the group see themselves and how this group would appeal to others.

The Big Five factor of openness to new experience was found to be negatively related to goal clarity. The group variable of goal clarity emphasizes the knowledge the team members have regarding the goals of the group and how satisfied a person is with group. This negative relationship may be explained logically as the team members' range of interests increases or the members' innovativeness increases, there could be less individual satisfaction received from achieving the team's goals.

A negative relationship also existed between openness to experience and the group-process variable of open group process. This negative relationship could occur for several reasons, including the limited exposure some students, especially undergraduate students, have to team-oriented tasks. With limited group experience, the stress of having to depend on other team members as a component of their individual grade may create a situation in which a student's willingness to accept new ideas, to make appropriate compromises, and to accept creative solutions to the problems confronting the group may be diminished. These factors may tend to increase group conflict and decrease a student's satisfaction from the involvement within the team and from the learning experience inherent in a business simulation. The lack of social reward in the form of actual compensation and the deferment of performance rewards and grades until the end of the course may also decrease the satisfaction the students receive for the team tasks.

Finally, openness to experience was positively related to the group-process variable of internal fragmentation. Because students were allowed to form their own groups, most teams tended to organize around common identifying factors such as friendship, discipline major, and previous exposure to each other in various courses and collegiate activities. This creates a common range of interest and interpersonal relationship among the team members, which is measured by these two variables.

There were six research hypotheses in this study. The first concerned the relationship between the group process variables and a team's performance within the simulation. Hypothesis stated that the group process variables of homogeneity, goal clarity, cohesiveness, open group process and internal fragmentation will positively relate to a team's performance measures in the simulation. There was partial support of this hypothesis since several relationships existed between the various group process variables and the performance measures. These partial results are congruent with studies by Gosenpud and Washbush (1991), Norris and Niebuhr (1980), and Wolfe and Box (1988), which found group factors such as cohesion, goal clarity, and group interaction were all related to a group's performance.

Group homogeneity was found to be positively related to the performance measures of profit, ROS, ROA, and the firm's stock price. These results are similar to Gosenpud and Washbush (1991) and Miesing and Preble (1985), who found a correlation between simulation performance and how well teammates knew each other before the simulation and their connection to each other during the course. There existed a significant relationship between asset turnover and the group variables of cohesion and open group process. Again, this is consistent with Norris and Niebuhr (1980) and Wolfe and Box (1988), who found cohesion and levels

of conflict were related to performance. A negative relationship existed between the group variable internal fragmentation and asset turnover; thus, as internal group conflict decreases, indicating better group interaction, the performance measure of asset turnover increases.

The second hypothesis stated that measures of extraversion would be positively related to team performance in the simulation through the mediating group-process variables. The study found that partial mediation occurred between the personality variable of extraversion and the performance measure of asset turnover as influenced by the open group process variable. Partial mediation indicates that extraversion is influencing the performance variable of asset turnover directly but it is also influenced through the proposed model in Hypothesis 2. This means that a component of the relationship between extraversion and the performance variable of asset turnover is mediated by open group process.

Asset turnover is calculated by dividing a firm's sales by the total assets of the company. Because this asset turnover uses a firm's sales and total assets, it does not consider the firm's cost of doing business, unlike the other performance measures used in this study. To determine profits, a firm must calculate not only sales revenue but also the total costs to manufacture and sell the goods. By not considering the effects of costs, asset turnover becomes easier for inexperienced teams to take into account in their decision-making process. Asset turnover is a simple relationship to master, examining the present and forecast level of sales and the assets required to generate the desired amount of sales. Therefore, for newly formed teams, it is easier to see and thus control the relationship between generating sales and the level of assets or equipment required to achieve the desired sales volume.

This relationship between extraversion and asset turnover and the partial mediating effect of open group process can be examined and explained. The personality variable of extraversion relates to the outward orientation of the person and the comfort levels they experience with external relationships. The group variable of open group process examines the satisfaction and social rewards that people receive from the group, which has the effect of decreasing group conflict. Given the fact that asset turnover is the least complicated of the performance measures used in this study, it becomes the easiest for student teams to understand and use in their decision-making process. Therefore, groups may experience less group conflict and derive greater satisfaction when making decisions that influence this performance measure.

Although the results of this study were less than expected, there are a number of implications from an instructional design context. The commonly used financial performance measure in most simulations may not be the best means of assessing student learning and team performance due to the students' lack of understanding of the subject matter. A better approach might be to employ a variety of performance measures, including both financial, individual, and group assessment instruments. Another instructional design methodology option that instructors should consider would be to employ separate simulation periods rather than using only one simulation run that covers the entire course.

This study has a number of implications for an organizational perspective. With better understanding of personality antecedents and group performance, organizations could adopt strategies that are specifically aimed at finding individuals who display certain types of personalities and abilities. These strategies include the use of selection procedures to screen individuals whose personalities and competencies are related to emergent leadership and teamwork effectiveness. Organizational interventions could be employed to identify existing employees who would be most effective in leading a team, given their ability and personality.

In summary, although the results of this study led to rejecting most hypotheses, there was partial acceptance of the second hypothesis, that the measures of extraversion would positively affect team performance in the simulation through the mediating group-process variables. This study employed Hackman's (1987) IPO model, which allowed for a more complex research approach into the effectiveness of simulation. Finally, this study recommended the use of multiple means of evaluating student performance within a simulation. Because of the continuing demand on schools and faculty to better prepare their students for the rapidly changing business world, the educational advantages of experiential learning tools, such as simulations, hold great promise. Clearly, more research into the use of simulations in business education is required, and it is hoped that this study will serve as a foundation for future research into this area.

REFERENCES

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51(6*), 1173-1182.

Cammann, C., Fichman, M., Jenkins, D. G., Jr., & Klesh, J. R. (1983). *Assessing the attitudes and perceptions of organizational members: Assessing organizational change.* New York: Wiley-Interscience.

Campion, M. A., Stevens, M. J., & Medsker, G. J. (1996). *An input-process-output (IPO) model of work team effectiveness.* Paper presented at the 11th Annual Conference of the Society for Industrial and Organizational Psychology, San Diego.

Churchill, G. A. (1979). A paradigm for developing better measures of marketing constructs. *Journal of Marketing Research, 16*(2), 64-73.

Digman, J. M. (1990). Personality structure: Emergence of the five-factor model. *Annual Review of Psychology, 41,* 417-440.

Goldberg, L. R. (1993). The development of markers for the Big-Five factor structure. *Psychological Assessment, 4*(1), 26-42.

Gosenpud, J., & Washbush, J. B. (1991). Predicting simulation performance: Differences between groups and individuals. *Developments in Business Simulations and Experiential Exercises, 18*, 44-48.

Guzzo, R. A., & Salas, E. S. (1995). *Team effectiveness and decision making in organizations.* San Francisco, CA: Jossey-Bass.

Hackman, J. R. (1987). The design of work teams. In J. W. Lorsch (Ed.), *Handbook of organizational behavior* (pp. 315-342). Englewood Cliffs, NJ: Prentice-Hall.

Hackman, J. R., & Morris, C. G. (1975). Group tasks, group interaction process, and group performance effectiveness: A review and proposed integration. In L. L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 8) (pp. 47-100). Orlando, FL: Academic Press.

Hemmasi, M., & Graf, L. (1992). Managerial skills acquisition: A case for using business policy simulations. *Simulation and Gaming, 23*(3), 298-310.

Hemmasi, M., Graf, L., & Kellogg, C. (1989). A comparison of the performance, behaviors, and analysis strategies of MBA versus BBA students in a simulation environment. *Simulation and Gaming, 20*(1), 15-30.

Isabella, L. A., & Waddock, S. (1994). Top management team certainty: Environmental assessments, teamwork, and performance implications. *Journal of Management, 20*(4), 835-858.

McCrae, R. R., & Costa, P. T. (1985a). Comparison of EPI and psychoticism scales with measurements of the Five-Factor Model of personality. *Personality and Individual Differences, 6*, 587-597.

Miesing, P., & Preble, J. F. (1985). Group processes and performance in a complex business simulation. *Small Group Behavior, 16*(3), 325-338.

Norris, D. R., & Niebuhr, R. E. (1980). Group variables and gaming success. *Simulation and Games, 11*(3), 301-312.

Nunally, J. (1978). *Psychometric theory*. New York: McGraw-Hill.

Park Li Management Simulations, Inc. (1997). *Capstone: Team member guide* (Business Planning Edition, Version 5.7) [computer software]. Northfield, IL: Author.

Regan, P., & Rohrbaugh, J. (1990). Group decision process effectiveness: A competing values approach. *Group and Organization Studies, 15(1),* 20-43.

Stevens, M. J., & Campion, M. A. (1992). *Staffing teams: Development and validation of the teamwork-KSA Test.* Las Vegas, NV: Academy of Management.

Swezey, R. W., & Salas, E. (1992). *Teams: Their training and performance*. Norwood, NJ: Ablex Publishing Company.

Wolfe, J., & Box, T. M. (1988). Team cohesion effects on business game performance. *Simulation and Gaming, 19(1)*, 82-98.