

**CEO LOCUS OF CONTROL AND  
GAME PERFORMANCE AND PLAYING BEHAVIOR**

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**ABSTRACT**

The effects of a business game player's locus of control on company performance, risk-taking behavior, information-seeking activity and product innovation effort was examined. Those with an internal orientation out-performed those with an external orientation. The 'internals' mounted consistently higher product innovation efforts as hypothesized. The hypothesis regarding risk-taking behavior was not supported while the hypotheses regarding differential information-seeking activity were untestable due to a general lack of information acquisition. Locus of control and grade-point-average were relatively strong predictors of company economic performance.

**INTRODUCTION**

Since the beginning of the modern business gaming movement in the late-1950s a number of research streams have flourished. One stream embraces demonstrations of simulations that have been produced or the teaching, training and management development environments that have been created by simulations. Another stream has dealt with the gaming process' internal and/or external validity. This validity is usually either affirmed or denied by such measures as participant behavioral or attitudinal changes or increased learning levels. Another stream has dealt with business gaming procedures while another stream has dealt with those elements which make the gaming situation an optimal learning environment. This latter stream typically deals with the game's

external and internal structure with the tacit belief the simulation must possess a requisite level of validity if it is to be a meaningful experience given the (1) receptiveness, talents and motivations of the game's players and (2) game administrator's skills.

The research study reported here deals with this last research stream. It deals with how a significant personality trait, a player's locus of control, may dictate (1) how the simulation's playing environment is negotiated by the player and (2) the success that player will obtain in the gaming situation. If a playing environment created by a simulation has validity it must allow for, and reward and punish, those personality traits and qualities rewarded and punished in the real-world environment the simulation has copied or replicated. Given this validity its user can be confident the simulation's lessons are transferable to the real world and that real-world management trainees or practicing managers can benefit from playing the business game.

**LITERATURE REVIEW**

Much research has been conducted on the personality traits and characteristics of successful versus unsuccessful real-world managers and executives. Psychological tests have been conducted or summarized, such as those by Henry (1948), Rosen (1959), Piotrowski and Rock (1963), Ghiselli (1966), Berlew and Hall (1966) and Kraut

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(1969), on real-world managers to either determine or predict which individuals are or will be more successful in higher management positions. This has also been the case in the business gaming field.

Studies have been conducted by Haley and Stumpf (1989) on personality types and strategic decision-making biases, Wolfe and Chacko (1980) on cognitive structure, ambiguity tolerance and category width, Badgett, Brenenstuhl and Marshall (1978) on locus of control and interpersonal trust, Hoffmeister and De Marco (1977) on order, autonomy, endurance, time competence and locus of control and Davis (1982) on cognitive styles. More recently a flurry of activity has revolved around insights into the gaming process brought about by applying the Myers-Briggs Type Indicator Myers and McCaulley (1985). The work of Chanin and Schneer (1984), Patz (1992), Anderson and Lawton (1993), Gosenpud and Wash-bush (1992) and Michael, Johnson, Fleming and Lynch (1991) typifies these activities.

Faria (1987) found the majority of North America's business games are used in business policy or strategic management-type management development and education situations. Accordingly, research into the personality characteristics associated real-world strategic managers as expressed in management games would be useful. Research of this nature would also be useful to the field of strategic management as it has been recommended by some that management games can be employed as laboratories for the study of the strategic management process (Nees, 1983; Schwenk, 1982). One relevant personality trait that has

recently received emphasis is the locus of control (LOC) possessed by a firm's strategic manager or chief executive officer (CEO).

Locus of Control is a fundamental personality trait reflected in a generalized belief in either an internal or external control of actions taken by the individual (Rotter, 1966). Those with an external locus of control, labeled "Externals", believe their lives are largely controlled by forces outside of themselves such as luck, powerful people or institutions. Those with an internal LOC, labeled "Internals", believe they can influence their environments and can control their lives through effort and expertise. Given these two possible orientations, researchers have investigated this personality trait as applied to the CEOs of large organizations. Because top managers have a strong impact on their organizations, their personalities should influence the types of strategies chosen, the product/domains entered or retained, and the degree of risk-taking innovations attempted and implemented.

"Internals" are more task oriented and functioned better in stress situations, certainly the nature of a CEO's job situation (Anderson, 1977; Anderson, Hellriegel and Slocum, 1977; Lesage and Rice, 1979). "Internals" are also more likely to possess the entrepreneurial qualities necessary for product and service innovation (Brockhaus, 1975; Durand and Shea, 1974; Miller, 1983; Shapero, 1975). Miller, Kets De Vries and Toulouse (1982) found that "Internals" led companies that were more innovative, took greater risks, were proactive with the changes they faced in

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competitive environments, and used more planning in their attempts to take advantages of industry-wide changes.

Operating at the organizational level firms led by "Internals" also performed better than those led by "Externals" (Boone and De Brabander, 1992; Boone and De Brabander, 1993; Hodgkinson, 1992). In obtaining this superior performance the "Internals" engaged in more environmental scanning in both the amount of information sought and the frequency at which it was obtained (Dutton, Walton and Abrahamson, 1989). They scanned the environment in an opportunistic fashion rather than for defensive purposes (Begley and Boyd, 1987) and they were more innovative (Khan and Manopichetwattana, 1989). Given these real-world results and associations, a valid gaming experience should produce the same results if the LOCs of each company in the simulation were controlled. The following section presents the hypotheses to test the role of a player's LOC on firm performance and decision-making behavior.

### HYPOTHESES

Based on the literature cited, the following hypotheses were formulated:

- H1 Companies led by Internals will outperform companies led by 'Externals'.
- H2: Companies led by Internals will seek greater amounts of information about their firm's competitive environment than companies led by Externals.
- H3: Companies led by Internals will seek information about their firm's competitive

environment more often than companies led by Externals.

- H4: Companies led by Internals will engage in greater levels of risk taking behavior than companies led by Externals.
- H5: Companies led by Internals will engage in risk-taking behavior earlier in their leadership tenures than companies led by Externals.
- H6: Companies led by Internals will engage in greater levels of product innovation activity than companies led by Externals.

### METHODOLOGY

The study's subjects (n=68) were graduating seniors enrolled in capstone strategic management courses conducted in Spring-Fall 1994 and they displayed the demographic characteristics presented in Exhibit 1. These characteristics were typical for the southwestern institution at which the study was conducted. Participants were randomly assigned to single-member firms in one of four, 8-9 firm industries in The Executive Game (Henshaw and Jackson, 1990), a moderately complex game under the complexity scale of Wolfe (1978b). The simulation requires firms to make both strategic and tactical price, sales promotion, production, capacity expansion, research and development, raw material, maintenance and dividend decisions on a quarterly basis. Single-member teams were employed to eliminate group process effects on decision making practices and to make most direct the relationship between an individual player's locus of control,

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the decisions made and the results obtained in the game.

Each firm's ranked cumulative earnings over nine playing periods for 20.0% course credit was employed as the indicator of company success. Although other indicators of a firm's economic performance could have been employed, company earnings or profits are the most commonly employed criterion employed in studies of this type. Ranked earnings were employed as (1) this method allowed merging the results of separately-operating industries regardless of the absolute performance levels obtained in each industry and (2) the student's simulation grade was based on comparative within-industry performance. Accordingly, all statistical tests in this study were nonparametric.

Each subject's locus of control (LOC) was determined by administering a game-specific version of Hodgkinson's (1992) strategic locus of control scale. Although similar studies of chief executive officer locus of control have employed Rotter's (1966) I-E scale, the instrument suffers from a lack of context specificity (Phares, 1976; Adler and Weiss, 1988) and possesses a social desirability bias (Spector, 1988). The Hodgkinson scale remedies these problems and possesses good reliabilities with Cronbach coefficient alphas ranging between 0.70 and 0.88.

The LOC instrument was administered at the simulation's midpoint after the players had gained considerable experience with the game's competitive environment. The instrument's game-specificity was obtained by replacing Hodgkinson's general terms with those relating to The Executive Game itself such as in the

following manner:

There is very little my company in THE EXECUTIVE GAME can do in order to change the "rules of competition" in its industry.

My company in THE EXECUTIVE GAME is able to influence the basis upon which it competes with other firms in its industry.

Market opportunities in my industry in THE EXECUTIVE GAME are largely predetermined by factors beyond my company's control.

The amount and frequency of competitive environment information-seeking by player, was tested by allowing each company to purchase up to sixteen bits of information per playing period. The information possessed point estimate errors ranging from plus or minus 10.0%-15.0% and could be requested on an industry-wide basis or by specific competitors within the industry. Companies were charged \$2,000 for each bit of information, which included such items as a competitor's plant capacity, marketing budgets and total-industry and company R&D budgets.

Each company's degree and order of risk-taking behavior was judged by plant and equipment expansion levels in the face of ambiguous sales-forecasting situations with unknown rewards yet specific excess capacity costs. Each company's product innovation activity was measured by its R&D budget levels, which in this simulation are "aimed mainly their at improving and differentiating the firm's product" (Henshaw and

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Jackson, 1990, P. 18)

EXHIBIT 1  
STUDY GROUP DEMOGRAPHIC  
CHARACTERISTICS

Age: 25.0	
Work Experience: 4.86 years	
Grade-point-average: 2.97	
Major:	
Accounting	44.8%
Economics	4.5
Finance	14.9
Management	11.9
Marketing	11.9
Mgt. Info. Sys.	11.9
Total	100.0%
Sex:	
Male	55.2%
Female	44.8
Total	100.0%
Marital Status:	
Single	68.7%
Married	6.4
Widowed	1.5
Divorced	4.5
Engaged	7.5
Separated	1.5
Total	100.0%

### RESULTS

The first hypothesis tested whether companies led by Internals outperformed those led by Externals. As shown in Exhibit 2 the Internals significantly outperformed the Externals  $p=0.31$ . The Spearman rank-difference correlation between LOC score and company performance was 0.38 significant beyond the .05 level in a one-tail test. The next two hypotheses tested for differential information-seeking activity by LOC score. These hypotheses could not be tested, as only four of the sixty-eight companies ever requested information, and only

18 information bits out of a total possible 9,792 bits were requested during the game. Those who requested information asked for an average of 3.8 bits on five separate occasions and almost all requests were made within the simulation's first three playing periods.

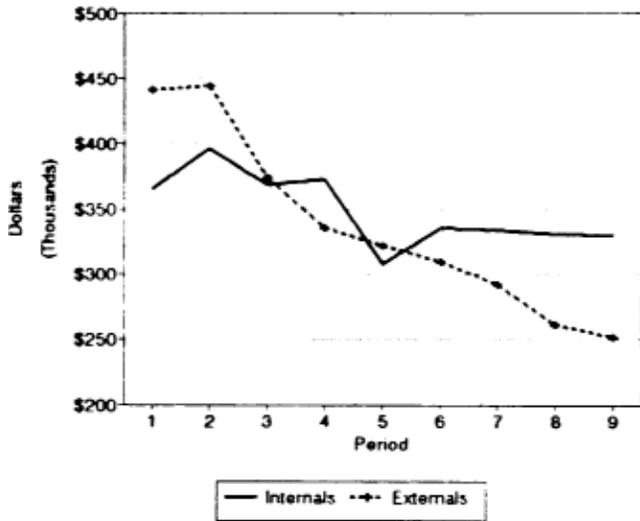
EXHIBIT 2  
COMPANY EARNINGS BY LOC GROUP  
(Median Earning In Millions)

Locus of Control	Earnings
Internals	\$ 3,280.3
Externals	- 464.4
Significance = 0.031	
Spearman rho = 0.380	

Exhibit 3 graphs each LOC group's plant and equipment expenditures. Contrary to what was hypothesized, the Externals outspent the Internals early in the simulation. Although the Internals outspent the Externals later in the game the initial expenditure lead built up by the Externals was not overcome by the Internals. The first-year average quarterly plant and equipment investment for the Internals was \$375,843 versus \$392,234 for the Externals, significant beyond the .001 level. The Internals outspent their counterparts in five of game's nine quarters later in the simulation, but overall the Internals spent \$9,835,870 less than the Externals significant beyond the .001 level. Given the Externals outspent their rivals early in the simulation, when it was most difficult to predict both demand and the benefits that could be derived from plant expansions, it could be concluded they engaged in greater risk-taking be-

DISCUSSION

EXHIBIT 3  
AVERAGE FIRM PLANT AND EQUIPMENT EXPENDITURES

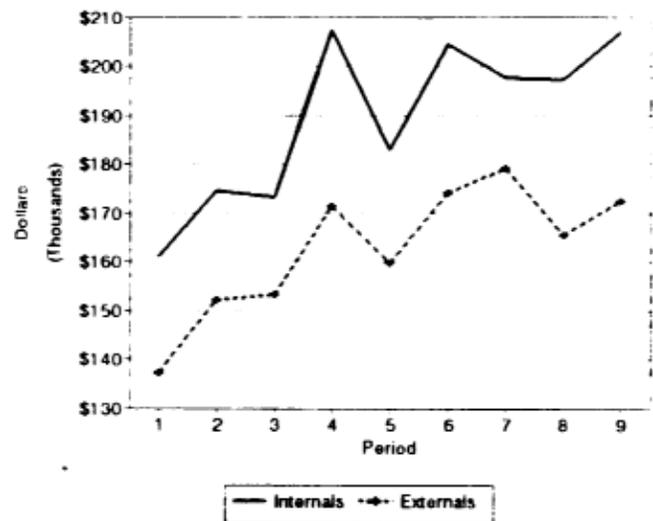


havior. The Internals did much of their expanding when demand was more easily forecasted and therefore their expansions entailed a lower degree of risk. The fact that the Internals made these expansions later in the simulation also indicates they were followers rather than leaders in this effort thus rejecting hypothesis H<sub>5</sub>.

Exhibit 4 shows the last hypothesis regarding product innovation activity was supported beyond the .001 level for both total and average quarterly spending. An additional test investigated whether a relationship existed between a player's GPA and LOC score to test whether it was the CEO's GPA rather than LOC score that was associated with the firm's economic performance. A zero correlation was found. This lack of association indicates the player's combined locus of control score and GPA afforded a more powerful explanation of company performance than when these personal attributes were considered in isolation.

Although this study's major hypothesis regarding the expected performance levels exhibited by the Internals was supported, the contrary and equivocal results associated with four of the remaining five hypotheses requires a further examination. Regarding the general lack of information seeking behavior regardless of LOC

EXHIBIT 4  
AVERAGE FIRM R&D EXPENDITURES



score, it is possible the companies felt that both the simulation's quarterly and year-end industry-wide information, which was provided gratis, was adequate for their planning purposes. It is also possible the companies either thought the information obtained for \$2,000 per bit was either too inaccurate or presented data that was not relevant to the decision maker's needs. Moreover, given the information costs were a strict known, but the information's benefits could not be quantified, the rigidly rational choice would be to forego purchasing information. Another explanation for the lack of information-seeking activity could lie

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in the complexity of the game it-self. Given The Executive Game is of intermediate complexity, with only one product being sold in one market, it is possible that relatively little competitor and product-performance information is needed or desired by players. Players engaged in such simulations as, The Multinational Management Game (Keys, Edge and Wells, 1994), The Business Management Laboratory (Jensen, 1992) or The Business Policy Game (Cotter and Fritzsche, 1995), which entail multiple products sold in multiple markets, might avail themselves of the opportunity to purchase additional information. Further research into this area with more complex simulations is warranted.

Because studies have found moderate to high and positive correlations between academic achievement and game results in single-member company situations (Vance and Gray, 1967; Gray, 1972; Wolfe, 1978a) the relationship between LOC scores and GPAs was examined. It is possible the Internals performed better because they possessed higher GPAs and therefore were better prepared for the simulation. Exhibit 5 shows this was true. A fairly strong relationship existed between the player's past academic achievement level and game performance. This relationship, moreover, is even stronger than that which existed between the player's LOC score and game performance. A regression analysis was performed to determine if a relationship existed between a player's GPA and LOC score as this would test whether it was the CEO's GPA rather than LOC score that was associated with the firm's economic performance. A zero correlation was found. This

lack of association indicates the player's combined locus of control score and GPA affords a more powerful explanation of company performance than when these personal attributes are considered in isolation.

**EXHIBIT 5**  
COMPANY EARNINGS BY GPA  
(Median Earnings In Millions)

GPA	Earnings
High	\$ 2,625.3
Low	- 332.4
Significance = .002	
Spearman rho = .470	

### CONCLUSION

As generally hypothesized, a player's strategic locus of control in a general management game was associated with company economic performance. Those who were Internals outperformed those who were Externals and the Internals engaged in higher levels of product innovation activity as hypothesized. It is suggested that further study into this lack of information-seeking activity be conducted with more complex games and/or with simulations that offer less "free" information. This study also reaffirmed the positive relationship that exists between a player's past academic achievement levels and game success.

### REFERENCES

Due to space limitations the references to this paper will be supplied upon request.