The Interaction of Leadership Roles and Organizational Learning Environment: A Canonical Correlation Approach

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As managerial development continues to take a significant portion of organizational budgets, researchers seek to find effective methods of improving the quality of that training. At the same time, organizations search for a sustainable competitive advantage through the learning organizational environment. This study shows the correlation between leadership roles and the organizational environment in which they are developed. Correlations are found between the Competing Values Framework (Quinn, 1988) and the Context-for-Learning (Ghoshel & Bartlett, 1994). These correlations allude to the effectiveness of *managerial development to develop a learning organizational environment.*

INTRODUCTION

Rapid economic changes in the global marketplace require organizations to recognize and pursue opportunities that develop or preserve a competitive advantage (D'Aveni, 1994; McNamara, Vaaler, & Devers, 2003). Resource based theory proposes that the diverse resources cultivated, obtained, or supported by the organization develop such a competitive advantage (Barney, 1991; Barney, Wright, & Ketchen, 2001; Ireland, Hitt, & Sirmon, 2003). The focus of resource based theory scholars centers on resource heterogeneity in order to identify these unique resources, which explain firm performance (Peteraf, 1993; Peteraf & Barney, 2003). A central tenet in the resource-based view theory of the firm is creation and maintenance of management capabilities (Mueller, 1996).

Some empirical research provides a glimpse of how influential people policies are over time (Patterson, West, Lawthom, & Nickell, 1997). From such studies, organizations recognize the importance of these capabilities and seek methods to develop these skills. Therefore, organizations devote a sizeable portion of their human resources budget on management capability development (Saari, Johnson, McLaughlin, & Zimmerly, 1988). Management skill sets enable a firm to outperform its rivals or enable a firm to develop competitive heterogeneity (Hoopes, Madson, & Walker, 2003). However, are the management capabilities developed through these human resource efforts conducive to the organizational environment and the needs of the workforce of that organization?

As the organizational world becomes increasingly dynamic, interdependent, and unpredictable, it is impossible for organizational leadership to "figure it all out" (Senge, 1990). Successful leading edge organizations realize the importance of having everyone within the organization involved in the process of actively learning and adapting in order to create the organizational competitive advantage. Such learning organizations involve a proactive, creative approach to solicit involvement from and empower employees at all levels of the organization (Hannah & Lester, 2009; Wall, 2005).

Such organizational environments have largely been viewed as largely descriptive rather than evaluative (Schneider & Reichers, 1983), but studies that are more recent suggest that environment is not only evaluative but has effect on productivity of the organization (Patterson, West, Shackleton, Dawson, Lawthom, Maitlis, Robinson, & Wallace, 2005). Environments that foster intentional and ongoing actions continually to transform the organization by acquiring information and knowledge and the subsequent incorporation into decisions and actions provide a competitive advantage for that organization (Hodgetts, Luthans, & Lee, 1994). In fact, such an environment of organizational learning may not only provide for competitive heterogeneity and therefore a competitive advantage but also the only means of developing a sustainable competitive advantage (Crossan & Berdrow, 2003).

The purpose of this paper is to explore whether management capabilities interact with the organizational environment. The competing values framework (Quinn, 1983) provides a broad portrayal of managerial capabilities, while the context for learning model (Ghoshal & Bartlett, 1994) supplies a view of the environment of a learning organization. The following discussion illuminates these two models. Then a discussion of the exploratory research objectives, the data and analysis, and the results and discussion of the research conclude this study.

Managerial Competencies

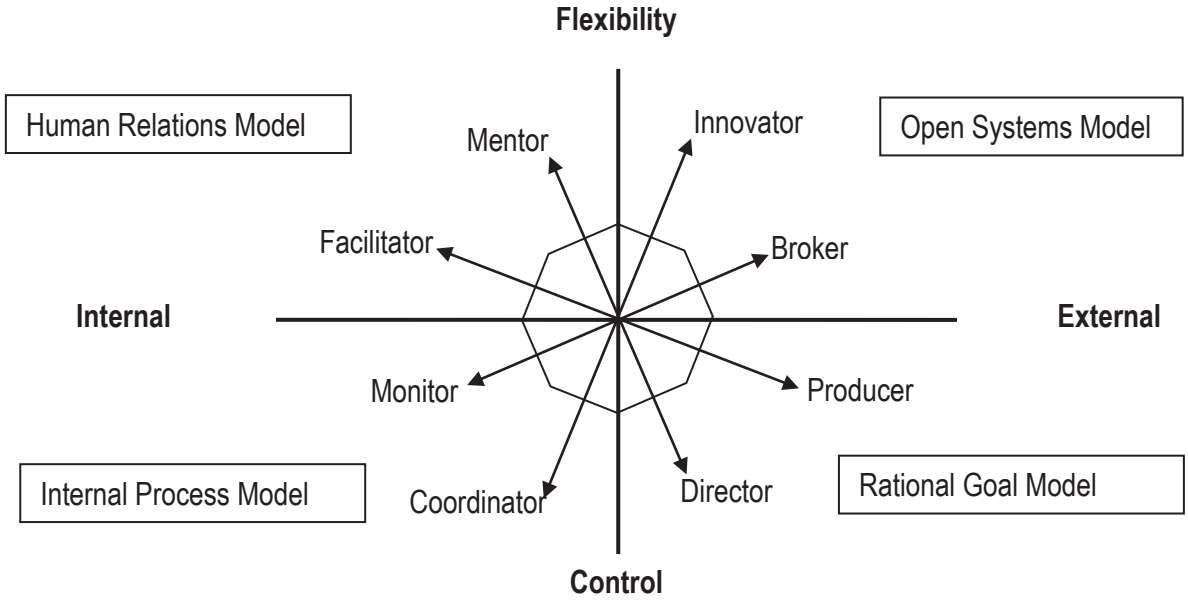
A critical strategic intangible resource of an organization is the leadership found within that organization. These competencies can provide a means for an organization to remain competitive. These skills can further be a distinctive advantage in a particular industry, or with particular boundary conditions. In fact, there is an ongoing debate about what constitutes leadership skills and what constitutes managerial skills (Howell & Costley, 2001). Generally, managers value stability, order, and efficiency, and leaders' value flexibility, innovation, and adaptability (Bennis & Nanus, 1985). Managers concern themselves with the day-to-day operations of the organization. Leaders, on the other hand, concern themselves with the future direction, goal setting, and strategies necessary to meet the goals (Kaplan & Kaiser, 2003).

Organizations are most interested in pragmatic solutions to the ongoing needs of the organization rather than the theories of the leadership debate. Combining both of these sets, Quinn and associates viewed a balanced approach to these competencies with the "master" manager (Quinn, Faerman, Thompson, & McGrath, 2003). The competing values framework (CVF) offers a method to analyze the master managers' skills (Quinn & Cameron, 1983; Quinn, 1984, 1988; Quinn, Sendelbach & Spreitzer, 1991; Quinn, Spreitzer & Hart, 1992). Their model (see Figure 1) incorporates four historical models of efficient organizations to provide quadrants to the CVF (Quinn, et al., 2003). Those four models are human relations model, rational goal model, open systems model, internal process model.

Utilizing the relationships between these historical models provides a framework for the construct organizational effectiveness. The horizontal axis contains control systems competing with flexible systems, while the vertical axis contains internally focused systems competing with externally focused systems. The human relations model sits in between flexibility and internal and promotes commitment and morale as well as participation and openness. The perceptual opposite is the rational goal model which sits between external and control. The rational goal model suggests productivity and accomplishment as well as direction and goal clarity. The open systems model shares the external axis with the rational goal model and the flexibility axis with the human relations model. This model contains innovation and adaptation with growth and resource acquisition. The final model is the internal process model. This model shares the control axis with the rational goal model and the internal axis with the

human relations model. This model supplies stability and control as well as documentation and information management.

FIGURE 1
QUINN'S COMPETING VALUES & ROLES



By establishing the four different models in such a manner, the values and weaknesses of each model become more apparent. These models represent the development of management belief over the past century (Quinn, et al., 2003). The development of each model follows the societal changes, as well as modifications in existing viewpoints and attempts to become better (Fabian, 2000). Managers that call upon the benefits of more than one model, while recognizing the weakness in another model as it pertains to his or her own unique situation within their organization provides more potential effectiveness (Senge, 1990). The challenges for managers are to appreciate the values and weaknesses of each model and then to acquire and use the competencies of each model through integration of those competencies in the managerial situations that he or she encounters.

In each quadrant, two defined roles describe the behaviors that a leader in those roles might exhibit. Each role has an opposite or competing role from the exact opposite quadrant. Effective use of these behaviors suggests individual leader competencies and perception of the effectiveness of the leader (Hart and Quinn, 1993; Hooijberg, 1996). A leader should be aware of the unseen (competing) values at the other end of the pursuant values. This is the key to the competing values framework.

The complementary roles of Mentor and Facilitator fall in the internal-flexible quadrant. The Mentor role behaviors consist of understanding others, communicating effectively, and developing followers. The Facilitator role behaviors consist of building effective teams, facilitating participative decision-making and managing conflict.

Competing roles appear in the external-control quadrant. The complementary roles of Producer and Director fall into this quadrant. The Producer role behaviors consist of working productively, managing time and stress, and fostering a productive work environment. The Director role behaviors consist of designing and organizing work including delegation and envisioning the future, and setting goals.

Encompassed in the internal-control quadrant are the complementary roles of Monitor and Coordinator. The Monitor role behaviors consist of monitoring collective and organizational performance while monitoring individual performance. The Coordinator role behaviors consist of managing projects and design work processes across functional areas.

Competing roles of the internal-control quadrant exist in the external-flexible quadrant. The complementary roles in this quadrant are the Innovator and Broker. The Innovator role behaviors consist of fostering a creative environment and creating creative change. The Broker role behaviors consist of building and maintaining a power base, presenting ideas, and negotiating agreement and commitment.

Quinn (1988) detailed leader profiles and designated some effective and others ineffective. Effective leader profiles were the Master Manager (balanced in all skills), the Conceptual Producer (weak in monitoring and coordinating, strong in production and innovation), the Peaceful Team Builder (weak in producing and brokering, strong in facilitating), and the Aggressive Achiever (slightly weak in facilitating, strong in producing). Ineffective leader profiles include the Drowning Workaholic (weak everywhere but strong in producing), the Chaotic Adaptive (strong in facilitating, mentoring, innovating and weak elsewhere), the Abrasive Coordinator (strong in monitoring and coordinating but weak elsewhere), and the Extreme Unproductive (weak everywhere, but stronger in mentoring and weakest in producing). The Master Manager role is the leader that utilizes all behaviors within the correct context (Quinn, 1988; Hooijberg & Quinn, 1992; Hooijberg, 1996).

Organizational Learning Environment

Similar to managerial competencies, the activities undertaken by the individuals within an organization also form unique beneficial resources (Porter, 1991). Barnard (1938) suggested that individuals within the organization contribute to the cooperative system of the organization, often only for the good of the organization. This contribution is embedded in what the organizational theory literature describes as climate or culture (see Pettigrew, 1979; Denison, 1996; Asif, 2011 for examples) and the strategy process literature describes as organizational context (see Burgelman, 1983; Ramaswamy, Mingfang, & Veliyath, 2002; Janowicz-Panjaitan & Noorderhaven, 2009 for examples).

Building on Barnard (1938), Ghoshal & Bartlett (1994), through a detailed case study followed a troubled organization on a lengthy turnaround. During that case study, the authors focused on the activities of the individuals in the organization during the turnaround process that influenced the organizational environment. Using a thorough induction process, the authors identified four dimensions of the new environment. These dimensions were a contrast from previous studies that proposed process variables of structure and systems by focusing on these and the more routine and minor activities that frame behaviors of the organization. These dimensions are discipline, stretch, trust, and support.

Discipline as a dimension begins with the establishment of clear, unambiguous performance standards and, most importantly, an acceptance and commitment to those standards. External consultants and other public sources provide benchmarks that highlight the difference between what had been done and what needed to be done. Couple with clear performance standards is the need for fast feedback in both quality and quantity. Following fast feedback, consistent sanctions that promote open communication between what is expected and what is delivered. The last portion of this dimension is a commitment level at all levels of the organization.

Stretch embodies an individuals' voluntary activities to accomplish more than what is expected (Hamel & Prahalad, 1993). This environment is collectively built through a consistent vision (Denison & Mishra, 1995), or a shared ambition, a collective identity (Polletta & Jasper, 2001; Allaire & Firsirotu, 1984), and the development of individual significance (Richardson & Vandenberg, 2005; Thomas & Velthouse, 1990, Hackman & Oldham, 1980). The stretch attribute provides engagement and influence for individuals within the organization to undertake more activities and responsibilities than simply his or her own for the benefit of the organization.

The trust attribute stimulates the individuals of an organization to commit and rely on others' commitments. The confidence of reliance develops from the perception of fairness and equity in the organizational decision processes, as well as involvement of individuals in the decision and particularly

the activities that involve those individuals. The last component of trust is the staffing of positions with people who possess or seem to possess the requisite skills and capabilities contribute to trust.

The final attribute is support that encourages the organizational members to lend assistance to others. Characterizations of this organizational context attribute are access to resources available to others, autonomy, or the freedom to make decisions, especially at lower levels, and guidance and help from within groups, as well as, from senior management levels. This attribute contributes to the empowerment and commitment of individual organizational members (Fenton-O'Creevy, 1998; Kanter, 1988).

Through a detailed case study, Ghoshal & Bartlett (1994) identified these four attributes of a collective learning environment. Table 1 contains a summary of each attribute found during their study.

TABLE 1
ATTRIBUTES OF COLLECTIVE LEARNING

Attribute	Definition
Discipline	• clear performance standards • fast feedback • open communication • management by commitment
Stretch	• shared ambition for the future across the organization • collective identity • personal link between the individual's work and the company's priorities (hence personal meaning)
Trust	• perceived equity in decision-making (a.k.a. fair decision making) • involvement of people in decisions that affected their work or collective problem solving • individual competence
Support	• access to organizational resources (which was presented as inter-group cooperation and coordination) • autonomy or the freedom to make decisions • guidance and help including help from within groups, as well as, from management in terms of coaching and support

They also concluded that there were four attributes that they believed distinguishable there was also a gestalt effect that required the presence of all four attributes. These attributes require the leader to model certain behaviors or even encourage other behaviors from those that they lead. Discipline requires setting clear performance standards and rapid feedback as responses to follower actions. Stretch requires a measure of organizational commitment on the part of followers to "go the extra mile." Trust establishes fairness in decision-making or the follower must feel a sense of control over his or her own destiny. Support indicates a follower access to all necessary resources to complete the tasks and goals before them.

Black & Boal (1997) operationalized the four attributes in developing the framework context for learning (CFL). By obtaining individual responses from leaders and follower, CFL captured organizational environment. The empirical evidence of a dependent variable composed of four resources had adequate Cronbach's Alpha and goodness of fit indicators.

RESEARCH OBJECTIVE & METHODOLOGY

The literature review determined that both the organizational environment model and the leadership role model are well defined and researched as separate models but interactions between the two complete models is nonexistent. This is mainly because both models contain several variables, which complicates simple multiple regression analysis. Multiple regression analysis requires a single metric dependent

variable and several metric independent variables. The research analysis should support the fact that the two models are not independent of each other and further determine the magnitude of the relationships that exists between the two sets of variables. Additionally, the contributions of each set of independent and dependent variables when the models are maximally correlated should be found. Finally, by measuring the relative contribution of each individual variable in the canonical function, a determination of which of the individual variables contribute the most and the least to the canonical functions or relationships of the two models.

Questionnaire and Data Collection

The sample for this survey consisted of workers within two county sheriff departments. These two counties are in the southern half of a southwestern state of the United States. The workers consisted of 78 sheriffs' deputies, 33 officers from the detention units, 14 from the transportation department, and 4 from the administrative offices.

Black & Boal (1997) administered questionnaires to 455 workers at three work sites from two different *Fortune 500* organizations found in the Midwestern portion of the United States. Their questionnaires measured the effects of the context for learning environment. This survey used their survey for those measures. The competing values framework has many survey instruments available. Quinn & Cameron (1983) first developed the instrument to measure the leadership skills in the competing values framework. The final survey instrument consisted of 159 items (117 for competing values framework, 42 for context for learning), which broke down to 37 total dimensions (24 for competing values framework, 13 for context for learning).

The factor analysis of the two separate instruments yielded four factors for the context for learning and eight factors for the competing values framework. The factor loadings represent the reflective factors for the correlation of the central constructs. Canonical correlation determines the correlation between multiple independent variables and multiple dependent variables. The assessment of correlation for the constructs will be conducted in this manner.

Data Analysis

Canonical correlation analysis is a multivariate statistical model analysis that facilitates the study of linear interrelationships between two sets of variables. One set of variables is referred to as independent variables and the other set is considered dependent variables (Green, 1978; Green & Carroll, 1978; Hair, et al., 2003); a canonical variate is formed for each set. Such a canonical variate is formed from the multiple dependent variables whereas multiple regression uses a single dependent variable. Canonical correlation develops a canonical function that maximizes a correlation coefficient between these two canonical variates. The correlation coefficient measures the strength of the relationship between these canonical variates. Further, the canonical correlation is interpreted from canonical loadings or the correlation of the individual variables and their respective variates. Since the canonical loadings are similar to factor loadings for each variable, this portion of the analysis is comparable to estimating a factor for each set of variables in order to maximize the correlation between the factors.

Another unique component of canonical correlation analysis is that it develops multiple canonical functions. Each canonical function developed is independent of other canonical functions, such that each canonical function represents a different relationship found among the sets of independent and dependent variables. The canonical loadings of each individual variable are different in each canonical function and represent the individual variable's contribution to the specific relationship being analyzed.

RESULTS & DISCUSSION

The designation of the variables includes eight dependent variables and four independent variables. The designation of variables in a canonical correlation is not as important as in regular correlation because the smallest number of variables (in this case four) determines the number of variates. As stated previously, the conceptual basis of both sets is well established, so it is not necessary to suggest different variables or different combinations of variables. The eleven variables result in a 12-to-1 ratio of variables

to observations, which surpass the recommendation of 10 observations per variable. The normality assumptions appear to be normal, although some appear to depart from the diagonal, typical of a departure from normality, the requirement for normality is not as important in canonical correlations. Similarly, scatterplots for the residual errors of both sets of variables found linearity and homoscedasticity.

With all assumptions met, the canonical correlation analysis derived four canonical functions. This is consistent with the function total being equal to the smallest number of variables whether dependent or independent. Table 2 denotes that all four canonical correlation functions are statistically significant. Those results are a test of the significance of the functions separately, multivariate tests of the functions simultaneously results in the test statistics of Wilk's Lambda, Pillai's criterion, Hotelling's trace, and Roy's ger, which can be found in Table 3. All four of these tests found statistical significance of the model.

TABLE 2
MEASURES OF OVERALL MODEL FIT

Canonical Function	Canonical Correlation	Canonical R-Square	F Statistic	Significance
1	0.732	0.536	5.36537	0.000
2	0.449	0.202	2.80283	0.000
3	0.379	0.144	2.43937	0.005
4	0.269	0.072	1.88916	0.010

TABLE 3
MULTIVARIATE TESTS OF SIGNIFICANCE

Statistic	Value	Approximate F Statistic	Significance
Wilk's Lambda	0.29445	5.36537	0.000
Pillai's trace	0.95347	4.73363	0.000
Hotelling's trace	1.65191	6.01397	0.000
Roy's ger	0.53558		

Now that the statistical significance is found, the practical significance needs to be examined. The practical significance is determined by the size of the canonical correlations to decide which canonical functions to interpret. The squared canonical correlation provides an estimate of the shared variance between the canonical functions. While this is a convenient and appealing measure of the shared variance, it may misinterpret the variance because the squared canonical correlation represents the variance shared by the linearly composite sets of dependant and independent variables and not the variance extracted from the sets of variables (Alpert & Peterson, 1972). The redundancy index allows the analysis to overcome the inherent bias and uncertainty found in using the canonical roots as a measure of shared variance.

Table 4 notes the method to find the redundancy index for the first canonical variate. The redundancy index is calculated as the average loading squared times the canonical r-square for the first canonical variate. A similar method was used for each canonical function. The first canonical correlation function explains more than half of the overall model fit, and the redundancy index suggests that more than half (0.213 and 0.336) of that result are due to the shared variance between the independent and dependent variable sets. The remaining canonical functions have significantly lower redundancy index values (see

Table 4). These significantly lower values suggest that the first canonical function does hold practical significance. The remaining functions, while statistically significant, do not hold practical significance.

TABLE 4
REDUNDANCY CALCULATIONS FOR CANONICAL FUNCTION 1

Variables	Canonical Loadings	Canonical Loading Squared	Average Loading Squared	Canonical R-Square	Redundancy Index
Dependent variables					
Support	0.043	0.162			
Trust	0.186	0.035			
Stretch	0.739	0.546			
Discipline	0.920	0.846			
		1.590	0.397	0.536	0.213
Independent variables					
Mentor	0.818	0.669			
Facilitator	0.714	0.510			
Monitor	0.703	0.494			
Coordinator	0.706	0.498			
Director	0.862	0.743			
Producer	0.917	0.841			
Broker	0.755	0.570			
Innovator	0.832	0.692			
		5.018	0.627	0.536	0.336

Now that we found one canonical variate to be both statistically and practically significant and the canonical function and redundancy index acceptable, the first objective of this research is met. As stated in the research objective, this analyses' goals are threefold to determine the independence, or lack thereof, of the two sets of variables, to determine the contribution of each set of variables, and to determine which of the individual variables contributes to the canonical variate.

In order to determine the second portion of the first objective of this research, the magnitude of contribution, the canonical weights represent that contribution to the variate. The canonical weights for all canonical variates can be found in Table 5; however the first canonical variate is the only important one for this analysis. The variable of the dependent set (organizational environment) that contributes the most is support. Interestingly, discipline has a large inverse effect on the canonical variate. For the independent variables (leadership roles), producer and broker contribute the most to the canonical variate, with facilitator have a large inverse effect on that same variable. The canonical weights, however, are unstable owing to the multicollinearity; therefore, the canonical loadings are evaluators that are more appropriate.

The analysis moves from the overall model fit to evaluating the first canonical variate to establish the relative importance of the individual variables. Table 6 contains the canonical loadings for both the independent and dependent variables for all four canonical functions. Keeping in mind that only the first canonical variate is important, the canonical loadings measure the linear correlation between a variable in either set and that set's canonical variate. In other words, the canonical loading is similar to the factor loading in assessing the relative contribute of each variable set to the canonical function. The larger the coefficient, the more important the variable set. The independent variable set all contribute highly to the canonical function with all eight variables loading at factors from .703 to .917. This suggests a high

degree of intercorrelation among the eight variables and that all contribute highly to effective leadership roles.

TABLE 5
CANONICAL WEIGHTS FOR THE FOUR CANONICAL FUNCTIONS

	Canonical Weightings			
	Function 1	Function 2	Function 3	Function 4
Dependent Variables				
Support	0.328	-0.218	1.038	0.696
Trust	0.000	-0.915	0.023	-0.466
Stretch	-.0359	-0.407	-0.574	0.871
Discipline	-0.942	0.608	0.002	-0.911
Independent Variables				
Mentor	0.318	1.026	-0.358	-1.671
Facilitator	-1.129	-2.972	0.675	1.144
Monitor	-0.396	-0.771	-.0978	-0.776
Coordinator	-0.034	0.919	-0.827	0.663
Director	0.388	-0.485	-1.218	-1.492
Producer	0.992	-0.226	1.274	2.718
Broker	0.165	1.653	-1.084	1.153
Innovator	0.576	0.665	2.133	-1.742

The dependent variables are quite different. They show two variables with very high loadings, (discipline, .920, and stretch, .739), a variable at a moderate level, (support, .403), and a variable at a low amount (trust, .186). This might present a follow-up analysis of sensitivity in which the low variable and possibly the moderate variable are deleted. This is very similar to a stepwise regression analysis. Nonetheless, the results suggest that at least some variables of the organizational environment and all of the leadership roles contribute highly to the best canonical variate.

The final objective of this research has already been addressed. The general contribution of the individual variables for both the independent and dependent set is found in the redundancy index calculated in table 3. The combined redundancy value of .549 would be an acceptable R-squared for a comparable multiple regression. This supports the thought that the variable sets are fairly well predicted when functioning as a set. Furthermore, the individual contributors that are key predictors seem to be all of the leadership roles and the organizational environment variables of discipline and stretch.

CONCLUSIONS

According to Hair et al. (2003), there are three objectives of canonical correlation analysis. These objectives may all be reached or only portions may be realized, especially in an exploratory analysis such as this one. The objectives are to determining whether two sets of variables are independent or have a relationship, deriving a set of weights for the dependent and independent variables such that the linear combinations are maximally correlated, and explaining the contribution of each variable to the relationship extracted by the process. In so doing, the canonical correlation suggests a descriptive representation of the relationship between the two sets of variables. The results suggest that four statistically significant relationships exist, but only one of these is practically significant. That one relationship is descriptive of a more than half of the overall variance. The two variable sets of organizational environment as defined by Ghoshal & Bartlett (1994) and leadership roles as established

by Quinn and others are not independent of each other. Therefore, more research should be done to determine the interrelationships between these two sets of important organizational phenomena.

TABLE 6
CANONICAL LOADINGS FOR THE FOUR CANONICAL FUNCTIONS

	Canonical Loadings			
	Function 1	Function 2	Function 3	Function 4
Dependent Variables				
Support	0.403	-0.144	-0.844	0.323
Trust	0.186	-0.887	-0.140	-0.399
Stretch	0.739	-0.294	0.209	0.568
Discipline	0.920	0.062	-0.373	-0.104
Independent Variables				
Mentor	0.818	-0.212	-0.206	-0.113
Facilitator	0.714	-0.447	-0.194	-0.009
Monitor	0.703	-0.474	-0.366	-0.152
Coordinator	0.706	-0.398	-0.400	-0.066
Director	0.862	-0.333	-0.293	-0.087
Producer	0.917	-0.322	-0.132	0.085
Broker	0.755	-0.086	-0.256	0.075
Innovator	0.832	-0.305	-0.044	-0.173

Furthermore, this study suggests that some of at least the organizational environment variables might not play a role in the positive outcomes when coupled with leadership roles. This significant contribution to at least thought could benefit many organizations in the wake of their managerial development with the reasonable organizational environment. It would be very beneficial to continue this study by removing both independent and dependent variables to determine the added contribution to a canonical variate.

This analysis, however, is descriptive in nature. It is limited to law enforcement entities in a small area of a unique region of the United States. The prescriptive nature of such findings should be taken with a small amount of trepidation. This analysis should take place in a number of different organizations and with a variety of workers before a generalization is made. Perhaps the individual correlations should be made, in order to better determine the relationship to individual leadership roles and the organizational environment. Such a finding might also delve into the debate of academic expert thinking and actual results of survey instruments.

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