ABSTRACT

While both transformational leadership and collaboration are thought to positively influence organizational innovation, examination of the influence of these characteristics on a manager’s propensity to select innovative options is limited or non-existent. This study tests this implicit assumption underlying these literatures using a scenario based approach.

Key Words: Transformational Leadership, Collaboration, Innovation
INTRODUCTION

There is increasing evidence that the route to above normal returns in today’s business world is through innovation. While such innovations do not always have to be radical, the dynamic nature of the global business environment requires that firms who want to earn real profits rather than just follow the competition must seek out “new ways of doing things” (Schumpeter, 1939) that can lead to the creation of rents. As such, increasing attention is being paid to determining how organizations can promote and develop innovations.

A variety of approaches to increasing organizational innovation have been, and continue to be, explored, including such factors as the role of learning and knowledge management (Tsai, 2001), collaboration (Schilling and Phelps, 2007) and much more. One area in particular that is receiving attention is the role of leadership in the innovation process. Given that leaders not only determine the strategic choices made by a firm but also the organizational processes that might foster innovation, such attention appears warranted (Jung et al, 2008).

While a variety of leadership approaches have been examined, a collection of adaptive leadership behaviors that are typically categorized under a transformational leadership label show particular promise in enhancing innovation within organization (Jung, Wu & Chow, 2003). Such leaders are believed to stimulate creative thinking in subordinates (Podsakoff et al, 1990; Bass et al, 2003), articulate and help followers visualize attractive future states (Bass et al, 2003), and lead by example through modeling appropriate behaviors (Podsakoff et al, 1990). These behaviors, taken in tandem, are thought to create organizational conditions that foster innovation and there is increasing evidence in support of this view.

Underlying this view, however, is an implicit and rarely tested assumption that transformational leaders want innovation and are willing to take the risks that come with pursuing uncertain avenues for the organization. Said differently, it is assumed that, given a choice of whether to pursue an uncertain innovation opportunity, those leaders higher in transformational leadership characteristics would be more likely to pursue the idea than would those who do not score as high on these characteristics. Further, the implicit assumption is that it is the transformational leadership characteristics, rather than some other characteristics that such leaders might also possess, that leads to choosing to innovate. While such assertions would appear to be a natural extension of the transformational leader construct, and a necessary condition if transformational leadership is in fact to lead to organizational innovation, the assertions remain untested and implicit in the extant literature.

To address this issue, this study reports the findings from a test of these assumptions utilizing a scenario based decision situation. After first determining the subjects standing on several individual characteristics, including transformational leadership, the subjects were then given one of two scenarios related to innovation opportunities for a firm and asked to make several recommendations regarding the course of action the firm should pursue. While the evidence does indicate a role for transformational leadership in influencing the choices made, it also indicates that this relationship may not be as straightforward as the traditional assumptions regarding transformational leadership might suggest.
In the pages that follow, attention first turns to the literature regarding innovation and the role of leadership in this process. Based on this, hypotheses regarding transformational leadership and its role in predating innovation choices are developed. A study testing these hypotheses is described and results reported. The paper concludes with a discussion of the findings and suggestions for future research related to transformational leadership and innovation.

**LITERATURE REVIEW**

Open the pages of any management journal these days and you are likely to find an article that either directly or indirectly addresses the topic of innovation. In strategy, companies are encouraged to gain a competitive advantage by being the “first mover” and finding new ways of leveraging technology. In organization theory, researchers are finding new approaches to structuring the organization to help balance the needs to both explore new areas and exploit existing opportunities. Operations management researchers are looking for ways to help companies find innovation through their supply chain relationships and build flexibility into their manufacturing operations, while organizational behavior and human resource researchers are looking for organizational process approaches and selection and training practices that will unleash creativity, enhance knowledge sharing and learning, and thereby help a company become more innovative.

Such attention would appear to be well placed. Researchers in both economics and strategy are coming to agreement that increasing competition, the development of more and more economies around the globe, and the rapid pace of technological change are all combining to minimize traditional profit opportunities from quasi-monopoly positions built on efficiency, scale, or market imperfections. Instead, companies seeking to gain advantage must do so through innovation, finding temporary profitable positions ahead of competitors, and those wishing to remain ahead must find ways to build dynamic capabilities that support a stream of continual innovation.

Recognizing the need for innovation, however, is not the same as achieving it. Innovation is less predisposed to management influence as are day-to-day organizational operations. Accordingly, attention is turned to a brief review of the nature of innovation and approaches to facilitating and benefiting from it. From there, the focus is aimed at the role of leadership in this process and whether its influence is felt directly or indirectly in the innovation process.

**Innovation**

The challenge of innovation lies in its intangible nature (Miles, Miles & Snow, 2005). While an organization can put the pieces in place to encourage innovation it cannot guarantee a regular stream of “ah ha” moments. Further, the challenges continue even if the firm is able to have success in nurturing innovative ideas. They must then determine if they have the capabilities (e.g., in marketing, production, etc.) to fully develop and exploit the innovation. They must also determine what the impact of the innovation will be on current operations. Innovation, by its nature, requires change which can be disruptive to the organization. Whether trying to determine when to introduce a next generation product to stay ahead of the competition without significantly cannibalizing current sales, or how to best leverage a radical innovation that will
transition the firm out of its current market, managers face significant unknowns that make managing the process difficult.

Moran and Ghoshal (1999) captured the essence of the challenges facing managers when they noted that successful innovation requires three distinct steps: the recognition and ability to develop the initial concept, the awareness of a viable market for the idea, and the ability to develop and market the innovation so as to capture the benefits arising from it. Further, they built on concerns raised by such research streams as absorptive capacity (Cohen & Leventhal, 1990) and exploitation versus exploration (March, 1991) and suggested that it was unlikely that these three steps needed for innovation would occur in a single place on any regular basis. That is, the knowledge and learning necessary to develop the initial idea and recognize the value of it are broad enough that it is likely to take interaction either across multiple units within the organization or between organizations if innovative output is not to be stifled. Similarly, the need to possess and be able to regularly adjust the resources and capabilities necessary for the successful development of an ongoing stream of innovations so as to capture the value they generate is likely to require extensive coordination within and/or between firms.

As a result, it is not surprising that a number of researchers have identified collaboration as one of, if not the most important, capabilities that a firm must possess if it is to maintain a continuing stream of innovations (c.f., e.g. Chesbrough, 2003, 2007; Miles, Miles and Snow, 2005, Miles et al, 2010, Wallin and Von Krough, 2010). Proponents of collaboration have argued that combining knowledge is likely to increase the chances that innovative ideas will be recognized and developed. Especially where collaborators bring different backgrounds and knowledge/learning histories, the pool of ideas and the possible combinations will be greater (Miles, Miles and Snow, 2005).

Collaboration can occur both within a firm and between firms. Within a firm, collaboration often focuses on getting different units to work together towards a common cause. This may be different functional units (e.g., R&D, Marketing, Production) or it may involve working across divisions (e.g., product or geographic divisions). In either case, the firm must find ways to promote a shared vision and structure organizational processes and reward systems to promote trust and the sharing of knowledge between the units (Eisenbeiss, van Knippenberg & Boerner, 2008). Given that many organizations have historically focused on exploiting current advantages, most often using an approach where each unit focuses on its own tasks to promote control and efficiency, this is not necessarily an easy task.

Enhancing collaboration between firms, while more difficult than within firm collaboration, may be even more valuable for innovation (Ahuja, 2000). Each firm has its own market and market knowledge so the value of any given idea can be better recognized and evaluated (Moran and Ghoshal, 1999). In terms of development, the combined resources and capabilities of two or more firms helps ensure not only that the necessary skills for bringing the innovation to market are available, but also that the necessary capacity can be found in areas such as production and marketing to get the innovation to market in a timely manner. As such, more and more firms are seeking out ways to partner with others in pursuit of innovation.

Whether internal or external collaboration is the goal, however, the evidence suggests that most firms are still wrestling with developing collaborative capabilities (Miles et al, 2005). As such,
innovation remains underdeveloped in most companies, with even the best only unleashing 20 – 30% of their potential innovations (Chesbrough, 2003). Whether trying to determine when to introduce a next generation product to stay ahead of the competition without significantly cannibalizing current sales, or how to best leverage a radical innovation that will transition the firm out of its current market, managers face significant unknowns that make managing the process difficult.

Not all managers are willing and/or able to take on such a difficult process. Leading and managing significant change and innovation is likely to require managers with particular skill sets and attitudes (Gumusluoglu and Ilsev 2009; Miles & Miles, 1999). Balancing the demands of stability and change is at the heart of the exploration/exploitation challenge (March 1991) and creates a variety of issues as managers strive to make their companies more dynamic (Teece, 2009). At the same time, though, there are managers who are willing to push ahead with both the pursuit of innovation even in the face of uncertainty, and who are continuing to explore a variety of collaborative arrangements to help them in this pursuit. Accordingly, attention now turns to a brief exploration of leadership traits that may facilitate innovation.

Leadership and Innovation

Choosing to pursue an innovation, and if so how to pursue it, is fraught with uncertainty. The process is ill defined and difficult to manage directly, and outcomes cannot be guaranteed. As such, and as with most strategic decisions, there are likely to be individual differences between managers in the choices they make. A significant body of research associated with the upper echelons perspective (Hambrick and Mason 1984; Finkelstein and Hambrick, 1996) has established that the characteristics of managers do in fact often influence organizational choices. While much of that research was done utilizing demographic observables, Carpenter, Geletkanycz & Sanders (2004) noted in their review of the extant work that moving beyond demographics would be beneficial. Heading that call, we focus on two related dispositional aspects of the individual here: the degree to which a manager has characteristics of a transformational leader and the degree to which the manager believes in the value of collaboration.

Transformational Leadership. Transformational leadership has taken a central role in research on leadership over the last decade or so. Focusing primarily on the leader subordinate relationship, it examines the degree to which a leader can help shape visions of the future, develop belief in the ability to get there, and help motivate actions toward appropriate goals (Burns, 1978; Bass, 1985; Goodwin, Wofford, and Whittington, 2001; Bass, Avolio, Jung, Berson, 2003). Transformational leaders have a bias towards action and a desire to help formulate and lead appropriate changes over time. Given these characteristics, it is not surprising that recent research has begun exploring the relationship between transformational leadership and organizational innovation.

Transformational leadership is typically characterized as a set of interrelated behaviors. These include inspirational motivation, intellectual stimulation, charismatic role modeling and individual consideration (Bass and Avolio, 1994; Podsakoff et al, 1990). Studies have shown that leaders demonstrating these traits generate followers who are more likely to internalize organizational values and goals, and exceed performance expectations (Jung and Avolio, 2000).
If innovation is one of the organizational goals, this suggests that followers will develop intrinsic motivation to work hard towards achievement of innovation (Jung, Chow & Wu, 2003). In addition, the transformational leader’s encouragement of nontraditional thinking by modeling the questioning of old ways (Bass, 1985) should facilitate innovative approaches in subordinates. And, the development of a trusting environment and a focus on the team rather than the individual should encourage creative interaction (Bass, Avolio, Jung, & Berson, 2003).

In the main, studies relating transformational leadership to organizational innovation have found positive results (c.f., Garcia-Morales, Matias-Reche, and Hurtado-Torres, 2008; Gumusluoglu and Ilsev 2009). Jung, Chow and Wu (2003) found that transformational leadership at the CEO level is positively related to employees’ perceptions of support for innovation, which in turn has a positive relationship with organizational innovation. Eisenbeiss, Knippenberg & Boerner, (2009) found similar results at the team level, relating managers transformational leadership to both creativity and innovation for the team.

It would appear, then, that through their behaviors transformational leaders generate organizational actions that lead to innovation. What is missing from this analysis, however, is a specific focus on whether transformational leaders actually choose innovation more readily than do non transformational leaders. Said differently, given a set of options, would those leaders who demonstrate transformational leadership characteristics be more likely to take risks and select the more innovative options?

At one level, this would seem to be self-evident. Transformational leadership includes such characteristics as inspirational motivation, which includes helping others envision attractive future states (Bass et al, 2003), and intellectual stimulation, which includes encouraging non-traditional thinking (Podsakoff et al, 1990). Each of these would suggest that a transformational leader would choose innovation if they are also going to model appropriate behaviors (Avolio, Bass, and Jung, 1999). That said, these transformational leader behaviors do not necessarily have to focus on innovation. An attractive future state might involve a more efficient and effective work place, and intellectual stimulation may be finding different ways to achieve this.

As well, it is possible that even if transformational leaders do have a greater tendency for innovation, the attention currently given to the value of innovation may make even non-transformational leaders lean in this direction. Especially when an innovative option does not appear to carry significant risk (e.g., where the innovation is incremental rather than radical), both transformational and non-transformational leaders may opt to pursue the innovation. Thus, specific examination of transformational leadership and decision choices would appear warranted.

Given the lack of previous research, any hypotheses in this area must be considered exploratory. That said, the specific characteristics of a transformational leader and the increasing evidence regarding the association between transformational leadership and innovation would appear to support a view of transformational leaders being more likely to choose innovation options. Thus:

Hypothesis 1: There will be a positive relationship between the level of transformational leadership characteristics and willingness to pursue innovation.
Collaboration. As noted earlier, both internal and external collaboration are often associated with innovation. Just as with transformational leadership, however, the focus of the research on collaboration has been at the organizational rather than the individual level. That is, studies have examined whether firms showing greater levels of internal and/or external collaboration are more innovative rather than whether leaders who promote collaboration are themselves more prone to select innovation options.

For internal collaboration in particular, there are many scenarios that could be imagined where a manager might promote collaboration but not necessarily promote innovation. For example, encouraging work units to collaborate to make the work flow process more efficient, or encouraging cross divisional collaboration to share knowledge might both be done without any consideration for collaboration. While collaboration typically promotes learning (Vera & Crossan, 2004), this learning does not necessarily have to result in innovation. That said, encouraging collaboration takes effort and it would seem that a manager who promoted collaboration would want to get all the benefits possible from it, including innovation.

In the case of external collaboration, the link to innovation appears to be more clear. While it is possible to work for greater collaboration with other firms for efficiency or effectiveness purposes, such as improving supply chain operations, most of the literature on external collaboration focuses on its role in promoting innovation. Thus, a manager who believes in external collaboration is likely to also be willing to make choices that promote innovation.

As with transformational leadership, the lack of specific previous research linking a manager’s views on collaboration with their decision making regarding innovation limits the confidence of predictions regarding the relationship between these variables. That said, collaboration is generally tied to learning and knowledge management within an organization and there is reasonable evidence that organizations that have greater collaborative capabilities also demonstrate greater levels of innovation (Eisenbeiss, van Knippenberg & Boerner, 2008). Thus, it is a reasonable extension to suggest that managers who believe in collaboration will also be willing to make choices that promote innovation. More formally:

Hypothesis 2: There will be a positive relationship between support for collaboration and willingness to pursue innovation

Transformational Leadership and Collaboration. As described above, the literatures relating both transformational leadership and collaboration with innovation have largely generated support at the organizational level. That is, transformational leadership appears to be associated with organizational innovation as does having increased levels of collaboration. Further, there is often overlap in these literatures since at least some of the transformational leadership behaviors would appear to relate to encouraging collaboration. For example, transformational leadership encourages identification with the larger group or organization (Bass et al, 2003) and thus may be more willing to share and work in a collaborative way (Bass and Riggio, 2006). Given this, it would seem reasonable to examine the relationship between transformational leadership and collaboration in terms of how they relate to innovation.

At the simplest level, this would seem to suggest that a transformational leader would be a proponent of collaboration. While the term is not typically used, promotion of working for the
good of the whole and thinking collectively to find non-traditional solutions are consistent with collaborative principles. As such,

Hypothesis 3: There will be a positive relationship between the level of transformational leadership characteristics and willingness to support collaboration.

If the hypothesis above holds, then speculation would turn to whether transformational leadership and collaboration have independent influences on willingness to pursue innovation. It should be noted that while there is evidence that transformational leadership and innovation are positively related, the exact nature of this relationship is not clear. Sarros, Cooper & Santora (2008) suggest that transformational leadership builds a climate for innovation, and Jung et al (2008) found that the influence of transformational leadership on innovation might be moderated by not only organizational climate but also by external factors such as environmental complexity and competition. Others (e.g., Vera and Crossan 2004; Bryant, 2003) have explored the relationship between transformational leadership and organizational learning, typically seen as a precursor to innovation.

Since collaboration can be viewed as a necessary component of a climate for innovation, it may well be that transformational leadership’s influence on innovation is not direct but is instead realized through its influence on collaboration. That is, transformational leadership may be associated with collaboration and collaboration with a willingness to innovate. Further, while transformational leadership is most often tested as a package (Jung et al 2008) it is possible that the components of transformational leadership may have different relationships from each other when it comes to untangling the connections between transformational leadership, collaboration and innovation. With little to guide predictions, however, the emphasis here is on the overall measure of transformational leadership.

Hypothesis 4: Willingness to collaborate will mediate the relationship between transformational leadership and innovation.

METHODS

This study utilized a scenario based experimental design. While not particularly common in work on innovation or interorganizational arrangements, such a design can be very helpful in establishing the existence of specific relationships (Taylor, Goodwin and Cosier, 2003) and providing better evidence of causation since variables can be directly manipulated. Given the difficulties inherent in trying to capture information on decision factors from managers in actual organizations (Carpenter et al, 2004; Hambrick & Mason, 1984), and that asking managers directly about decisions runs the risk of retrospective sensemaking contaminating the results (Weick, 1979), the scenario based approach was deemed appropriate for study of the relationships between characteristics of innovation, interorganizational relationships, and individual decision maker characteristics that are of interest.

Sample

The sample consisted of a total of 139 students from a large southwest university that has a number of returning adult students. About 80% of the students were graduating seniors,
meaning most were the “managers of tomorrow”. The primary goal here was to establish whether the relationships of interest could be found at all (Taylor et al., 2003) and the guidelines proposed by Campbell (1989) indicated that using a lab setting with students to examine the specific relationships we are interested in was appropriate. Further, Kreuger, Reilly, and Carsrud (2000) have suggested and empirically found that samples of upper division students reveal preferences at a time when they face important career decisions. Further, such samples explicitly include subjects with a broad spectrum of intentions, attitudes toward their future, and decision making abilities and while details of the actual business condition examined here may not yet have coalesced in subjects’ minds, their ability to make decisions based on stable dispositional traits has been (Scherer et al. 1989).

The students surveyed were drawn from three different business courses. 88% were seniors and 92% were business majors (spread across all business disciplines). 54% were male, with an average age range between 22 and 25. Virtually all respondents had been employed at some point and approximately 75% were currently working. Approximately 37% were working full time and another 18% were working more than 20 hours per week. Over 55% were currently employed in a position with at least some supervisory responsibilities and more than 50% had at some point held at least a lower level management position.

Procedures

Subjects were first given a survey that measured their individual characteristics (transformational leadership and willingness to collaborate) along with demographic variables. To minimize the potential for common method bias, the scenarios where the subjects made decisions regarding whether to pursue an innovation were administered about two weeks after the individual surveys. Scenarios were developed based on a combination of Moran and Ghoshal’s (1996) conceptualization of the three requirements needed for development of an innovation (the idea, the value of the idea, the ability to benefit from developing the idea). Two extreme conditions were developed. In the uncertain condition, there was certainty regarding the basic idea of the innovation, but uncertainty regarding its value and whether it could be profitably developed and marketed. In the certain condition, in contrast, the decision maker was portrayed as having reasonable confidence in all three aspects. Responds were randomly assigned to one of the scenarios.

In order to establish a common frame of reference, the scenarios started with a common description of the situation. The scenarios outlined a situation where the respondent was a member of top management in a small to medium sized enterprise (SME) being presented with a potential innovation by the head of the company research team. It was explained that the company was in a relatively high growth industry where being innovative and continually coming up with new ideas/products/services was advantageous in maintaining a competitive advantage. The specific conditions in each scenario were presented in a common format but varied whether regarding the level of confidence.

After reading the background and scenario information, respondents were then given a set of questions to answer. These questions, common regardless of scenario, included items for the dependent variable as well as manipulation check questions to ensure that each respondent was accurately able to identify the uncertainty intended by the scenario they were given.
**Dependent Variable**

The dependent variable addressed whether the respondent would choose to pursue the innovation idea discussed in the scenario. Five items were used to measure this, all of which used a Likert scale that ranged from 1 (strongly disagree) to 5 (strongly agree). Questions included items such as “the firm is likely to benefit financially if they pursue this idea” and included one reverse coded item (I would be likely to recommend not pursuing this idea. The five items loaded on to a single factor and had a Chronbach’s Alpha of .77. Accordingly, the responses on the five items were averaged to create the overall measure.

**Independent Variables**

*Transformational Leadership.* Transformational leadership (α = .885) was measured as a self-assessment using an adaptation of Podsakoff, MacKenzi, Moorman, and Fetter’s (1990) scale of transformational leadership. Use and contextualization of this scale was appropriate for this study in order to keep the length of the overall instrument manageable and the scale has shown good reliability in previous work. As expected, the 23 items from the scale used here had an overall Chronbach’s Alpha of .87, suggesting that they could be combined to form an overall measure of Transformational Leadership.

At the same time, a factor analysis revealed most of the expected sub-dimensions of transformational leadership. The top 4 factors, all with Eigenvalues greater than 1.5, explained over 54% of the variance. Analysis of the items showed that these equated to four of the six transformational leadership sub-dimensions proposed by Podsakoff et al (1990) including Articulating a Vision, Modeling, Intellectual Stimulation, and Fostering Group Goals. Chronbach’s Alphas for each of these sub-dimensions were within acceptable limits, and thus these four sub-dimensions were also retained for further analysis.

*Collaboration.* Willingness to Collaborate was measured using an instrument adapted from Sveiby and Simons (2002). The instrument included 20 items that assessed the respondent’s feelings about whether various collaborative behaviors should be encouraged within and between organizations. As expected, factor analysis revealed that the items loaded on to two distinct factors, each having an Eigenvalue greater than 2 and together accounting for over 50% of the variance. Analysis of the items revealed that these factors reflected encouragement for within and between organization collaboration. Accordingly, the resulting nine items in each factor (2 items were dropped due to cross loadings) were averaged to create the two collaboration measures.

**Manipulation Check.**

To determine whether the respondent was able to correctly identify the uncertainty intended in the scenario they were given, a manipulation check was administered in the form of two questions at the end of each scenario. The questions asked the respondents to identify (1) how far along they believed the innovation was to becoming a reality, and (2) given a list of different phases of innovation, at what stage would they place the innovation idea. Results indicated that the scenarios were generally perceived in the way that they were intended.
RESULTS

Descriptive Statistics
Descriptive statistics and correlations for the variables of interest are shown in Table 1. As would be expected, there was a high correlation between the overall measure of transformational leadership and the four sub-dimensions, and between each of the sub-dimensions. This indicates that these variables should not be used in the same analysis due to likely problems with collinearity. Other correlations were, with some minor exceptions, in the directions expected given the hypotheses.

TABLE 1 - Descriptive Statistics/Correlation Matrix

<table>
<thead>
<tr>
<th>Descriptive Statistics</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>TL Vision</td>
<td>3.90</td>
<td>0.68</td>
<td>139</td>
</tr>
<tr>
<td>TL Model</td>
<td>4.02</td>
<td>0.61</td>
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<tr>
<td>TL Group</td>
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<td>139</td>
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<tr>
<td>Pursue Innovation</td>
<td>3.47</td>
<td>0.48</td>
<td>139</td>
</tr>
<tr>
<td>Collaboration</td>
<td>3.94</td>
<td>0.59</td>
<td>139</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Correlations</th>
<th>TL Overall</th>
<th>TL Vision</th>
<th>TL Model</th>
<th>TL Intellectual</th>
<th>TL Group</th>
<th>Pursue Innovation</th>
<th>Collaborati...</th>
</tr>
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<tbody>
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<td>TL Overall</td>
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<tr>
<td></td>
<td>Correlation</td>
<td>Sig. (2-tailed)</td>
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<td>.000</td>
<td>.000</td>
<td>.000</td>
<td></td>
</tr>
<tr>
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<td>.619**</td>
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<td>Correlation</td>
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<td>TL Intellectual</td>
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<td>.552**</td>
<td>.479**</td>
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<td></td>
<td>Correlation</td>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
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</tr>
<tr>
<td>TL Group</td>
<td>Pearson</td>
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<td>.204*</td>
<td>.228**</td>
<td>.117</td>
<td>.116</td>
<td>1</td>
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<td></td>
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<td>.007</td>
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<td>Pearson</td>
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<td>.236**</td>
<td>.314**</td>
<td>.362**</td>
<td>.402**</td>
<td>.262**</td>
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<td>.005</td>
<td>.000</td>
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<td>.002</td>
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<td>Collaboration Within</td>
<td>Pearson</td>
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<td>.156**</td>
<td>.264**</td>
<td>.333**</td>
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<td>.005</td>
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<tr>
<td>Collaboration Between</td>
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<td>.236**</td>
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<td>.000</td>
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</table>

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).
Hypotheses Testing

Because they included a prediction of mediation, the hypotheses were tested using the procedures outlined by Baron and Kenney (1986) to identify the presence of an intervening variable. This analysis consists of three steps. In the first step, the relationship between the predictor variable and the intervening variable is established. If a relationship cannot be established, the analysis would stop at this point. In the second step, the criterion variable is regressed on the predictor. In the third step, the criterion variable is regressed on both the predictor variable and the proposed intervening variable. A mediating influence is confirmed when the effect (beta) of the predictor variable on the criterion variable is less when the intervening variable is included (step three) than when it is not (step 2).

Hypothesis 1, the relationship between transformational leadership characteristics and the decision to pursue an innovation, is thus tested in the second step of the process. Hypothesis 2 on collaboration and innovation is tested in the third step of the process and Hypothesis 3 which looked at the relationship between transformational leadership and collaboration is actually tested in the first step of the process.

Step one began with analysis of the correlation matrix. As can be seen in Table 1, transformational leadership and collaboration (the mediating variable in regards to innovation) were significantly correlated for both the collaboration within the organization and collaboration between organization measures. This was true for both the overall measure of transformational leadership and for each of the sub-dimensions. Thus Hypothesis 3 regarding the relationship between collaboration and transformational leadership is supported.

Step two examined the relationship between transformational leadership and innovation. Here, the outcome variable of pursuit of an innovation was regressed on both the overall transformational leadership variable and, in separate regressions, each of the transformational leadership sub-dimensions. Results of this analysis for the overall transformational leadership measure and for the sub-dimensions of TL Vision, TL Model, and TL Intellectual Stimulation are shown in Table 2 (a-d). In all but the TL Intellectual Stimulation sub-dimension, transformational leadership was a significant predictor of pursuing an innovation, explaining about 5% of the variance in each case. Thus, Hypothesis 1 was supported.

The fact that the above relationships were significant allowed for continuation of the analysis. In step three, a series of hierarchical regressions were performed in which the proposed mediators of collaboration were entered first, and the transformational leadership variable was entered second. Results of this analysis are shown as equation two in the sub-tables of Tables 2. The analysis serves two purposes. First, it provides partial support for Hypothesis 2 regarding the relationship between collaboration and innovation. While the collaboration within measure was significant, the collaboration between measure was not significant. Second, the analysis provides support for the view of collaboration within as a mediator of the relationship between transformational leadership and innovation. For the overall transformational leadership variable, the relationship was fully mediated since transformational leadership was not significant once collaboration within was controlled for. In the case of TL Vision and TL Model, a full mediation
could be contended, though in each case the transformation leadership variable reached marginal significance. Taken together, these results provide support for Hypothesis 4.

Taken together, the above analysis suggests at least partial support for all four hypotheses (with the exception of between organization collaboration). The analysis, however, was done on the combined sample with both scenarios included. Because both transformational leadership and collaboration are often purported to be associated with more radical innovation, the analysis was rerun treating each scenario as a separate sample. The results suggest significant differences between the scenarios.

For the scenario with greater certainty, transformational leadership was not a significant predictor of the decision to pursue the innovation, whether as an overall measure or for the sub-dimensions. Collaboration within, however, was a significant predictor, explaining about 10% of the variance (in the interest of space, those results are not shown). For the scenario with greater uncertainty, however, the results showed that both transformational leadership and collaboration within the organization were both significant predictors of the decision to pursue the innovation (see Table 3a-d). Further, each variable appeared to account for independent variance in predicting innovation.

The analysis was run using the same procedure as laid out above. As can be seen in the tables, the overall transformational leadership variable was still marginally significant after controlling for collaboration, and the TL Vision and TL Model variables retained most of their explanatory power after controlling for collaboration. Further, TL Intellectual was now seen as a significant predictor of innovation by itself, though this relationship was fully mediated by collaboration. While in the same general directions as the initial analysis, and still broadly supportive of the hypotheses, these results suggest that the nature of the relationships may change based on the type of innovation that is being examined.
### TABLE 2 Regression and Mediation Analysis – Overall Sample

<table>
<thead>
<tr>
<th>Equation 1</th>
<th>Predictor Variables</th>
<th>Predicted Variable</th>
<th>( \Delta R^2 )</th>
<th>( \Delta F )</th>
</tr>
</thead>
<tbody>
<tr>
<td>2a. Overall Transformational Leadership</td>
<td>Overall Transformational Leadership</td>
<td>.214</td>
<td>.046</td>
<td>6.517**</td>
</tr>
<tr>
<td></td>
<td>Criterion Variable = Pursue Innovation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2b. TL Vision</td>
<td>TL Vision</td>
<td>.204</td>
<td>.042</td>
<td>5.975**</td>
</tr>
<tr>
<td></td>
<td>Criterion Variable = Pursue Innovation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2c. TL Model</td>
<td>Collaboration Within</td>
<td>.069</td>
<td></td>
<td>10.121**</td>
</tr>
<tr>
<td></td>
<td>Criterion Variable = Pursue Innovation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2d. TL Intellectual</td>
<td>Collaborative Model</td>
<td>.228</td>
<td>.052</td>
<td>7.535**</td>
</tr>
<tr>
<td></td>
<td>Criterion Variable = Pursue Innovation</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7p \leq .10; *p \leq .05; **p \leq .01
### TABLE 3 Regression and Mediation Analysis – Uncertain Scenario

<table>
<thead>
<tr>
<th>Equation</th>
<th>Predictor Variables</th>
<th>Beta – Overall TL</th>
<th>$\Delta R^2$</th>
<th>$\Delta F$</th>
</tr>
</thead>
<tbody>
<tr>
<td>3a.</td>
<td>Overall Transformational Leadership</td>
<td>.312</td>
<td>.097</td>
<td>8.072**</td>
</tr>
<tr>
<td></td>
<td>Criterion Variable = Pursue Innovation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equation 2</td>
<td>Predictor Variables</td>
<td>Beta – TL Vision</td>
<td>$\Delta R^2$</td>
<td>$\Delta F$</td>
</tr>
<tr>
<td>3b.</td>
<td>Collaboration Within</td>
<td>.072</td>
<td>5.840**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Collaboration Within + Overall TL</td>
<td>.237</td>
<td>.042</td>
<td>.065+</td>
</tr>
<tr>
<td></td>
<td>Criterion Variable = Pursue Innovation</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Equation 1 | Predictor Variables | Beta – TL Model | $\Delta R^2$ | $\Delta F$ |
| 3c.       | TL Model | .357 | .127 | 10.934** |
|           | Criterion Variable = Pursue Innovation |
| Equation 2 | Predictor Variables | Beta – TL Intellect | $\Delta R^2$ | $\Delta F$ |
| 3d.      | Collaboration Within | .072 | 5.840** |
|           | Collaboration Within + TL Model | .304 | .085 | 7.425** |
|           | Criterion Variable = Pursue Innovation |

$+p \leq .10; \quad *p \leq .05; \quad **p \leq .01$
DISCUSSION

While both transformational leadership and collaboration have been associated with organizational innovation, both streams of literature have worked under an implicit and untested assumption that these characteristics actually lead to decisions to pursue innovation in the leader/manager. This study tested this assumption using a scenario based experimental design and found that the relationships are not necessarily as clear as the assumptions would indicate. While both transformational leadership and willingness to collaborate were positively associated with innovation choices, the results indicate that the willingness to collaborate variable is more dominant, fully or partially mediating the transformational leadership relationship to innovation. That is, it appears that transformational leadership may be associated with a willingness to collaborate and that it is the willingness to collaborate that really predicts the innovation choice. This was particularly true in the case of more certain innovations, where collaboration was a significant predictor and transformational leadership was not. In the less certain scenario, however, there appeared to be at least some support for both variables having an independent influence. These findings are in line with the broader literature on transformational leadership and innovation at the organizational level, where researchers are finding that the relationship may be moderated by various internal and external conditions (e.g., Jung et al 2008). It is also in line with a general view of transformational leadership carrying greater weigh in general when situations are less certain (Jung, Chow & Wu, 2003). In any event, the findings suggest that additional research is needed before the real relationships can be determined.

That said, the approach used here, especially with the use of student subjects in the role of management decision makers, has limits and as such caution should be used in generalizing the results. While the experimental approach using scenarios is particularly appropriate for the purpose of establishing relationships (Taylor, Goodwin and Cosier, 2003), and did in fact provide valuable insights into the variables studied here, it also has its limits. Future research might be directed towards replicating the scenario approach with a more experienced sample (either MBA students or executive education participants come to mind) and examining these variables more directly within organizations. Particular attention might be paid to flushing out the knowledge and learning aspects of both transformational leadership and collaboration, since innovation appears to rely on knowledge and learning. Such research provides challenges in gaining access to appropriate decision makers and situations, but is important in helping both research and managers better understand how best to promote innovation opportunities.
REFERENCES


