Following the Leader in R&D: The Joint Effect of Subordinate Problem-Solving Style and Leader- Member Relations on Innovative Behavior

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1. What are the concepts studied in the paper?

This paper studies how innovative behavior, among R&D professionals, is—positively or negatively—related to:
- i) Problem solving styles (associative or bisociative),
- ii) Leader-member-exchange (LMX) styles (transactional or transformational).

In the process, a few key terms that are critical to the paper were defined.

The foundation of **LMX** theory is social exchange between leaders and followers. On one hand this relationship can be considered **transactional** if it is driven by either the fulfillment of contractual obligations such as those included in the subordinate's job description or how he/she complies with requests in the interest of maintaining employment. On the other hand, a LMX relation is considered **transformational** when based on more psychological exchanges such as trust, support and consideration. This type of relationship is viewed more like a collaborative partnership.

The author defines **problem solving** as "a habit-based propensity to react in a certain way in specific problem solving contexts." The **associative** mode is characterized by habitual thought, adherence to rules and disciplinary boundaries, and use of rationality and logic. In contrast, the **bisociative** mode is characterized by a propensity to process information originating from different, often overlapping domains. The bisociative style generates more novel approaches and more innovative solutions to problems.

2. What methodology has been used?

The study considered 2 samples of R&D managers and engineers from two large U.S. companies. Sample 1 and sample 2 included 110 and 149 professionals, respectively.
A first questionnaire was sent to employees and a second one was simultaneously sent to the managers to assess innovative behavior. A 100% response rate was obtained from the 22 and 26 managers in the two samples 1 and 2, respectively.
Appropriate measures were defined for all dependent or independent variables:
- Innovative behavior had four items:
  1. Searched out new technologies, processes, techniques, ideas
  2. Generated creative ideas,
  3. Promoted and championed ideas to others,
  4. Was innovative in general
- LMX had three items:
  1. Clear understanding of where I stand with my manager,
  2. My manager understands my job problem and my needs,
  3. My working relationship with my manager is effective.
- Problem solving styles' indexes included ten and nine items. A high score on the associative scale indicated a preference for systematic, habitual problem solving; whereas a high score on the bisociative scale indicated a preference for more intuitive problem solving.

– Education was added to the survey as a covariate.

As analysis tools, the authors calculated correlation factors among the study variables as well as well as hierarchical regression to study the relative significance of the variables relative to the innovative behavior.

3. What are the contributions of the paper to the research literature?

This paper contributes, through statistical results, to our understanding of how innovative behavior is related to:

1. The problem solving style — positively when a bisociative style is applied, negatively when an associative style is applied.

2. The LMX relationship — positively when transformational, negatively when transactional.

Furthermore, the study showed that LMX leadership was strongly related to the innovative behavior of R&D professionals regardless of:

1. The problem solving style, and

2. The task type — research, development or product engineers.

4. How does the paper compare with other research publications in the field?

a) What have the other researchers found that are related to this research?

The leader-member exchange (LMX) model, formerly referred to as the vertical-dyad linkage model, was introduced during the mid-70s (Dansereau, Graen, & Haga, 1975; Graen, 1976; Graen & Cashman, 1975) [4]. Since then, a good number of research papers have been published, mostly on adjectives of LMX (ability, affect, gender…).

LMX-related publications
Through my literature search, I found a few studies that focussed on different aspects of LMX in the workplace:
– In their review, Gerstner and Day [1], have studied and found a significant relationship between LMX and a lot of different aspects that bring satisfaction on the job: job performance, satisfaction with supervision, overall satisfaction, commitment, role conflict, role clarity, member competence, and turnover intentions.
– Another LMX relationship was studied by Wayne, Liden and Sparrowe [2] but this time it was the influence of the gender on LMX that was the focus.

Females were found to be less likely to develop high LMXs with their male superiors in comparison to males.

- Day and Crain published a similar paper in the way the study was conducted and the data analyzed. [3] The researchers looked at how affect and ability influenced initial LMX. Support was found for the general hypothesis that leaders and followers incorporate trait as well as ability information in their initial exchange quality judgments.
- S. Wayne and S. Green [4] found that even if an employee has made a positive impression on the supervisor, he or she may still have a need to maintain an impression.
- A very complete study published by R. Sparrow and C. Liden [5] suggests that leaders differentiate in the quality of the exchange relationships they develop with members.

Innovative behavior (and leaders)-related publications
- C. Prather [7] defines a continuum of problem solving/creativity styles. At one end, what Scott and Bruce would call "associative" style and that Prather calls "adaptive" or "within the box". On the other end of the continuum we find what Scott and Bruce would call "bisociative" style and that Prather calls "reactive" or "outside the box". If names differ, the general idea remains the same and Prather suggests that most effective leaders rate somewhere in the middle of the innovative behavior index.
- In his book *"Managing with a conscience"* [8], F. Sonnenberg explains that corporations that foster trust and communication with employees, customers and suppliers build an effective organization. Employee morale plummets when office politics make innovative behavior risky. A track record of integrity, reliability and fairness are essential.

By the same authors
- In a 1994-study [6] Scott and Bruce had already researched the present subject with maybe a heavier approach using larger scales with more items to measure the variables. At that time they had also found that leadership, support for innovation, managerial role expectations, career stage, and systematic problem solving style are significantly related to individual innovative behavior. Four years later they have reduced the scale size to keep the most meaningful items and they also broadened their sample size to two corporations' managers and subordinates.

b) What are the findings of this paper that support, extend or refute the findings of other researchers?

- As we just saw, Scott and Bruce extended their 1994 study by 1) refining their methodology and, more importantly, 2) adding to the scope of their research the influence of the problem solving style of the subordinate on his/her innovative behavior.

– This study extends earlier research performed on LMX by studying its influence on *innovative behavior* of engineers adding a new dimension to the already existing literature.

c) How does this paper differ from the other researchers' work?

The majority of the papers that I reviewed and referenced is not supported by quantified data and relies on either the authors' personal observations or review of the previous literature related to this topic. Scott and Bruce went through the lengthy process of collecting field data and analyzing it; this is to add to their credit.

5. What are the strengths and weaknesses of the paper in terms of concepts, methodology and results?

Concept:
Strength:
The subject matter—innovative behavior—is very applicable to today's performance requirements of R&D professionals. Innovation is key to corporations' success and this study is showing pointing at a couple of ways to improve innovation performance: LMX and problem solving style.

Methodology
Weakness:
This study was cross-sectional by design and does not look at the longitudinal change in the considered variables. Nevertheless that was also the case of many other studies that I encountered in my literature search.
Strength:
Strength of the study is that the samples consisted of actual employee-supervisor dyads taken in the same field.

Results
Strength:
The results provided by this study are adequate to validate the two proposed hypotheses.

6. What are the conclusions of the paper? Are they well stated? How are they supported by the research reported in the paper? Do they need strengthening? If so, how?

The conclusions of the paper are that:
– Bisociative (resp. associative) problem solving style is positively (resp. negatively) related to innovative behavior,
– Transformational (resp. transactional) leader-member-exchange (LMX) is positively (resp. negatively) related to innovative behavior,

- LMX explained variance in innovative behavior beyond that explained by problem-solving style alone, regardless of the type of task in which the R&D professionals were engaged.

The conclusions of the paper are well stated. The methodology used was rigorous, sample size was significant and the study provided adequate data to draw conclusions from.

7. Are the references adequate, or have you identified researchers in the same area that should be included? If so, give full citations and briefly describe their work.

Yes, the references are adequate. The references used by the authors are numerous and we find in them benchmark papers produced by authors whose names come back often in other work related to this area (i.e. Graen, Wayne, Waldman, Jabri, …)

8. After studying the paper and related literature, what research ideas have you identified for future work?

Here are some ideas for future research work:
- A longitudinal design should be examined, focussing on the evolution of impacting variables over a significant period of time.
- An extension to the present research focussing on the type of tasks in which the participants to the survey are involved.
- Focus on solutions to the findings found in this study; how to prevent or reverse factors—LMX and problem solving style—impacting innovative behavior: training, new employee selection…
- Along this idea I believe that there would be significant value in measuring the employee performance on the job as a function of how good of a fit exists between their problem solving style or personality traits and the type of skills required by their task.

References

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