



TRANSFORMATIONAL LEADERSHIP AND INNOVATIVE WORK BEHAVIOR AMONG R&D PROFESSIONALS OF INDIA: AN EMPIRICAL INVESTIGATION

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ABSTRACT

The purpose of this study is to examine transformational leadership as a predictor of innovative work behavior (IWB) in R&D organizations using the social exchange theory (SET). Scientists working in the R&D laboratories of India's CSIR were surveyed using a questionnaire administered in person. Given that transformational leadership is the critical antecedent of IWB, the analysis revealed that transformational leadership has a significant positive effect on scientists' IWB. The study provides implications on transformational leadership that have a remarkable relationship with innovative work behaviour. The paper contributes to the ongoing discussion regarding the leaders' influence on employees' innovation-related behaviors by examining the crucial role of transformational leadership in influencing IWB within the R&D context.

KEYWORDS: CSIR, Innovative work behavior, R&D, transformational leadership

1. INTRODUCTION

The ability to innovate products, processes, services, and technology to achieve reduced costs and higher performance is a key factor in an organization's success in the modern business environment (Angel & Sanchez, 2009; Dewett, 2007; Gupta & Singh, 2015). Modern organizations have realized the need for a proactive approach to "finding it" or being innovative (Peerzadah et al., 2021). For organizations to grow and remain competitive, these must produce innovative products and time- and cost-efficient processes (Anderson et al., 2014), which is only feasible if they monitor their employees' IWB. The concept of employees' innovative work behaviour (IWB) is regarded as a fundamental element among various forms and levels of innovation in the context of a rapidly evolving environment. This is due to the fact that it is the individuals who generate ideas (Masood & Afsar 2017; Peerzadah et al., 2023). As a result, the development and sustenance of employee innovative work behavior has emerged as a major challenge for organizations (Al Wali et al., 2023).

Organizations employ various strategies to nurture creative and innovative behavior for competitive advantage and survival (Gumusluoglu et al., 2017). As a result, the primary focus of organizations (particularly R&D organizations) is now on investigating all of the factors that can enhance the innovative work behavior of employees (Agarwal, 2021). Because every new idea originates in the minds of individuals, organizations are thus compelled to seek out an increasingly creative and innovative workforce (Gupta et al., 2013). IWB incorporates all individual behaviors that seek to generate, introduce, and implement new ideas for the organization's benefit (Afsar et al., 2021; Groelj et al., 2021). Consequently, one method for businesses to be more innovative is to utilize the innovative potential of their employees (De Jong, 2007). Individual ideas drive the innovation process, (Potocnik and Anderson, 2016); consequently, organizations are increasingly relying on their employees' IWB to offer new products/services, revamp business processes, and establish new working techniques (Cangialosi et al., 2020). The majority of academics and business professionals now agree that individual innovation contributes to the success of an organization (Amabile, 1988).

Furthermore, the ability to create and innovate is dependent not only on the characteristics of the individuals but also their work environment (Amabile et al., 1996; Mumford et al., 2002; Woodman et al., 1993), in which the leader plays a significant role. According to De Jong and Den Hartog (2008), leaders play a crucial role in the continued existence, success, and expansion of their organization by managing the innovation process. Because



innovation and leaders play important roles in helping the organization succeed and drive development (Peerzadah, et al., 2022), the study empirically examines transformational leadership as an antecedent of the innovative work behavior of employees working within the R&D context of India.

2. THEORETICAL BACKGROUND

Transformational leadership and Innovative work behavior

Leaders play a crucial role in the survival, economic viability, and growth of their organization by steering the innovation process in today's fast-paced, competitive business environment (De Jong and Den Hartog, 2008; Khan et al., 2012). According to the researchers (see, for example, Bass and Avolio, 1994; Bednall et al., 2018; Suifan et al., 2018), transformational leadership is the process by which leaders act as an idealized role model, stimulate and encourage positive work behaviors, provide inspirational motivation, and engage in supporting and mentoring followers to achieve the organization's shared vision and goals.

IWB is defined as "individuals' behaviors directed toward the initiation and intentional introduction of new and useful ideas, processes, products, or procedures within a work role, group, or organization" (De Jong, 2007; p.19). These new ideas and notions vary from conventions often held in the workplace. In today's highly competitive and ever-changing business environment, organizations face an enormous challenge to their continued success and expansion (Chowhan et al., 2017). Businesses now need to prioritize innovation if they want to survive and thrive in today's competitive marketplace. Innovation comes about when employees generate, promote and implement new ideas that are strategic factors of IWB (Hon and Lui, 2016; Janssen, 2000).

The literature on leadership and innovation has acknowledged that transformational leaders not only create new ideas themselves but also encourage and facilitate their employees to show their potential in solving complex issues and performing challenging tasks through innovative means (Peerzadah et al., 2021). Leaders face a difficult challenge in directing the innovation process at the organizational level, as they have to facilitate the perpetual creation and application of new ideas. To lead the innovation process, a leader must foster an environment that encourages all employees to engage in innovative practices and encourages the creation and exploitation of new ideas (Jaiswal and Dhar, 2015). According to Afsar and Umrani (2019), transformational leadership is a significant factor in stimulating and enhancing innovative work behavior among employees in a competitive business environment.

A body of empirical evidence supports transformational leadership as a predictor of positive work-related attitudes and behaviors, such as job satisfaction (Muterera et al., 2018), affective commitment (Jacobsen and Staniok, 2020), lower turnover intention (Caillier, 2016), organizational citizenship behavior (Altunoğlu, et al., 2019), helping behavior (Lim & Moon, 2021), creative behavior (Jaiswal & Dhar, 2015); entrepreneurial behavior (Afsar, et al., 2017). The individualized attention and support provided by transformational leaders to their followers' needs and requirements may have a greater impact on the followers' participation in creative endeavors. These leaders stimulate followers' intellectual thinking by persistently challenging followers' beliefs and assumptions, which eventually motivates followers to participate in the creation and application of ideas (Afsar and Umrani 2019). Such leaders are able to link their organization's vision to individual goals, inspiring followers and boosting productivity (Bednall et al., 2018). It is thus expected that transformational leaders would be able to motivate employees by connecting their future to the future of their organization and inspire people to engage in innovative behaviors by forging a strong feeling of shared vision and belonging with the organization. Following from the aforementioned explanations, it is proposed that:

H1. Transformational leadership is positively related to IWB.

3. METHODOLOGY

Sample and Data Collection

The research study was conducted in the R&D laboratories of India's largest civilian research and development agency; the Council of Scientific and Industrial Research (CSIR India). CSIR has 38 constituent laboratories and about 3,289 scientists. The different surveyed laboratories represented each of the five research domains of the agency (biological, chemical, engineering, information, and physical sciences). Yamne's (1967) method for sample selection was adopted to select a sample size of 357 for the present study. Following guidelines by Anjum et al., (2022) and Rahi et al., (2019), the respondents were selected using stratified random sampling to get the representation from all the subject categories or strata. Hence, the sample size of each section is proportional to the division's population size when observed in contrast to the total population. Each respondent received a blank envelope to return the completed questionnaire. Responses were anonymous and respondents were asked not to mention any personal identification



detail on the envelopes. All respondents had been associated with their leaders for at least 2 years. This ensured that there had been a substantial time of the dyadic relationship between the leader and the subordinate to make an accurate assessment of the leader.

Measures

Transformational Leadership

The transformational leadership style was measured by the Multifactor Leadership Questionnaire™ 5X (MLQ Form 5X-Short) by Bass and Avolio (1995). The sample items include: “My leader goes beyond self-interest for the good of the group”, and “My leader helps me to develop my strengths”.

Innovative Work Behaviour

Innovative Work Behaviour was measured by using the scale developed by De Jong and Den Hartog (2010). The sample items include: “I generate original solutions for problems”, “I attempt to convince people to support an innovative idea”, and “I contribute to the implementation of new ideas”. A Likert scale with five points was used to measure the items.

Demographic Profile

The respondents were: 71.7 percent male and 28.3 female; 4.8 percent of the respondents had a graduate degree, 17.9 had a post-graduate qualification and 57.4 had a Ph.D. degree and 19.9 percent had a post-doctorate. The average job tenure was 15 years. 44.3 percent of the respondents were junior-level scientists, 36.7 percent were middle-level scientists, 14.3 percent were senior-level scientists and 4.8 percent were other scientists.

4. RESULTS

Statistical data analysis has been done using the Smart-PLS 3 software as PLS is considered the most advanced technique for data analysis (Hair et al, 2017). The two-stage assessment procedure employed in this study which is considered most suitable in the field of social sciences (Hair et al, 2017), highlights the results recommended by researchers like Henseler et al., (2009). Since transformational leadership was modeled as a higher-order construct; the measurement model assessment was performed in two steps.

Step 1: Measurement model assessments of first-order constructs

In the first step, we evaluated the reliability and validity of the constructs in the measurement model, where the indicator loadings, average variance extracted (AVE), composite reliability (CR), and discriminant validity were calculated. According to Hair et al. (2017), the standard cutoff values for CR and AVE are 0.70 and 0.50, respectively. Besides, the indicators of reliability are over the required threshold value of 0.60 in the case of Cronbach alpha, and 0.70 for composite reliability (Hair et al, 2017). Hence the construct reliability was established (Table I).

Table I: The latent validity and reliability of the measurement model

Construct	Indicators	Loadings	alpha	CR	AVE
Transformational leadership: <i>Idealized Influence (attribute)</i>	IA1	0.780	0.786	0.862	0.610
	IA2	0.794			
	IA3	0.824			
	IA4	0.722			
<i>Idealized Influence (behavior)</i>	IB1	0.575	0.747	0.839	0.571
	IB2	0.861			
	IB3	0.793			
	IB4	0.763			
<i>Intellectual Motivation</i>	IM1	0.794	0.848	0.898	0.688
	IM2	0.877			
	IM3	0.863			
	IM4	0.780			



<i>Intellectual Stimulation</i>			0.771	0.851	0.591
	IS1	0.681			
	IS2	0.716			
	IS3	0.827			
	IS4	0.839			
<i>Individual Consideration</i>			0.630	0.844	0.730
	IC3	0.847			
	IC4	0.861			
Innovative Work Behavior			0.871	0.899	0.528
	IG1	0.685			
	IG2	0.703			
	IG3	0.735			
	ICG1	0.723			
	ICG2	0.606			
	II1	0.791			
	II2	0.788			
	II3	0.761			

Discriminant Validity

The criteria set out by Fornell and Larcker (1981) were used to assess the discriminant validity. According to the guidelines proposed by Fornell and Larcker (1981), the square root of the AVE should be greater than the correlation value of the latent constructs. The model's discriminant validity was established (table II) since the square root of the AVE (diagonal values) was found greater than the correlation values of the latent constructs (Chin, 1998).

Table II. Discriminant Validity (Fornell and Larcker Criterion)

	II (A)	II (B)	IC	IM	IS	IWB
II (A)	0.781					
II (B)	0.720	0.756				
IC	0.616	0.634	0.854			
IM	0.707	0.746	0.608	0.830		
IS	0.646	0.683	0.655	0.681	0.769	
IWB	0.191	0.167	0.155	0.187	0.130	0.726

Step 2: Measurement model assessments of second-order constructs

The assessment of the second-order construct was done based on the significance and relevance of weights, and collinearity test, redundancy analysis, suggested by (Becker et al. 2012; Chin, 1998; Hair et al. 2017). Transformational leadership was modeled as the higher-order (reflective-formative) construct in the study as evidenced by the studies (Pieterse et al., 2010; Schermuly, et al., 2022). Transformational leadership was based on five lower-order constructs: Idealized Influence (Attribute), Idealized Influence (Behavior), Inspirational motivation, Individual Consideration, and Intellectual Stimulation, While the dependent variable: Innovative Work Behavior was modeled as the single-order (reflective) construct as evidenced by the studies (De Jong & Den Hartog 2010; Singh & Sarkar, 2019).

For the HOC construct, the first-order constructs' weights were higher than 0.10 (table III) and their signs are consistent with the underlying theory. However, where weights were not significant, their outer loadings were assessed. If outer loadings, which are the indicator's absolute contribution to its principal construct, are above 0.50, the indicator or lower order construct (LOC) is kept even though it is not significant (Hair et al., 2017). In our study all the indicators have outer loadings above 0.50 hence all the lower-order constructs were retained. Besides, to ensure multicollinearity is not present at this stage, the variance inflation factor (VIF) values were determined. The VIF values of the first-order construct range from 2.105 to a maximum of 2.891. Therefore, multicollinearity is not present among the first-order constructs, as the VIF values are far below the common cut-off threshold of 5 (Hair et al., 2011).

Besides, for formatively measured constructs, convergent validity is assessed by the correlation of the construct with an alternative measure (global item) of the same construct (Hair et al., 2019). According to Hair et al. (2019), there should be a correlation of 0.70 or higher between the formatively measured construct and the global/single-item assessing the same construct. The correlation of global/single with its principal formative construct in the study was above 0.70 (beta=0.787; p-value=0.000; LLCI=0.739 and ULCI=0.830), hence convergent validity through redundancy analysis was established.

Table III. Validity of Higher Order Constructs

HOCs	LOCs	Outer weights	t-Statistics	p-values	Outer loadings	VIF
Transformational leadership	II (A)	0.461	1.375	0.169	0.893	2.537
	II (B)	0.329	0.994	0.320	0.844	2.689
	IC	0.416	1.461	0.144	0.825	2.105
	IM	0.190	0.531	0.595	0.808	2.891
	IS	0.300	1.023	0.306	0.623	2.497

Hypotheses testing

The results of Table IV revealed that the total effect of transformational leadership style on scientists’ innovative work behavior was positive and significant ($\beta= 0.208, p< 0.001$). The significance of the relationship is further supported by a non-zero confidence interval. Thus lending support to **H1**.

Table IV. Hypotheses testing

Path	coefficient	S.D	t-statistics	p-value	CIBc (2.50%)	CIBc (97.50%)	Decision
H1: TFL -> IWB	0.208	0.057	3.628	0.000	0.062	0.299	Supported

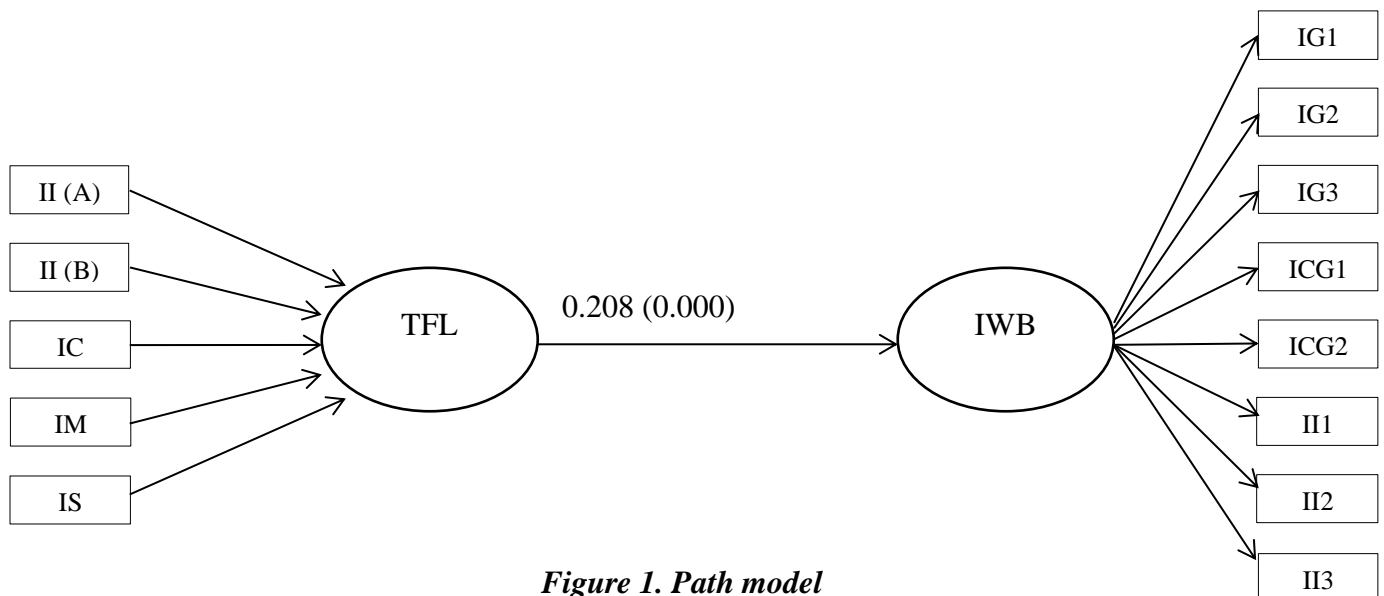


Figure 1. Path model



5. DISCUSSION AND CONCLUSIONS

The results revealed that transformational leadership has a positive and significant influence on IWB of scientists. Researchers (eg, Avolio & Bass 1995; Bass 1985; Burns 1978), discovered that transformational leadership is characterized by inspiring motivation, a shared sense of mission, an exciting vision, and aspirations. These characteristics of transformational leadership foster intrinsic motivation, creativity, and innovation among employees (Gumusluoglu & Ilsev, 2009; Pieterse et al., 2010). Inspirational motivation inspires employees to reform current systems and design novel approaches to resolving challenges and encourages them to exhibit behaviors based on the development of novel methods of doing things. Transformational leaders, according to Dvir et al. (2002), ensure that people challenge the status quo and are intellectually challenged by going above and beyond their self-interest for the sake of the group or organization. Following the social exchange theory (Blau, 1964), "a leader's individualized consideration encourages employees to reciprocate with greater creativity and innovativeness" (p. 566). As a result, followers are encouraged to exhibit IWB through the nature and substance of transformational leadership behavior as well as the coexistence of the social exchange relationships between leaders and followers. These findings are in line with earlier studies undertaken throughout the time period. According to recent studies like those by Schermuly et al. (2022) and Garg et al. (2022), transformational leadership encourages followers to engage in innovative and creative work behaviors. Our findings, therefore, add to the growing body of research supporting the significance of transformational leadership for employee innovative work behavior.

6. IMPLICATIONS

The study provides important theoretical and practical implications to the existing body of literature.

Theoretical implications

This study contributes to the theoretical understanding of transformational leadership, IWB, and their interdependent relationships in the context of R&D. While earlier research has justified using the social exchange theory to improve creative outcomes, the present study validated the applicability of social exchange theory, hence confirming the reciprocity principle of social exchange theory. The study contributes to leadership and innovation literature by validating the research model in a non-western emerging market context. By testing the theoretical model in an Indian setting, the study not only provides new evidence of the links between study variables but also validates the existing relationships between these factors found in Western and other contexts. Hence, the study extended the debate on leadership and innovation in the Indian context as recently highlighted by researchers (e.g., Gupta, 2020) for a need to study the varied contextual and personal factors at work in the Indian context. Moreover, the evidence of the effect of leadership on the innovation-related behaviors of R&D employees has been insufficient and controversial. While some studies suggest that leadership is superfluous in an R&D environment, others maintain that it is fundamental even in such environments (Zheng et al., 2010). This study thus contributes by testing and validating a framework linking leadership-to-innovative behavior in an R&D environment. Researchers interested in investigating leadership and its influence on employee IWB in the Indian R&D setting are expected to get useful insights from these findings.

Practical implications

The study indicates that to promote IWB in the workplace, particularly in R&D laboratories, the organization must focus on inculcating transformational leadership among R&D leaders and also train them in exhibiting transformational leadership behaviors with the hope of augmenting IWB in their organizations. The findings may also assist R&D organizations in developing leadership training programs that encourage leaders to adopt a style that improves the IWB of employees. HR managers, executives, and supervisors must thus make a concerted effort to demonstrate a transformational leadership style. Because transformational leaders intellectually excite subordinates by constantly forcing them to challenge the status quo, this inspires subordinates to engage in more innovation-related behaviors. In addition to encouraging employees to be more creative, this can reduce the anxiety associated with the uncertainty and ambiguity inherent in creative and innovative processes (Gong et al., 2009).

7. LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

Different leadership styles have distinct benefits and drawbacks. This study's coverage of only one leadership style is insufficient to encompass the entire spectrum of leadership. Therefore, it is necessary to expand this study and investigate other leadership styles, including but not limited to empowering leadership or self-leadership. The study has not investigated any underlying mechanism or boundary condition between leadership and scientists' innovative



work behavior. It is recommended to study other underlying processes and boundary conditions between transformational leadership and IWB. A new direction for future research might be to assess the contextual factors like innovative climate, and personal factors like growth mindset, work passion, personal strengths, and so on. The current study's data was gathered by a cross-sectional questionnaire survey. The inferences about causality need to be drawn with caution. Therefore, a longitudinal, multi-source study is encouraged for further investigation into this topic.

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