

The Influence of Transformational Leadership on The Improvement of Teachers' Innovative Work Behavior in Chinese Colleges and Universities

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Abstract

Teachers' innovative work behavior (IWB) at colleges and universities is directly linked to teachers' transformational leadership (TL) and teacher trust (TT). Universities have several challenges to remain viable and competitive. Educators may produce and improve their production by generating unique concepts in universities and institutions. The purpose of this research was to analyze how TL and trust may enable faculty members to engage in creative work behaviors. The research concentrated on a sample that is seldom examined in the literature on occupational well-being, namely university instructors, to test the model. An online survey was completed by 275 Chinese university professors in total. The study model was assessed using the bootstrapping method and structural equation modeling methodology. In addition, the performance metrics such as prediction error, level of innovative behavior, the prevalence of teacher job satisfaction levels, and Moderating effects of task complexity and innovation climate are assessed along with statistical analysis tests like the Analysis of Variance (ANOVA) and the Chi-square test are employed to determine the teachers' trust partly mediates the connection between TL and the IWB of instructors. This study suggests that teachers are inspired to innovate when exposed to TL behaviors, which benefits their creative behavior. Second, these data support the premise that transformative leaders may increase faculty relationships by establishing trust. This research offers a glimpse into the innovative behavior development teachers have experienced as a consequence of TL and their dedication to their career and organization.

1. INTRODUCTION

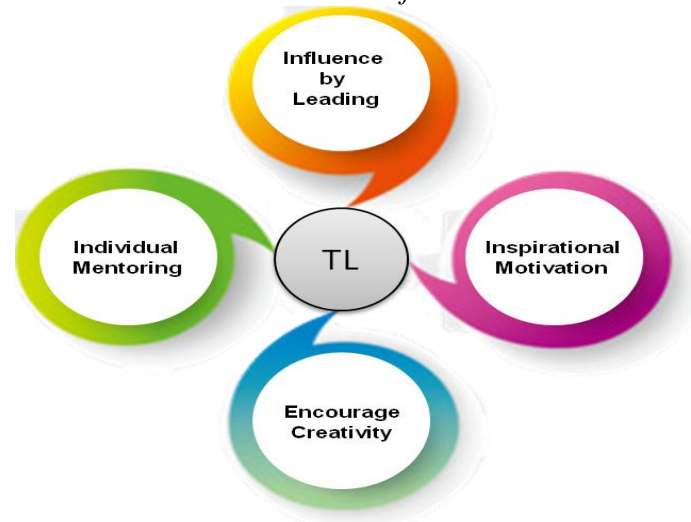
China's education officials have a long-term goal of improving the quality of education so that it becomes an exceptional education. Teachers' primary responsibilities have evolved due to the rapid movement in society's demands for information and skills offered by the educational system Zhou et al. (1). These days, instructors are expected to follow a

curriculum set by the Ministry of Education and to be creative in the lessons they teach their pupils. As the educational environment evolves, students will increasingly rely on innovative instructional methods to help them achieve their full potential. On the other hand, teachers must rethink their teaching and learning methods to engage students and provide them with the greatest possible educational experience Burbules et al. (2).

Today's universities focus on improving the quality of their faculty to maintain their long-term viability. But because of the massive financial ramifications of much work-related behavior, paying attention to teacher leadership, trust, and sustainability is becoming more necessary Huang et al. (3). Because of this, university scholars and

practitioners have been more interested in teaching-related sustainability issues at universities during the last decade. As an important teacher consequence, the university sustainability component of innovative work behavior (IWB) is linked to instructors' IWB (Wang et al. (4)).

Figure 1
Elements of TL



Teachers' IWB is regarded to be significantly impacted by transformative leadership. Studies on IWB almost always attribute creative behavior to the presence of transformative leadership (TL), a practice that encourages IWB. Transformative leadership has been linked to more creative work practices, although previous studies found mixed results (Sudibjo and Prameswari (5) and Mody et al. (6)). To help their pupils achieve their entrepreneurial ambitions, instructors might be motivated by TL. It is the goal of TL and trust in higher education institutions to focus on the most critical issues affecting universities by going beyond the needs of their faculty. Regarding improving teachers' creative problem-solving and professional productivity, TL is a university technique. TL has been proven to have a considerable impact on IWB, consistent with other research. If a university wants to gain the confidence and credibility of other institutions, it must do more than just support its academic members (Masood

and Afsar (7)). Education in developing countries has recently grappled with incorporating new ideas across academic departments Purwanto et al. (8) and Garg et al. (9). Universities are responsible for ensuring that innovative teaching and learning approaches are included in their curricula to ensure that they can provide competent, relevant, and skilled instructors and students. This research aims to evaluate the impact of TL on teachers' IWB as it becomes more critical in maintaining educational quality and university success. Contribution of the study: The normalization technique is used to preprocess the data. To determine the connection between transformational leadership and the creative behavior of instructors, Analysis of Variance (ANOVA) and the Chi-square tests are used.

The following outline describes how the remaining parts of this research are laid out: The literature review is depicted in Section II, the material and methods are illustrated

in Section III, the results and discussion are described in Section IV, and the conclusion is described in Section V.

LITERATURE SURVEY

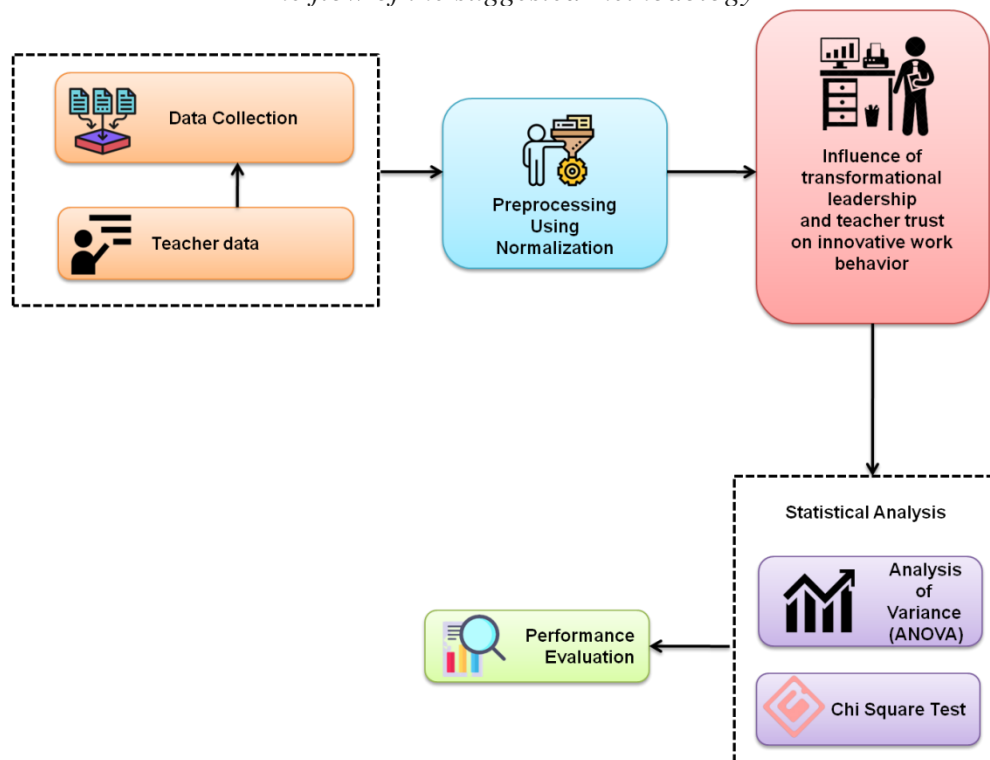
The link between the team, principal support, humor, and IWB among teachers will be examined (Johari et al. (10)). A survey of 354 Malaysian school teachers was used to gather data for this research. According to multiple linear regression analysis, teachers who reported high levels of cooperation and support from their principals were more likely to describe creative work habits. TL's influence on employees' IWB is the focus of (Afsar et al. (11) and Ahmed et al. (12)); the mediating impact of employee incentive to learn and the moderating role of job complexity and innovation atmosphere will be examined as well. Full-time employees and managers from 35 Pakistani enterprises completed a self-reported questionnaire. This research included 338 employee-supervisor dyads. Challenging the assumptions using "SEM(Structural equation model)". (Li et al. (13)) examined how TL enhances IWB via trust, empowerment, and engagement. 281 Chinese multinational workers provided data. The hypothesized hypothesis was tested using SPSS macro. Empowerment moderated TL and IWB. Organizational leaders may enhance workers' IWB by winning their trust and engaging them in creative activities. This important research analyses how TL might drive followers' creative behavior in the Chinese corporate setting. Psychological empowerment, TL, and IWB moderate the relationship between authentic leadership and IWB. The chosen case study was the focus of our mixed-methods investigation. A quantitative field study of 126 workers of a global technology corporation was carried out on a sample. Using paired sample t-tests and hierarchical regression, the hypotheses were tested. The qualitative study included

semi-structured interviews with four senior CEOs (Groselj et al. (14) and Shahabaz et al. (15)). (Afsar et al. (16) and Zihan et al. (17)) mention the impact of TL on an employee's inventive work style via job design. Knowledge-sharing behavior is a possible moderator in the link between TL and IWB. The data was gathered quantitatively and cross-sectionally. Three hundred twenty-five hotel employees and 126 managers took part in this study. They were asked to rank their supervisors' TL style and job-creation and information-sharing habits. Supervisors were asked to rate their subordinates' creative work practices. To clear up any misunderstandings about the results relating to the effect of TL on the IWB of employees. Three hundred forty-nine executives and 539 executives from two manufacturing companies in eastern India were surveyed (Pradhan et al. (18)). Regarding workplace innovation, TL hasn't been studied in-depth enough, which sparked the authors to do their research into this topic. Involving TL and its subordinates in the creative process seeks to learn more about IWB from TL and its employees' perspectives. SmartPLS 2, a second-generation integrated regression model for statistical measurement, was utilized to examine the observed linkages (Yi et al. (22) and Salihu et al. (23)).

2. MATERIALS AND METHODS

The influence of TL and teacher trust on improving teachers' IWB is discussed in detail in this section. Figure 2 depicts the flow of the research. Initially, teachers' data were collected and preprocessed using normalization. Then we analyze the influence of TL and teacher trust on improving teachers' innovative work behavior using statistical methods such as "ANOVA" and the Chi-square test.

Figure 2
The flow of the suggested methodology



A. Data collection procedure

Data gathering started in 2019 and continued for around seven days. To communicate with the participants, we started by contacting the departments of human resources at two Chinese universities. One of the universities is associated with the Ministry of Education of China and is regarded as a prominent university in China; the other is a provincial university and is regarded as relatively inferior in teaching and research standards. The two universities represent different levels of reputation in the academic community. We enlisted the help of human resources departments to publish the online survey on the "Wechat" social media network, which is quite popular in China. Official announcements and information exchange were the primary purposes of the friend groups, which were made up of faculty members from both institutions representing various academic areas. Research aims, voluntary participation, and confidentiality were clearly stated with the link to the online survey.

• Participants

A total of 275 educators took part in the online survey. They were not compensated in any way for their involvement. There were 103 male and 172 female instructors in the sample. The average age of the group was 38.57. For the most part, participants were involved in research in the humanities and social sciences. According to the reported academic degrees, there were 149 doctorate holders, 111 master's degree holders, and 15 bachelor's degree holders. Finally, 29 individuals identified themselves as professors, with 97 declaring themselves to be associate professors, 131 as lecturers, and 18 as assistant professors (Meng et al. (24)).

B. Preprocessing Using Normalization

A typical preprocessing step in most data mining systems is data normalization. Normalized values of an attribute in a dataset fall within a predetermined range, such as 0.0 to 1.0, specified in the dataset. Normalization smoothes and normalizes data before modeling. "Min-max normalization," "z-score normalization,"

and "decimal scaling normalization" are all methods for data normalizing. The z-score normalization approach is used here.

- **Z-score normalization**

For each input feature vector, Z-score normalization, also known as zero-mean

$$d' = \frac{(d-\mu)}{\sigma}$$

The attributed under discussion has a mean of μ and a standard deviation of σ . To begin training, the z-score normalization is done to every feature in the data set. Once training data has been collected, each feature's standard deviation and mean should be saved to serve as weights in the creation of an algorithm.

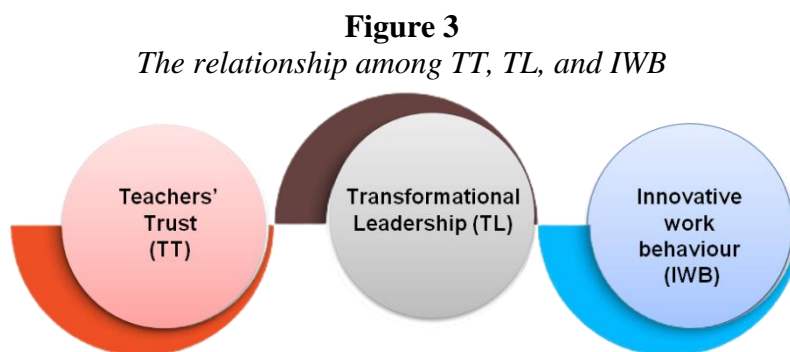
C. Influence of TL and TT on IWB

TL is a distinct leadership style that impacts teachers' morals and ethics to improve their

normalization, takes the mean and standard deviation of each feature across a training dataset and divides it by the number of elements in that dataset. The mean and standard deviation of each attribute is computed. As stated in the general formula, the transformation must be done.

(1)

performance. Transformational leaders are more trustworthy, pragmatic, and realistic, which helps them complete their objectives and encourages inventive work. Innovation is the process of developing and implementing new ideas to improve work performance—motivation, organizational support, and individual personality all impact innovation. TT, TL, and IWB are strongly interconnected and are depicted in Figure 3.



- **TL and TT**

The performance of teachers is strongly affected by transformational leaders because transformational leaders establish an organizational culture characterized by positive emotions and mutual trust. The concept of trust refers to social interaction between two parties and denotes the voluntary reliance of one party on the other party's conduct. Because each side is engaged in a reciprocal trade relationship with the other, such as that between a leader and follower (i.e. a principal and a teacher), each offers a unique resource to the transaction. In addition, it is anticipated that the leaders would give both concrete and intangible incentives to their instructors so that the teachers will exceed the objectives

set for them in their jobs. The four characteristics of TL are "idealized influence," "intellectual stimulation," "inspirational motivation," and "individual concern," all of which may be seen as intangible resources that transformational leaders can employ to build trust with their followers. We recommend leaders use these important traits as intangible resources while working with teachers to elicit favorable responses. Conversely, teachers may see a transformational leader's persistent attention to their particular performance goals as a valuable resource. This might lead to a sense of obligation and an increase in confidence in their leaders.

- **Trust in Leaders and Work Engagement**

When it comes to the notion of job engagement, participation and self-presence have become more critical. A culture of trust bolsters teachers' long-term loyalty to the institution. Institutional desirable discretionary behaviors such as collaboration, citizenship, commitment, and dedication are strongly correlated with high levels of trust. By showing more discretionary conduct in the workplace, the instructors display their faith in the leader. In other words, instructors are more inclined to share their discretionary behavior when they have more trust in their supervisors. When teachers believe in the leadership, they are less likely to engage in self-protective activities like lobbying and ingratiation because they can concentrate on the task and not worry about defending themselves. Teachers have more time and energy to devote to their current jobs when they trust their superiors. Their career will be more productive as a result.

- **Work Engagement and IWB**

The institution that succeeds will need to foster a culture of innovation in the workplace to help teachers deal with an ever-changing environment. An innovative work style is one in which instructors come up with and implement new ideas as they go about their duties to improve individual, group, or organizational performance. Work involvement is characterized by vigor, dedication, and absorption. When leaders (principals) in a college or university provide an efficient working environment to teachers, one in which the teachers can highly engage themselves in

$$p = AO_{between}/BO_{error} \quad (2)$$

$$\text{Where } AO_{between} = \frac{\sum_{u=1}^j f_u (\bar{k}_u - \bar{k})^2}{j-1} \text{ and } BO = \frac{\sum_{u=1}^j \sum_{d=1}^{f_u} (k_{us} - \bar{k}_u)^2}{f-j}$$

The Welch test statistic depicts that

$$a = \frac{\sum_{u=1}^h a_z [(t_v - t)^2 / (h-1)]}{1 + \frac{2(t-2)}{j^2-1} \sum_{u=1}^h [(1-a_z/v)^2 / (g_u-1)]} \quad (3)$$

Where $A_z = \frac{b}{\sigma_1^2}$, $q = \sum_{u=1}^h A_u$ and $L = \frac{1}{q} \sum_{u=1}^h a_u a_u$ is defined as:

$$q = \frac{h^2-1}{3 \sum_{u=1}^j [(1-t_z/v)^2 / (g_u-1)]} \quad (4)$$

The following is the interpretation of the Brown-Forsythe test statistic:

their work, the teachers are more likely to bring more innovative ideas to themselves, their team, and their institution. This is because the teachers are more likely to be highly engaged in their work.

- **TL and IWB**

The norms and values may be significantly altered via the use of TL, which in turn assists individual members of the institution in improving their performance. The intellectual thinking that helps instructors think beyond the box is stimulated by transformational leadership, which results in the teachers being more dedicated to successfully achieving the corporate goal. Teachers' working practices are also modeled by transformational leaders to assist students to improve their skills and abilities to address work-related issues. To create and improve teachers' IWB, transformational leadership must include all of these important qualities (e.g., problem-solving, motivating indicators, and performance assessment).

D. Statistical analysis

- **Analysis of variance (ANOVA)**

"ANOVA, or analysis of variance," is used to break down the reported variability into separate groups for subsequent examination. A one-way ANOVA is utilized if there are three or more sets of data to be correlated. An ANOVA F-statistic is the ratio of the null model's average sum squared to the whole model. It is computed using the least-squares method and all variances are normalized to be the same. There are several ways to express this:

$$q^* = \frac{\sum_{u=1}^h g_u (\bar{l}_u - \bar{l})^2}{\sum_{u=1}^h (1 - g_u/g) o_u^2} \tag{5}$$

As long as the center O* has l - 1 and o degrees of freedom, the number of degrees of freedom o is acceptable.

$$1/q = \sum_{u=1}^h m_u^2 / (g - 1), m_u = \frac{(1 - h_u/g) o_u^2}{\sum_{u=1}^j (1 - g_u/g) o_u^2} \tag{6}$$

The sample size is used to calculate the generalised t-value.

$$t = r \left(z_{h-1, h-1} \left(\frac{h-1}{h-1} \tilde{O}_s \left(\frac{h_1 o_1^2}{s_1 s_2, \dots, s_{h-1}}, \frac{h_2 o_2^2}{s_1 s_2, \dots, s_{h-1}}, \frac{h_3 o_3^2}{(1-s_2) s_3, \dots, s_{h-1}}, \dots, \frac{h_n o_n^2}{(1-s_{h-1})} \right) \right) \right) \tag{7}$$

Beta stochastic processes are used in the Z-distribution to anticipate outcomes.

$$S_e \sim \text{Beta} \left(\sum_{u=1}^e \frac{(h_u - 1)}{2}, \frac{h_{e+1} - 1}{2} \right), e = 1, 2, \dots, n - 1 \tag{8}$$

• Chi-Squared Test

The Chi-square test of independence is a useful statistic for evaluating research ideas. There aren't many statistics that can tell you not just how significant disparities are, but also which groups are responsible for them. Both are possible using the Chi-square statistic. It is calculated using Equation 9. There is no need for homoscedasticity in the data or even equality of variances across the many study teams. This approach may be used to

$$\chi^2 = \sum \frac{(m_j - g_j)^2}{g_j} \tag{9}$$

In this equation, χ^2 represents the Chi-square, m represents the actual number of participants, and g represents the anticipated number of participants.

analyze research that is either dichotomous or includes numerous groups. Over other statistical methods, the Chi-square method has numerous benefits over others, such as being able to be utilized in investigations when parametric assumptions cannot be satisfied, being simple to calculate, and providing an abundance in distribution data. This statistic provides more information than many other related statistics, allowing the researcher to draw more conclusions from it.

IWB of faculty members at private colleges and universities as a direct outcome of those two factors' combined positive impact. The findings of an ANOVA and a Chi-square test are shown in Table 1, and these tests are used to examine the effect of TF on the enhancement of IWB on the part of instructors working in private colleges and universities.

3. RESULTS AND DISCUSSION

This section provides an in-depth discussion on the impact that TL and TF (Teachers Faith) in teachers had on the

Table 1
ANOVA and Chi-square test results

Variable	Chi-square test		ANOVA		
	χ^2	p-value	F	P	SD
Innovative behavior	3.89	0.045	3.39	0.019	0.57
Inspirational motivation	3.76	0.044	3.06	0.27	0.66
Charisma	4.53	0.022	3.44	0.015	0.42
Intellectual stimulation	6.78	0.012	4.16	0.005*	0.57

Individualized consideration	3.98	0.036	3.26	0.024	0.55
Commitment	4.65	0.025	3.95	0.009	0.34

When a predicted event does not materialize, it is known as a prediction error. Figure 4 displays a comparison between the suggested method's and the existing method's prediction error. Correlation analysis (Hidayat et al. (19)),

Regression analysis (Mehdinezhad et al. (20)), and the T-test (Nazim et al. (21)) are all used in this research. When compared to other approaches, the suggested method has a smaller prediction error than the current methods.

Figure 4
Comparison of prediction error

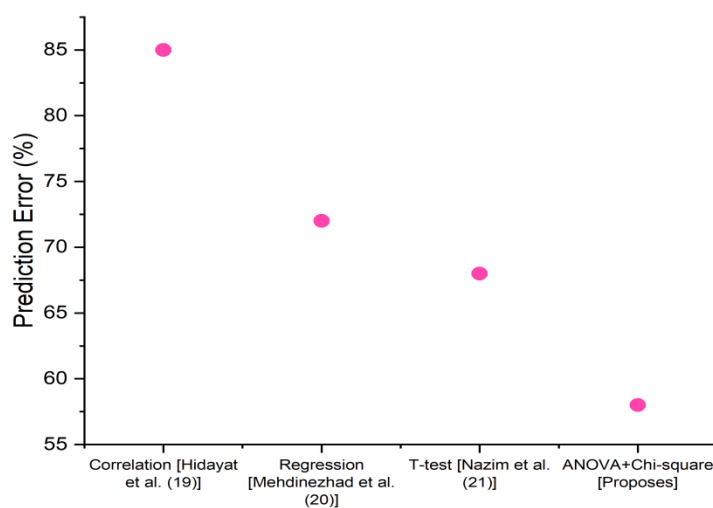


Figure 5 illustrates the degree of IWB. The amount of IWB shown by respondents was found to be modest, as seen in the figure. The degree of IWB is measured along three dimensions: idea generation, idea promotion, and idea realization. The idea realization dimension displays the greatest level. Nevertheless, each of the dimensions is at a level that is quite close to moderate.

Figure 6 shows the prevalence of teacher job satisfaction ratings in rural China and other countries/regions. Note. "Very satisfied," "Somewhat satisfied," and "Less than satisfied" are the three categories of teacher work satisfaction. According to the data, Moroccan teachers are quite happy in their jobs.

Figure 5
Level of innovative behavior

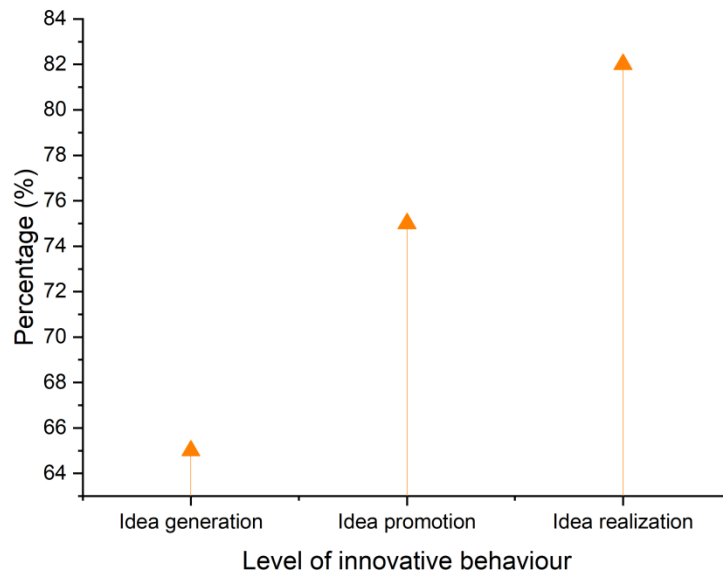


Figure 6
Comparison of prevalence of teacher job satisfaction levels

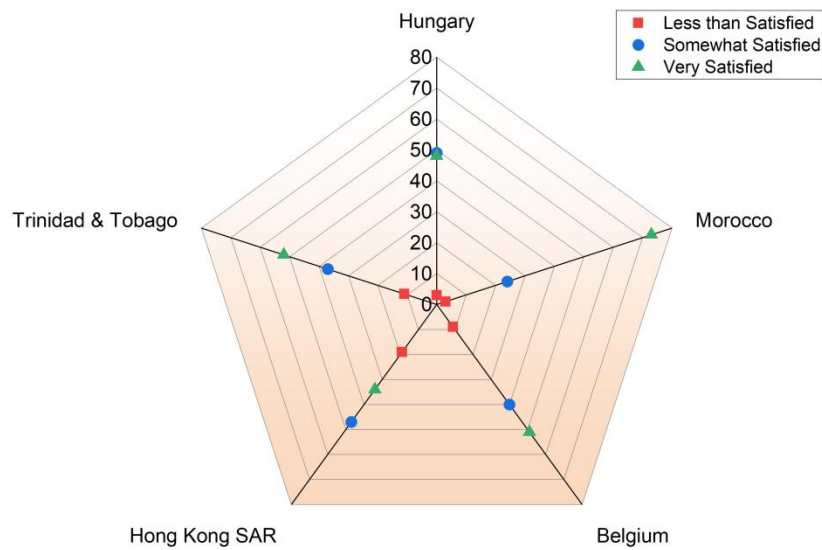
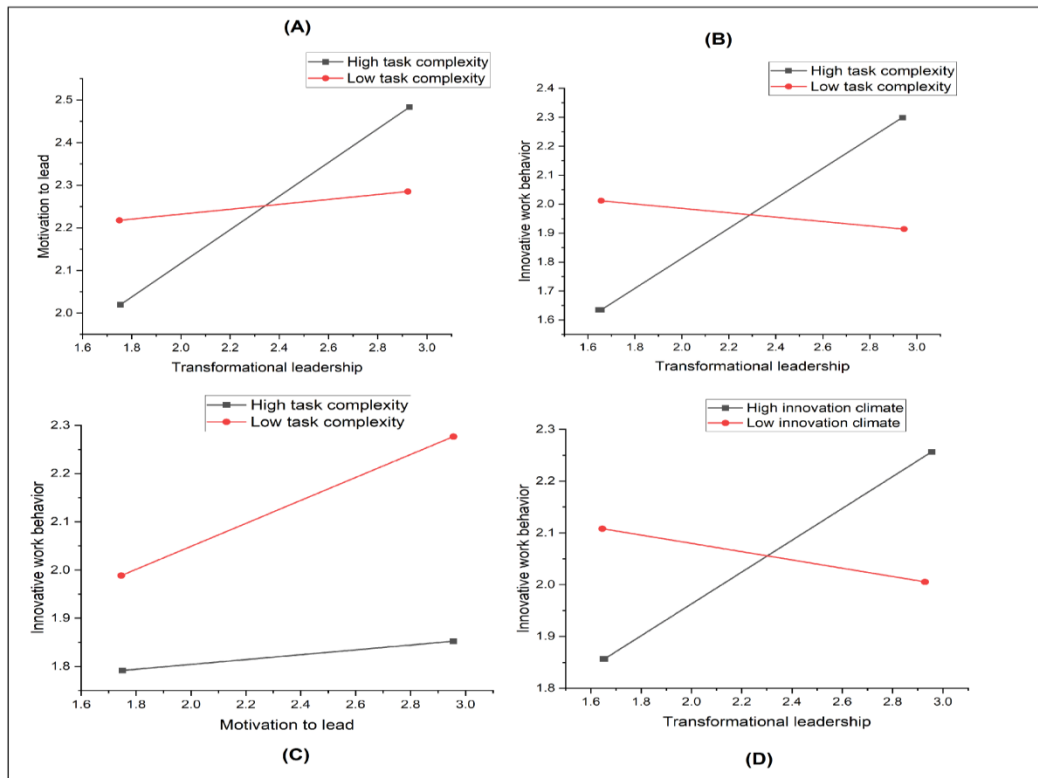


Figure 7
Moderating effects of task complexity and innovation climate



As shown in Figure 7(a), when the job complexity is high, the link between TL and the desire to learn is more pronounced. Task complexity was also employed as a moderator in the associations between TL and IWB. We looked at the impact of the control variables on IWB, but no significant effect was discovered. Figure 7b indicates that the association between TL and IWB is higher when the complexity of the job is high rather than low. Figure 7(c) demonstrates, in addition, that the favorable link between IWB and drive to learn is strengthened with larger levels of innovation atmosphere. A high or low degree of task complexity does not influence the link between learning motivation and IWB, as shown in Figure 7(d). Researchers have discovered a strong influence of the innovation atmosphere on the link between TL and IWB.

4. CONCLUSION

The findings of this research highlight the relevance of TL and TT in terms of fostering innovative work behavior in teachers. To begin, leaders (principals) at institutions need to work on developing their TL abilities to guarantee more innovative results for their institutions. The outcomes of this research suggest that instructors are motivated to innovate when they are exposed to TL behaviors, which in turn has a beneficial effect on the innovative behavior of teachers. Second, these findings provide credence to the idea that transformative leaders may strengthen their relationships with faculty members by establishing and sustaining high levels of trust. Teachers who can communicate their ideas, detect faults, exchange expertise, and address work-related issues with their supervisors are more likely to demonstrate innovative work behaviors. In the future, research should be undertaken with a larger

sample size in larger institutions across national and international contexts. This research employed an appropriate and accurate empirical model. Different factors that may have a major impact on a person's capacity to demonstrate creativity may be considered as possible mediators in the future study.

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