"Relationship between transformational leadership and knowledge management: The moderating effect of organizational culture"

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RELATIONSHIP BETWEEN TRANSFORMATIONAL LEADERSHIP AND KNOWLEDGE MANAGEMENT: THE MODERATING EFFECT OF ORGANIZATIONAL CULTURE

Abstract

In the context of Peruvian public universities, knowledge management is a key tool for academic advancement and social progress. This study investigates how transformational leadership impacts knowledge management, with a special focus on the moderating effect of organizational culture. Data were collected from 370 managerial staff members, both teaching and administrative, across various public universities in Peru, through online surveys. The methodology employed was the analysis of regression models with interaction terms. The results demonstrate that transformational leadership has a significant positive effect on knowledge management ($\beta = 0.7092$; $p < 0.01$), especially highlighting the influence of charisma ($\beta = 0.5315$; $p < 0.01$). Organizational culture proved to be a significant moderator in this relationship. This was reflected in the significance of the interaction terms between the dimensions of organizational culture and transformational leadership. Participation has a moderating effect ($\beta = 0.4507$; $p < 0.01$), consistency is a significant moderator ($\beta = 0.5356$; $p < 0.01$), adaptability has a moderating influence in the relationship between leadership and knowledge management ($\beta = 0.4890$; $p < 0.01$), as does mission ($\beta = 0.3846$; $p < 0.01$). This suggests that in contexts where organizational culture is robust and focused on learning and collaboration, transformational leadership effectively enhances knowledge management. These results provide a deeper understanding of the role of transformational leadership and organizational culture in knowledge management practices in the academic field, offering valuable insights for future research and administrative practices in the educational sector.

INTRODUCTION

In today's dynamic academic world, Peruvian public universities face significant challenges in knowledge management, a vital element for their academic success and contribution to socioeconomic development. Various factors, such as the constant evolution of information technologies, changing educational demands, and resource limitations, can hinder the effective implementation of knowledge management practices in these institutions (Martins et al., 2019; El Kharraz & Boussenna, 2021). These challenges underscore the importance of leadership, especially transformational leadership, recognized for its ability to inspire, motivate, and develop followers, and its significant impact on creating an environment that not only values knowledge but also promotes its effective management, thus fostering collaboration, innovation, and continuous learning. This dynamic is particularly relevant in universities, where leadership not only directs but also transforms the way knowledge is created, shared, and used (Darmawati et al., 2018).

Furthermore, the organizational culture in universities, with its varied values, norms, and beliefs, plays a fundamental role in the way knowledge is collaborated and managed. This cultural dimension not only directly influences knowledge management but may also moderate the relationship between transformational leadership and knowledge management. The study of this interaction is particularly relevant in public universities, where cultural diversity and the need for constant adaptation present both challenges and opportunities for effective knowledge management. Therefore, understanding and optimizing these relationships is crucial to improve the academic performance and innovative capacity of these institutions, which in turn can have a significant impact on the employability and preparation of graduates to face the challenges of the contemporary world.
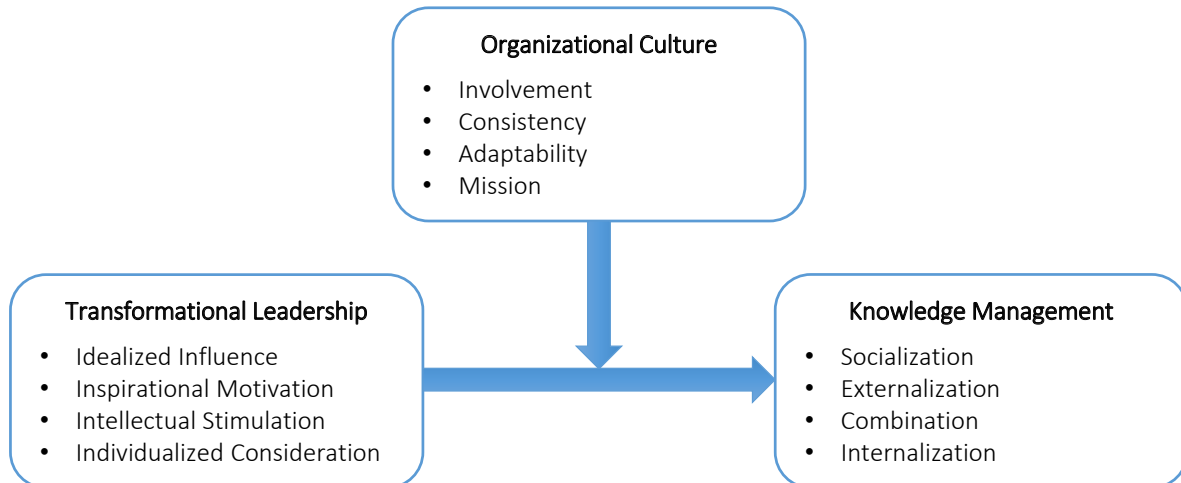
1. LITERATURE REVIEW AND HYPOTHESES

Transformational leadership, defined and expanded by Bass and Riggio (2005) as the process through which a person influences others to achieve common goals, represents a form of leadership that transcends traditional management practices, focusing on inspiring and motivating followers beyond their initial expectations (Sunaengsih et al., 2021). This leadership style is based on idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration (Bass & Riggio, 2005), elements that together create an environment conducive to innovation and organizational learning. These dimensions not only foster a positive and creative work environment but are also fundamental in driving effective knowledge management within organizations (Al Amiri et al., 2020; Rashwan & Ghaly, 2022).

Knowledge management, understood as the process by which an organization acquires, develops, shares, and utilizes knowledge to improve its performance and secure a competitive advantage (Becerra-Fernandez & Sabherwal, 2014; Bharadwaj et al., 2015), is deeply influenced by transformational leadership. This type of leadership acts as a catalyst, fostering an environment where creativity, collaboration, and idea exchange are the norm, driving teams to achieve ambitious goals and continuously seek new ways to improve and adapt. This process involves recognizing, gathering, organizing, storing, and disseminating crucial knowledge to achieve organizational goals (Tsou & Chen, 2022). The SECI model, proposed by Nonaka and Takeuchi (1995), emphasizes knowledge generation through the interaction and transformation of tacit and explicit knowledge. This model divides the knowledge creation process into four interconnected stages: socialization, externalization, combination, and internalization, each essential in the evolution and application of knowledge within an organization. In this context, transformational leaders, through their ability to influence and motivate, inspire their teams to actively participate in these stages, thus creating a culture of continuous learning and a greater willingness of employees to share their knowledge and experience (Amrullah et al., 2022; Asad et al., 2022; Mlinarević et al., 2022).

Transformational leadership enhances knowledge management (Xie, 2020). Transformational leaders inspire their teams to collaborate, innovate, and learn. These leaders foster innovation, creativity, and knowledge sharing (Jiang & Chen, 2018). They also assist team members in developing skills and competencies, which improves knowledge management (Firmansyah et al., 2022). Transformational leaders promote a culture of knowledge sharing, which aids the company in acquiring, storing, and using information (Ugwu & Okore, 2019).

When an organizational culture emphasizes the importance of knowledge, it positively affects knowledge management processes (Adeinat & Abdulfatah, 2019; Lam et al., 2021). The perception among organization members that their knowledge contributions are valued and recognized increases their willingness to engage in sharing and collaborating in knowledge management (Chidambaranathan & Swarooprani, 2017). This active participation is key to acquiring, generating, and effectively applying knowledge, significantly contributing to the effectiveness of knowledge management practices, as discussed by Adeinat and Abdulfatha (2019) and Bryant (2003). Additionally, an organizational culture that pro-

Organizational Culture

- Involvement
- Consistency
- Adaptability
- Mission

Transformational Leadership

- Idealized Influence
- Inspirational Motivation
- Intellectual Stimulation
- Individualized Consideration

Knowledge Management

- Socialization
- Externalization
- Combination
- Internalization

Figure 1. Conceptual model

motes open and transparent communication facilitates knowledge sharing among organization members (Wolf, 2022).

When employees feel safe to share their ideas and experiences, a conducive environment for knowledge management is created, promoting collaboration and collective knowledge building (Chidambaranathan & Swarooprani, 2017; Kumari & Saharan, 2021). Similarly, an organizational culture oriented towards continuous learning stimulates the constant acquisition and updating of knowledge and skills (Hafeez et al., 2021; Mutonyi et al., 2022). In this culture, leaders and organization members are willing to learn and adapt to changes, which is crucial for effective knowledge management (Saif & Yeop, 2020). On the other hand, a culture of collaboration and teamwork facilitates the creation and sharing of knowledge (Bass & Riggio, 2005; Lam et al., 2021). When employees work together on projects and share their perspectives and knowledge, knowledge management is enriched, fostering innovation and creating more effective solutions (Aichouche et al., 2022). Finally, a culture that allows for risk management and uncertainty fosters experimentation and innovation. This approach leads to the creation of new knowledge and the implementation of more effective knowledge management strategies, as employees are motivated to try new ideas and approaches without fear of potential failures (Tennakoon et al., 2022). In essence, an organizational culture that values knowledge, promotes open communication, encourages con-

tinuous learning, fosters collaboration, and allows for risk management and uncertainty creates a favorable environment for successful knowledge management in organizations (Carneiro & Streit, 2021; Mambo & Smuts, 2022).

Moderation is a concept that refers to how one variable influences the interaction between two other variables (Abbas et al., 2017; Alzuod, 2021; Chatchawanchanchanakij et al., 2020; El Kharraz & Boussenna, 2021). In the dynamics between transformational leadership, knowledge management, and organizational culture, the significant role of culture as a mediating and moderating element is highlighted (Bagga et al., 2022; Esfahani et al., 2021). An organization's culture has the power to modify both the intensity and the trajectory of how leadership interacts with knowledge management, indicating that the effects of leadership on knowledge management can vary depending on organizational culture (Udín, 2023).

The culture of an entity shapes how leadership is understood and implemented in relation to knowledge management. It can also determine how leaders implement and exercise leadership styles in this context (Chang & Lin, 2015; Espinoza & Chung, 2020). The specific way in which organizational culture impacts may depend on its unique values, norms, and beliefs (Mutonyi et al., 2022). Therefore, it is vital to understand how organizational culture modulates the interaction between transformational leadership, knowledge management, and organizational outcomes, as this

is key to the development of effective leadership and knowledge management strategies in public universities (Adeinat & Abdulfatah, 2019; Chung, 2017).

In the context of public universities in Peru, characterized by diverse and deeply rooted organizational cultures, understanding the impact of organizational culture on the dynamics between transformational leadership and knowledge management is critical. The purpose of this study is to analyze the moderating effect of organizational culture on this relationship, with the goal of identifying the key factors that determine the success of knowledge management in these institutions. The hypotheses were formulated as follows:

H1:   *Transformational leadership is significantly related to knowledge management practices.*

H2:   *Organizational culture moderates the relationship between transformational leadership and knowledge management practices.*

2. METHOD

This study was conducted in the context of public universities in Peru. A total of 50 public universities were identified in Peru. To select participants within each university, stratified sampling based on job type (teaching or administrative) was used to ensure balanced representation of both groups. A sample size of 370 individuals was determined, based on a 95% confidence level and a 5% margin of error.

Data collection was carried out using Google Forms via an email link, accompanied by a cover letter explaining the purpose of the study and ensuring confidentiality. Preliminary processing was conducted to ensure the accuracy and sufficiency of the responses. The survey was divided into two sections. The first section collected profile data such as gender, age, type of worker, and administrative position at the time of the survey. The second section included the values of all the variables under investigation.

Table 1 summarizes the demographic data of the sample and shows the distribution of respondents by characteristics. The gender distribution was

58.92% male and 41.08% female. The majority of participants (38.38%) were aged between 35 and 49 years, followed by 33.24% (50-64), 18.92% (65 and over), and 9.46% (under 35 years). 54.32% of respondents were administrative workers within the university, and 45.68% were teaching staff holding an administrative position. The table also shows the distribution of respondents by administrative area of work.

Table 1. Description of respondents

Characteristics	Frequencies	%
Gender		
Male	218	58.92
Female	152	41.08
Age		
≤ 34 years old	35	9.46
35-49 years old	142	38.38
50-64 years old	123	33.24
≥ 65 years old	70	18.92
Type		
Administrative	201	54.32
Teacher	169	45.68
Administrative Area		
Administration	110	29.73
Accounting	88	23.78
Academic department	105	28.38
Laboratory Management	39	10.54
Secretariat	28	7.57
Total	370	100.00

The research model includes three constructs. The first is transformational leadership, which is evaluated through four dimensions, including Individual Consideration (IC), Intellectual Stimulation (IS), Inspirational Motivation (IM), and Idealized Influence (II), which were measured using the Multifactor Leadership Questionnaire by Avolio et al. (1999). Using the Denison Organizational Culture Survey (DOCS) (Denison et al., 2006), four characteristics of organizational culture were identified: participation (P), consistency (C), adaptability (A), and mission (M). These four dimensions were taken into consideration for this study. The third construct, knowledge management, was evaluated through knowledge management processes (Becerra-Fernandez & Sabherwal, 2014). Each variable was measured using a 5-point Likert scale, from strongly disagree to strongly agree.

To quantitatively analyze the survey data, multivariate statistical techniques were applied, suita-

ble for handling the complexity of the data and for examining the relationships between independent and dependent variables. First, the reliability and validity of the measurement scale were assessed through Confirmatory Factor Analysis and Exploratory Factor Analysis. Subsequently, multiple regression analysis was used to test hypotheses related to the influence of leadership behaviors and organizational culture on knowledge management. Additionally, a moderating regression analysis was conducted to assess the impact of organizational culture on the relationship between leadership behaviors and knowledge management practices. All data analysis was performed using Python as the statistical software.

3. RESULTS

The findings from assessing the measurement instruments' reliability and convergent validity within the study were positive. Both the Transformational Leadership Measurement Tool and the Denison Organizational Culture Instrument exhibited strong internal consistency and suitable convergent validity. Similarly, the Knowledge Management Questionnaire indicated satisfactory internal consistency and convergent validity, despite some indicators showing lesser degrees of convergence. Cumulatively, these outcomes endorse the dependability and validity of the instruments applied in the research.

Construct validity, based on a confirmatory factor analysis, shows that the MLQ-5X questionnaire, used to assess transformational leadership, did not adequately agree with the initially proposed four-factor model, as evidenced by several fit indices ($\chi_{160}^2 = 218.851$, p = 0.0014). In particular, the RMSEA (0.115) and GFI (0.811) were outside the ideal ranges. Therefore, an exploratory factor analysis was performed, resulting in three distinct components: attributed charisma, intellectual stimulation, and individual consideration. This finding highlights the close relationship between idealized influence (both attributed and behavioral) and inspirational motivation, being grouped under the factor attributed charisma. These results are consistent with previous research that has questioned the four-dimension structure proposed for transformational leadership and identified similar groupings of behaviors (Darmawati et al., 2018). Consequently, the new dimensions found will be used for future statistical analysis in this study.

The organizational culture model, composed of the dimensions of involvement, consistency, adaptability, and mission ($\chi_{588}^2 = 569.211$, p = 0.7035), and the knowledge management model, which includes the dimensions of socialization, internalization, externalization, and combination ($\chi_{84}^2 = 91.713$, p = 0.2647), also showed a good fit to the data based on GFI, CFI, and TLI indices. These results support the validity and fit of the models used in the study.

The results (Table 4) reveal a positive association between transformational leadership and knowledge management, supported by positive correla-

Table 2. Reliability measures of measurement instruments

Measurement Instruments	Cronbach's alpha	Composite Reliability	Average Variance Extracted
Transformational Leadership (MLQ − 5X Short Form)	0.8706	0.8532	0.7326
Denison Organizational Culture	0.8895	0.8742	0.8512
Knowledge Management Questionnaire	0.8028	0.8001	0.7923

Table 3. Goodness-of-fit measures for the validation of measurement instruments

Measurement Instrument	χ^2	Goodness-of-Fit Index (GFI)	Root Mean Square Error of Approximation (RMSEA)	Standardized Root Mean Square Residual (SRMR)	Comparative Fit Index (CFI)	Tucker-Lewis Index (TLI)
Transformational Leadership	218.851**	0.811	0.115	0.045	0.857	0.841
Organizational Culture	569.211	0.942	0.053	0.062	0.971	0.968
Knowledge Management	91.713	0.963	0.018	0.048	0.973	0.982

Note: ** p < 0.01.

Table 4. Correlations between the dimensions of transformational leadership and knowledge management

Transformational Leadership	Dimensions			
	Internalization	Socialization	Externalization	Combination
Charisma	0.8803**	0.5814**	0.6327**	0.6969**
Intellectual Stimulation	0.5560**	0.4711**	0.1797**	0.3101**

Note: ** p < 0.01.

tions between the dimensions. The impact of charisma in the context of transformational leadership is quite significant, as evidenced by its strong positive correlation with the Internalization construct ($r = 0.8803$). Additionally, it is observed that both Intellectual Stimulation and Individual Consideration show moderate associations with several dimensions of knowledge management. In summary, the application of transformational leadership, particularly when accompanied by charismatic qualities, can have a substantial influence on the effectiveness of knowledge management processes within a university context.

The results shown in Table 5 support the first hypothesis posed, both at the level of the general construct and its specific dimensions. Model 1 shows that transformational leadership has a high explanatory power over knowledge management in general (66.65%), indicating that this type of leadership has a positive impact on knowledge management practices in public universities. In addition, it was determined that the three dimensions of transformational leadership significantly explain the behavior of knowledge management (Model 2).

In the analysis of the dimensions of knowledge management, it is found that for Internalization

(INT), Charisma (CA) stands out with a coefficient of 0.7605, being highly significant. This is followed by Individual Consideration (CI) and Intellectual Stimulation (EI), with an explained variability of 80.5%

In summary, it is evident that transformational leadership, particularly the dimension of Charisma, exerts a positive and significant influence on knowledge management and its respective dimensions. It is worth noting that the dimensions inherent to transformational leadership manifest variations in their impact, depending on the particular dimension of knowledge management being analyzed. Internalization emerges as the dimension most sensitively influenced by the attributes of transformational leadership, while Externalization is presented as the least permeated by these characteristics.

To test the second hypothesis, a hierarchical regression analysis was performed. Assessing the interaction within the regression model is advisable to determine if a specific variable has a moderating effect on another. To eliminate collinearity between variables, standardization was carried out. A significant residual variance in the dependent variable is a test of the mod-

Table 5. Multiple regression analysis explaining knowledge management from the dimensions of transformational leadership

Explanatory Variable	Knowledge Management		Dimensions of Knowledge Management			
	Model 1	Model 2	INT	SOC	EXT	COM
Constant	1.1011**	1.1324**	0.5319**	0.8586**	1.8312**	1.4824**
Transformational	0.7092**	–	–	–	–	–
CA	–	0.5315**	0.7605**	0.7330**	0.2714**	0.2960**
EI	–	0.0818**	0.1124**	0.1175	0.0286	0.0555
CI	–	0.0822**	0.1198**	−0.0077	0.0447	0.1325
R^2	0.6665	0.6822	0.8050	0.5832	0.0919	0.2369
F	775.41	276.23	531.15	180.06	13.02	39.95

Note: CA: Charisma; EI: Intellectual Stimulation; CI: Individualized Consideration; INT: Internalization; SOC: Socialization; EXT: Externalization; COM: Combination. ** p < 0.01.

Table 6. Multiple regression analysis explaining knowledge management from transformational leadership with the moderating effect of organizational culture

Explanatory Variable	Knowledge Management			
	Model 1	Model 2	Model 3	Model 4
Transformational Leadership	0.6595**	0.6372**	0.6577**	0.7468**
Moderating Effect				
TL x Participation	0.4507**	–	–	–
TL x Consistency	–	0.5356**	–	–
TL x Adaptability	–	–	0.4890**	–
TL x Mission	–	–	–	0.3846**
ΔR^2	0.050	0.070	0.050	0.020
ΔSSR	0.822	1.350	0.937	0.578

Note: TL: Transformational Leadership; *SSR*: Sum of Squares of the Regression. ** $p < 0.01$.

erating effect in interaction terms (Becerra-Fernandez & Sabherwal, 2014). For this reason, research on changes in R^2 and the F-statistic was conducted.

Table 6 presents the results of the models that include the interaction term between the dimensions of organizational culture and transformational leadership. Across all models, it is evident that transformational leadership has a positive and significant relationship with knowledge management, with coefficients fluctuating between 0.6372 and 0.7468. This underscores its central role in promoting effective knowledge management among faculty and administrative staff at public universities.

When analyzing the interaction terms in Model 1, it can be inferred that universities with more participatory organizational cultures might see a stronger influence of transformational leadership in their knowledge management processes, as indicated by the coefficient of 0.4507. This could reflect an open academic culture, where collaboration and idea sharing are more frequent and valued.

Model 2 suggests that an organizational culture characterized by consistency further enhances the impact of transformational leadership, with an interaction coefficient of 0.5356. Universities with consistent values and norms, aligned with transformational leadership practices, could cultivate an environment more conducive to knowledge management.

Model 3 indicates that adaptability has an interaction coefficient of 0.4890. Within the university setting, this could translate to universities that show flexibility and ability to adapt to changes, whether in teaching methodologies or research paradigms, benefiting from transformational leadership in terms of knowledge management.

Lastly, Model 4 highlights the relevance of mission with a coefficient of 0.3846. This suggests that universities with a clear mission, which is shared and understood by faculty and administrative staff, can enhance the impact of transformational leadership on knowledge management.

In summary, within the context of public universities in Peru, transformational leadership is fundamental for knowledge management. However, its effectiveness can be enhanced or modulated depending on the specific dimensions of the institution's organizational culture, reinforcing the importance of considering the cultural environment when implementing leadership strategies in the academic field.

To better understand the interaction term effect of the organizational culture dimensions, the following figures are presented. For each dimension, values below one standard deviation (Low Level) and above one standard deviation (High Level) were chosen. The regression lines were generated by substituting, in the moderating regression equation, the points generated by the standard deviations. From the two significant regression equations, the graphs of Figure 2 were obtained.
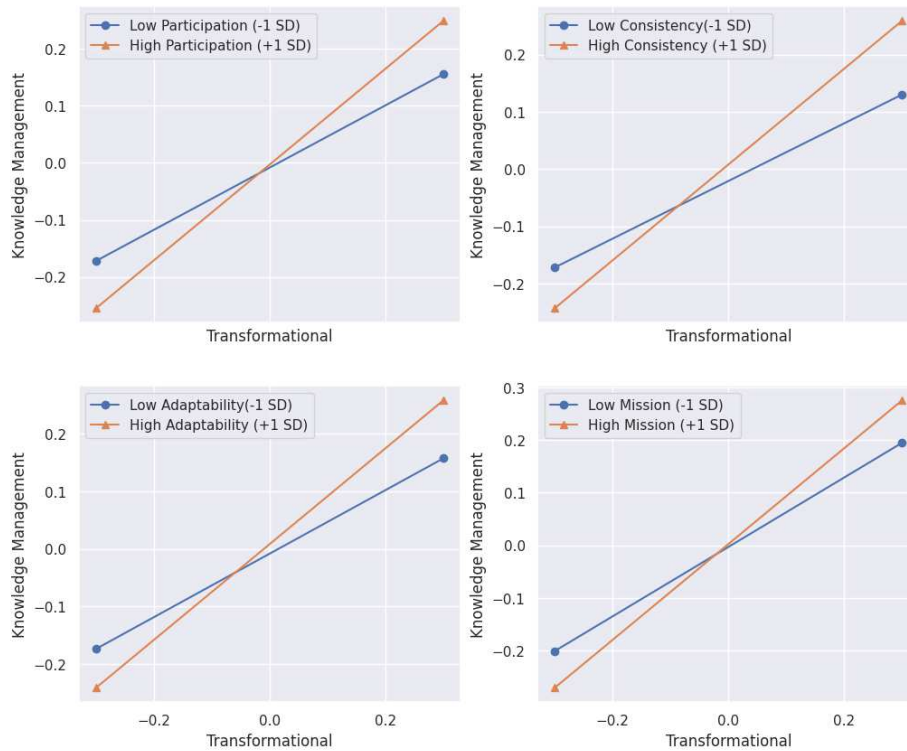
Figure 2. Moderating effect of organizational culture

4. DISCUSSION

The results of this study support the hypothesis that there is a significant relationship between transformational leadership and knowledge management practices in public universities in Peru (*H1*). Transformational leadership, especially charismatic leadership, was strongly correlated with knowledge management, explaining much of its variance. This is consistent with the findings of Darmawati et al. (2018), who also identified a substantial link between these two variables.

Furthermore, it is observed that individualized consideration and intellectual stimulation are significant predictors of knowledge management, particularly in relation to the internalization of knowledge. However, it is noteworthy that leadership behaviors do not predict the dimensions of socialization, externalization, or combination in knowledge management. This may be attributed to the study context, where the team emphasis is more on harmony and autonomy than on active knowledge sharing (Sunaengsih et al., 2021).

In conclusion, transformational charismatic leadership promotes knowledge management in uni-

versities in Peru. Knowledge management requires individual attention and intellectual stimulation. However, more research is needed to understand how these leadership behaviors affect the different dimensions of knowledge management and how they can be optimized to promote active and effective knowledge sharing in organizations (Ugwu & Okore, 2019).

In addition, the results of this study support the *H2*. This finding is particularly relevant in the context of Peruvian universities, where there are diverse and deeply rooted organizational cultures. While our result does not directly contrast with the study conducted by Nguyen (2009) in Australian SMEs, it is possible that differences in the type of organization (public universities vs. SMEs) may explain possible variations in the results. In this sense, the organizational culture in a public university could have a different impact on the relationship between transformational leadership and knowledge management compared to an SME. However, the finding does support the hypothesis proposed by Chung (2017), who suggested that the effectiveness of transformational leadership can vary among different organizational cultures.

Furthermore, it is possible that employees' perceptions of transformational leadership are influenced by the prevailing organizational culture in their respective universities. This, in turn, may affect the overall performance of the organization in terms of knowledge management.

CONCLUSIONS

The primary objective of this study was to examine the impact of transformational leadership on knowledge management in Peruvian public universities, with a particular focus on the moderating effect of organizational culture. The results obtained allow one to draw several important conclusions. Firstly, transformational leadership, especially its charismatic type, has a significant effect on knowledge management within the university environment. This indicates that effective transformational leadership is fundamental for improving the management and distribution of knowledge in Peruvian public universities.

Another relevant finding is that organizational culture, through its main components, plays a moderating role in the relationship between transformational leadership and knowledge management. This means that a well-developed and aligned organizational culture significantly enhances knowledge management. Therefore, to improve knowledge management and maximize the benefits of transformational leadership, it is recommended to adopt a comprehensive approach that considers organizational culture and its interaction with transformational leadership.

The results suggest that, to enhance their overall performance, Peruvian public universities should seriously consider integrating effective transformational leadership along with the development of an organizational culture that is coherent and complementary to this leadership style. This involves not only adopting inspirational and motivational leadership behaviors by university leaders but also creating policies and practices that promote a culture of openness, collaboration, and continuous learning. Additionally, fostering an organizational culture that supports knowledge management should be viewed as a key strategy for academic development. This includes promoting an environment where knowledge is freely shared, new ideas are valued, and innovation is encouraged. Adopting these approaches will not only improve knowledge management but will also strengthen the universities' ability to adapt to the changes and challenges of the contemporary educational environment. Finally, it is recommended that future research delve deeper into these interactions and their impacts in different university contexts.

AUTHOR CONTRIBUTIONS

Conceptualization: Victor Chung, Jenny Espinoza.
Data curation: Victor Chung.
Investigation: Victor Chung, Jenny Espinoza.
Methodology: Victor Chung.
Project administration: Jenny Espinoza.
Resources: Jenny Espinoza.
Software: Victor Chung.
Supervision: Jenny Espinoza.
Validation: Victor Chung, Jenny Espinoza.
Visualization: Victor Chung.
Writing – original draft: Victor Chung, Jenny Espinoza.
Writing – review & editing: Victor Chung, Jenny Espinoza.

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